DATA 301 Introduction to Data Analytics Spreadsheets: Microsoft Excel

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## Why Spreadsheets and Microsoft Excel?

*Spreadsheets* are the most common, general-purpose software for data analysis and reporting.

Microsoft Excel is the most popular spreadsheet program with hundreds of millions of installations.

• The spreadsheet concepts translate to other products.

Excel and spreadsheets are not always the best tool for data analysis, but they are great for quick analysis, reporting, and sharing.

## **Spreadsheet Overview**

A *spreadsheet* organizes information into a two-dimensional array of cells (a *table*).

A *cell* has two components:

- an address specified given a column letter and row number
- a location that can store a number, text, or formula

The power of a spreadsheet is that we can write simple formulas (commands) to perform calculations and immediately see the results of those calculations.

Spreadsheets are very common in business and reporting applications.

## **Spreadsheet Addressing**



rows

## **Spreadsheet Addressing**

The rows in a spreadsheet are numbered starting from 1.

The columns are represented by letters.

• A is column 1, B is column 2, ..., Z is column 26, AA is column 27, ...

A cell is identified by putting the column letter first then the row number.

• e.g. B3 is the 2nd column and the 3rd row.

Question: What column number is AD? How about BAD?

## **Spreadsheet Data Entry**

An entry is added to a cell by clicking on it and typing in the data.

• The data may be a number, text, date, etc. Type and *format* are auto-detected.

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| 2           | Food     | Chocolate        | Jan                      | 20             | \$ 2.00    | \$ 1.00                     | \$ 40.00         |                                         | fo                                                                       | rn        | nat                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 3           | Clothing | Jacket           | Jan                      | 15             | \$ 50.00   | \$ 35.00                    | \$ 750.00        |                                         | 10                                                                       |           | lai                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 4           | Toys     | Ball             | Jan                      | 55             | \$ 1.00    | \$ 0.50                     | \$ 55.00         |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 5           | Food     | Chocolate        | Feb                      | 80             | \$ 2.50    | \$ 1.00                     | \$ 200.00        |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 6           | Clothing | Jacket           | Feb                      | 10             | \$ 50.00   | \$ 35.00                    | \$ 500.00        |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 7           | Toys     | Ball             | Feb                      | 65             | \$ 1.00    | \$ 0.60                     | \$ 65.00         |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 8           | Food     | Chocolate        | Mar                      | 30             | \$ 2.00    | \$ 1.00                     | \$ 60.00         |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 9           | Toys     | Ball             | Mar                      | 70             | \$ 1.00    | \$ 0.40                     | \$ 70.00         |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 10          | Toys     | Bat              | Mar                      | 10             | \$ 75.00   | \$ 50.00                    | \$ 750.00        |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 11          | Clothing | Jacket           | Mar                      | 8              | \$ 50.00   | \$ 30.00                    | \$ 400.00        |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
| 12          | Food     | Apples           | Mar                      | 100            | \$ 3.00    | \$ 2.00                     | \$ 300.00        |                                         |                                                                          |           |                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |    |
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#### **Spreadsheet Formatting**

#### Formatting: bold, italics, underline, fonts, colors

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| 1           | Category | Product          | Month           | <u>Volume</u>           | Price      | Cost                           | Revenue                                      |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
| 2           | Food     | Chocolate        | Jan             | 20                      | \$ 2.00    | \$ 1.00                        | \$ 40.00                                     |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
| 3           | Clothing | Jacket           | Jan             | 15                      | \$ 50.00   | \$ 35.00                       | \$ 750.00                                    |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
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| 8           | Food     | Chocolate        | Mar             | 30                      | \$ 2.00    | \$ 1.00                        | \$ 60.00                                     |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
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| 12          | Food     | Apples           | Mar             | 100                     | \$ 3.00    | \$ 2.00                        | \$ 300.00                                    |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
| 13          |          |                  |                 |                         | Tot        | al:                            | \$3,190.00                                   |                                                                         |                                                            |          |                                           |                                                                                                                                     |         |   |
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## **Spreadsheet Selecting Cells**

Multiple ways of selecting cells:

1) With the mouse, (left) click and drag mouse to select a rectangle region of cells.

2) With keyboard, hold SHIFT key and use arrow keys to select a rectangle region of cells.

3) With mouse and keyboard, while holding CTRL key, (left) click on individual cells to select non-contiguous cells.

4) Click on a row number to select a whole row.

5) Click on a column header to select a whole column.

#### **Range Selecting Cells Example**

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| 1    | Category              | Product                 | Month           | <u>Volume</u>  | <u>Price</u> | Cost          | <u>Revenue</u>               |                                                                                     |                                                  |                  |                                    |                                                                                                   |        |    |
| 2    | Food                  | Chocolate               | Jan             | 20             | \$ 2.00      | \$ 1.00       | \$ 40.00                     |                                                                                     |                                                  |                  |                                    |                                                                                                   |        |    |
| 3    | Clothing              | Jacket                  | Jan             | 15             | \$ 50.00     | \$ 35.00      | \$ 750.00                    |                                                                                     |                                                  |                  |                                    |                                                                                                   |        |    |
| 4    | Toys                  | Ball                    | Jan             | 55             | \$ 1.00      | \$ 0.50       | \$ 55.00                     |                                                                                     |                                                  |                  |                                    |                                                                                                   |        |    |
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| 1/   | •                     | Quarter                 | Sales           | QuarterSa      | alesFormat   | Quarte        | erPivot .                    | (+)                                                                                 | : •                                              |                  |                                    |                                                                                                   | ►      |    |
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## Selecting Individual Cells Example

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| 1    | Category            | Product    | Month     | Volume           | Price       | Cost       | Revenue                                    |                                                                |                                                   |                |                          |                            |        |     |
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| 3    | Clothing            | Jacket     | Jan       | 15               | \$ 50.00    | \$ 35.00   | \$ 750.00                                  |                                                                |                                                   |                |                          |                            |        |     |
| 4    | Toys                | Ball       | Jan       | 55               | \$ 1.00     | \$ 0.50    | \$ 55.00                                   |                                                                |                                                   |                |                          |                            |        |     |
| 5    | Food                | Chocolate  | Feb       | 80               | \$ 2.50     | \$ 1.00    | \$ 200.00                                  |                                                                |                                                   |                |                          |                            |        |     |
| 6    | Clothing            | Jacket     | Feb       | 10               | \$ 50.00    | \$ 35.00   | \$ 500.00                                  |                                                                |                                                   |                |                          |                            |        |     |
| 7    | Toys                | Ball       | Feb       | 65               | \$ 1.00     | \$ 0.60    | \$ 65.00                                   |                                                                |                                                   |                |                          |                            |        |     |
| 8    | Food                | Chocolate  | Mar       | 30               | \$ 2.00     | \$ 1.00    | \$ 60.00                                   |                                                                |                                                   |                |                          |                            |        | ΗU  |
| 9    | Toys                | Ball       | Mar       | 70               | \$ 1.00     | \$ 0.40    | \$ 70.00                                   |                                                                |                                                   |                |                          |                            |        | -   |
| 10   | Toys                | Bat        | Mar       | 10               | \$ 75.00    | \$ 50.00   | \$ 750.00                                  |                                                                |                                                   |                |                          |                            |        | -   |
| 11   | Clothing            | Jacket     | Mar       | 8                | \$ 50.00    | \$ 30.00   | \$ 400.00                                  |                                                                |                                                   |                |                          |                            |        | -   |
| 12   | Food                | Apples     | Mar       | 100              | Ş 3.00      | \$ 2.00    | Ş 300.00                                   |                                                                |                                                   |                |                          |                            |        |     |
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# Manipulating Cells

Once you have selected one or more cells, there are several common actions you can perform:

#### 1) DELETE

- delete the contents of all cells by pressing delete key
- delete the contents and the cell locations (then shift remaining) by selecting Edit menu, Delete... or Delete... from pop-up menu (brought up by right click).

#### 2) Cut, Copy, Paste

- cut copies selected cells to clipboard and removes from document
- copy copies selected cells to clipboard
- paste copies cells in clipboard to sheet starting at currently selected cell

3) Add selected cells to a formula (requires that you were previously constructing a formula before selecting the cells).

## **Manipulating Cells - Filling**

*Filling* combines copy and paste.

There is a small box or tab beyond the cell's lower right corner (fill handle). Grab it with the cursor and pull to other cells.

#### Cut, Copy, Paste



| 1   | ي - رم   | ) <b>-</b>       |                      |                     |            |            | sales.xlsx - Exc                       | cel                  |                                                            |          |           | - 14                                                                                                                                                 | . 🗆 :    | × |
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| Pa  | ste      | Calibri<br>B I U | • 1                  | 11 - A <sup>*</sup> |            |            | Number<br>\$ ▼ %<br>€_0 .00<br>.00 →.0 | ▼ ■ Co 2 ■ Fo 5 ■ Co | nditional Form<br>rmat as Table *<br>II Styles *<br>Styles | atting ∗ | Insert •  | $\sum_{\mathbf{v}} \cdot \frac{\mathbf{A}}{\mathbf{Z}} \mathbf{v} \cdot \mathbf{v}$ $\bigcup_{\mathbf{v}} \cdot \mathbf{v} \cdot \mathbf{v}$ Editing |          | ~ |
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| 1   | Category | Product          | Month                | Volume              | Price      | Cost       | Revenue                                |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 2   | Food     | Chocolate        | Jan                  | 20                  | \$ 2.00    | \$ 1.00    | \$ 40.00                               |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 3   | Clothing | Jacket           | Jan                  | 15                  | \$ 50.00   | \$ 35.00   | \$ 750.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 4   | Toys     | Ball             | Jan                  | 55                  | \$ 1.00    | \$ 0.50    | \$ 55.00                               |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 5   | Food     | Chocolate        | Feb                  | 80                  | \$ 2.50    | \$ 1.00    | \$ 200.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 6   | Clothing | Jacket           | Feb                  | 10                  | \$ 50.00   | \$ 35.00   | \$ 500.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 7   | Toys     | Ball             | Feb                  | 65                  | \$ 1.00    | \$ 0.60    | \$ 65.00                               |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 8   | Food     | Chocolate        | Mar                  | 30                  | \$ 2.00    | \$ 1.00    | \$ 60.00                               |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 9   | Toys     | Ball             | Mar                  | 70                  | \$ 1.00    | \$ 0.40    | \$ 70.00                               |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 10  | Toys     | Bat              | Mar                  | 10                  | \$ 75.00   | \$ 50.00   | \$ 750.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 11  | Clothing | Jacket           | Mar                  | 8                   | \$ 50.00   | \$ 30.00   | \$ 400.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
| 12  | Food     | Apples           | Mar                  | 100                 | \$ 3.00    | \$ 2.00    | \$ 300.00                              |                      |                                                            |          |           |                                                                                                                                                      |          |   |
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# **Hiding Columns and Rows**

Right-clicking on the column or row header and selecting **Hide**.

• The column/row still exists but will not be displayed or printed unless unhidden.

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| 1    | Category              | Product       | Month        | Volume           | Price                 | <u>Cost</u>   | ፠        | Cut                                         |        |                                                     |                  |                                    |                                                                                      |        |   |
| 2    | Food                  | Chocolate     | Jan          | 20               | \$ 2.00               | \$ 1.0        | Ē        | <u>C</u> opy                                |        |                                                     |                  |                                    |                                                                                      |        |   |
| 3    | Clothing              | Jacket        | Jan          | 15               | \$ 50.00              | \$ 35.0       | Ĉ        | Paste Option                                | s:     |                                                     |                  |                                    |                                                                                      |        |   |
| 4    | Toys                  | Ball          | Jan          | 55               | \$ 1.00               | \$ 0.5        |          | <b>R</b>                                    |        |                                                     |                  |                                    |                                                                                      |        |   |
| 5    | Food                  | Chocolate     | Feb          | 80               | \$ 2.50               | \$ 1.0        |          |                                             |        |                                                     |                  |                                    |                                                                                      |        |   |
| 6    | Clothing              | Jacket        | Feb          | 10               | \$ 50.00              | \$ 35.0       |          | Paste <u>Special</u> .                      | •      |                                                     |                  |                                    |                                                                                      |        |   |
| 7    | Toys                  | Ball          | Feb          | 65               | \$ 1.00               | \$ 0.¢        |          | Insert                                      |        |                                                     |                  |                                    |                                                                                      |        |   |
| 8    | Food                  | Chocolate     | Mar          | 30               | \$ 2.00               | \$ 1.0        |          | <u>D</u> elete                              |        |                                                     |                  |                                    |                                                                                      |        |   |
| 9    | Toys                  | Ball          | Mar          | /0               | \$ 1.00               | \$ 0.4        |          | Clear Content                               | s      |                                                     |                  |                                    |                                                                                      |        |   |
| 10   | Clathing              | Bat           | Mar          | 10               | \$ 75.00              | \$ 50.0       |          | Format Cells                                |        |                                                     |                  |                                    |                                                                                      |        |   |
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#### **Selecting Cells Question**

**Question:** Which method allows you to select non-contiguous cells in a spreadsheet?

A) hold SHIFT key and use arrow keys

B) With the mouse left click on a cell and drag mouse

C) hold CTRL key and use arrow keys

**D**) hold CTRL key and left click on cells

## **Entering Formulas**

A *formula* is any expression that begins with an equal sign ("=").

• The equal sign means that a calculation must be done to compute the cell value.

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| 1    | Category | Product          | Month          | Volume         | <b>Price</b> | Cost                       | Revenue                                    |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 2    | Food     | Chocolate        | Jan            | 20             | \$ 2.00      | \$ 1.00                    | \$ 40.00                                   |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 3    | Clothing | Jacket           | Jan            | 15             | \$ 50.00     | \$ 35.00                   | \$ 750.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 4    | Toys     | Ball             | Jan            | 55             | \$ 1.00      | \$ 0.50                    | \$ 55.00                                   |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 5    | Food     | Chocolate        | Feb            | 80             | \$ 2.50      | \$ 1.00                    | \$ 200.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 6    | Clothing | Jacket           | Feb            | 10             | \$ 50.00     | \$ 35.00                   | \$ 500.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 7    | Toys     | Ball             | Feb            | 65             | \$ 1.00      | \$ 0.60                    | \$ 65.00                                   |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 8    | Food     | Chocolate        | Mar            | 30             | \$ 2.00      | \$ 1.00                    | \$ 60.00                                   |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 9    | Toys     | Ball             | Mar            | 70             | \$ 1.00      | \$ 0.40                    | \$ 70.00                                   |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 10   | Toys     | Bat              | Mar            | 10             | \$ 75.00     | \$ 50.00                   | \$ 750.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 11   | Clothing | Jacket           | Mar            | 8              | \$ 50.00     | \$ 30.00                   | \$ 400.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
| 12   | Food     | Apples           | Mar            | 100            | \$ 3.00      | \$ 2.00                    | \$ 300.00                                  |                                                                    |                                                           |                |                                    |                                                                                                                                      |         |    |
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#### Formula Expressions

A *formula* expression can consist of literals (numbers, text strings), operators, functions, and cell references.

Simple mathematical expressions:

- = 1 + 5
- $\bullet = 1.5 * 3.14 + 42$

#### Common functions:

- = ROUND(PI(),2)
  - // Result is 3.14
- = CONCATENATE("Hello", " World") // Hello World
- Other common functions for trigonometry, dates, and financial.

#### Formula Expressions

The power of formulas comes from using cell references (similar to variable names in programming).

#### Cell reference examples:

- = A1 + A2
- = B1 + A3 A4

#### **Formulas Question**

**Question:** A cell contains the following: =2+4\*3 What is the value of the cell?

<mark>A)</mark> 14

**B)** 18

**C)** =2+4\*3

## **Using Excel Functions**

Excel has a large number of built-in functions to use.

#### A *function* takes arguments as input and produces an output.

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| 1       | String Functi | ions           |      | Date Functions       |                 |          | Math Functions   |            |        |   |
| 2       | Test messag   | e!             |      | Friday, July 01, 201 | 6               |          | 25               | 2.2        | 2      |   |
| 3       |               |                |      |                      |                 |          |                  |            |        |   |
| 4       | LEN(A2)       | 13             |      | YEAR(D2)             | 2016            | 5        | ROUND(H2,0)      | 2          | 2      |   |
| 5       | UPPER(A2)     | TEST MESSAGE!  |      | MONTH(D2)            | 7               | 7        | SQRT(G2)         | 5          | 5      |   |
| 6       | LOWER(A2)     | test message!  |      | DAY(D2)              | 1               | L        | POWER(G2, 2)     | २(G2, 2)   |        |   |
| 7       |               |                |      | WEEKDAY(D2)          | 6               | 5        |                  |            | Ţ      |   |
| 8       |               |                |      | NOW()                | 12/3/2015 12:37 | 7        |                  |            |        |   |
| 9       |               |                |      |                      |                 |          |                  |            |        |   |
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#### Concatenation

**String concatenation** is when two or more strings are combined by appending them in order. Function in Excel is CONCATENATE () or &.

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| 2    |                |      | _      |         | one       |              |                  |            |             |            |           |        |    | 2    |              |               | one                   | _                |            |             |             |         |         |    |
| 3    | Hello W        | orld | _      |         | string.   |              |                  |            |             |            |           |        |    | 3    | Hello World  |               | string.               |                  |            |             |             |         |         |    |
| 4    |                |      |        |         |           |              |                  |            |             |            |           |        |    | 4    |              |               |                       | _                |            |             |             |         |         | -  |
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#### **LOOKUP** Function

#### The LOOKUP function searches for a value in a column.

• VLOOKUP searches a column in a table ; HLOOKUP searches a row in a table.

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| A       B       C       LOOKUP(F2, A2:A6, C2:C6)         A       B       C       LOOKUP(lookup_value, lookup_vector, [result_vector])       H       I       J       K       L       M       N       O         1       Product Id       Product Name       Product Id       2       I       Apple       \$ 3.99       Product Id       2       I       I       J       K       L       M       N       O         2       1       Apple       \$ 3.99       Product Id       2       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I       I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Past                            | ooard r      | в                                       | I <u>U</u> -                                                   | <u>× 11</u> × A <sup>*</sup> A                                            |                                 | = ≫ -<br>≡ ≪≣ ⇒≣<br>lignment                                           |        | Accounting<br>\$ - %<br>Num               | 9 ←.0 .00<br>9 ←.0 →.0<br>ber r | Conditiona<br>Formatting | Format as Cell<br>Table + Styles +<br>Styles | Insert  Insert  Cells | ∑ - AZY<br>↓ Sort a<br>e - Filter<br>Editi | & Find &<br>Select + | ~       | • |
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#### **INDEX Function**

#### INDEX() returns the value in the array of cells at the given index.

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| 1 Pro            | oduct Id   | Product Na                | me Product Price          | INDEX(refere | nce, row_num, [c     | olumn_num],      | [area_num])                    |                           |                                        |                                               |                                            |                    |         |
| 2                | 1          | Apple                     | \$ 3.99                   | ) [          | Product Id           | 2                | 2                              |                           |                                        |                                               |                                            |                    |         |
| 3                | 2          | Banana                    | \$ 2.99                   | )            | Price (LOOKUP)       | \$ 2.99          |                                |                           |                                        |                                               |                                            |                    |         |
| 4                | 3          | Lettuce                   | \$ 1.99                   | )            | Price (VLOOKU        | P) \$ 2.99       |                                |                           |                                        |                                               |                                            |                    |         |
| 5                | 4          | Squash                    | \$ 6.99                   | )            |                      |                  |                                |                           |                                        |                                               |                                            |                    |         |
| 6                | 5          | Pumpkin                   | \$ 5.99                   | )            | Product (INDEX       | ): B6,F2+1)      |                                |                           |                                        |                                               |                                            |                    |         |
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#### **Formulas Question**

**Question:** A cell contains the following: 'ABC'+'DEF'. What is the value of the cell?

#### A) error

B) ABCDEF

C) 'ABC'+'DEF'

#### **Formulas Question**

**Question:** How many of the following statements are **TRUE**?

- 1) CONCATENATE function can take 3 arguments.
- 2) There is an Excel function that has 0 arguments.
- **3)** = INDEX ({1,3,5},2) returns 5.
- 4) =LOOKUP(5, {1,3,5}, {"a", "b", "c"}) returns "c".

A) 0 B) 1 C) 2 D) 3 E) 4

## **Try it: Entering Formulas**

#### **Question:** Add a column for expenses and profit as below:



# Advanced Spreadsheet Addressing

The dollar sign "\$" is a symbol that indicates an *absolute address*.

• By default, addresses are "relative" in the sense that if they are in a formula that is copied to another cell, they will be changed relative to where they were copied from their origin.

Example:

- Cell A1 has the formula =A2+B1
- Copy contents of cell A1 to cell C4.
- Formula changes to =C5+D4 because moved down three rows and over two columns.
- If cell A1 had the formula =\$A\$2+\$B\$1, then the same formula would be in cell C4.
- Question: What if formula was =\$A2+B\$1?

#### **Formulas and References Question**

**Question:** Cell A1 contains the following: =\$B2+D\$4. What is the formula if the cell is copied to cell D3?

A) error

**B)** =\$B2+D\$4

**C)** =\$B4+F\$4

**D**) =\$B4+G\$4

# **Aggregate Functions**

An *aggregate function* computes a summary function over a range of cells. The values can either be data values or cell locations.

#### Common functions are:

- MIN(<value list>)
- MAX(<value list>)
- SUM(<value list>)
- AVERAGE (<value list>) returns average of values in list
- COUNT(<value list>)
- MEDIAN (<value list>)

- returns minimum value in list
- returns maximum value in list
- returns sum of all values in list
- returns count of values in list
- returns median value of list

If specifying a cell rectangle, give the upper left and lower right corners, separated by a colon.

• e.g. = AVERAGE (A3:E6) - rectangle of 4 rows and 5 columns

## **Aggregate Functions Example**

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| 1    | Category              | Product    | Month      | <u>Volume</u>             | <u>Price</u>               | Cost     | Revenue                                 | Expenses                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Profit                                       |                |            |                                      |        |    |
| 2    | Food                  | Chocolate  | Jan        | 20                        | \$ 2.00                    | \$ 1.00  | \$ 40.00                                | \$ 20.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$ 20.00                                     |                |            |                                      |        |    |
| 3    | Clothing              | Jacket     | Jan        | 15                        | \$ 50.00                   | \$ 35.00 | \$ 750.00                               | \$525.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$225.00                                     |                |            |                                      |        |    |
| 4    | Toys                  | Ball       | Jan        | 55                        | \$ 1.00                    | \$ 0.50  | \$ 55.00                                | \$ 27.50                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$ 27.50                                     |                |            |                                      |        |    |
| 5    | Food                  | Chocolate  | Feb        | 80                        | \$ 2.50                    | \$ 1.00  | \$ 200.00                               | \$ 80.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$120.00                                     |                |            |                                      |        |    |
| 6    | Clothing              | Jacket     | Feb        | 10                        | \$ 50.00                   | \$ 35.00 | \$ 500.00                               | \$350.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$150.00                                     |                |            |                                      |        |    |
| 7    | Toys                  | Ball       | Feb        | 65                        | \$ 1.00                    | \$ 0.60  | \$ 65.00                                | \$ 39.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$ 26.00                                     |                |            |                                      |        |    |
| 8    | Food                  | Chocolate  | Mar        | 30                        | \$ 2.00                    | \$ 1.00  | \$ 60.00                                | \$ 30.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$ 30.00                                     |                |            |                                      |        |    |
| 9    | Toys                  | Ball       | Mar        | 70                        | \$ 1.00                    | \$ 0.40  | \$ 70.00                                | \$ 28.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | \$ 42.00                                     |                |            |                                      |        | _  |
| 10   | Toys                  | Bat        | Mar        | 10                        | \$ 75.00                   | \$ 50.00 | \$ 750.00                               | \$ 500.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | \$ 250.00                                    |                |            |                                      |        | _  |
| 11   | Clothing              | Jacket     | Mar        | 8                         | \$ 50.00                   | \$ 30.00 | \$ 400.00                               | \$ 240.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | \$ 160.00                                    |                |            |                                      |        | -  |
| 12   | Food                  | Apples     | Mar        | 100                       | Ş 3.00                     | Ş 2.00   | \$ 300.00                               | \$ 200.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Ş 100.00                                     |                |            |                                      |        | _  |
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#### **Try it: Aggregate Functions**

#### **Question:** Create aggregate functions to match below:

| H                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | S→ → → sales.xlsx - Excel |           |              |               |              |                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |      |           |                                           |                                               |                         | □ ×     |  |  |  |  |  |  |  |  |  |  |
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| 1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Category                  | Product   | <u>Month</u> | <u>Volume</u> | <u>Price</u> | Cost                                   | Revenue                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Food                      | Chocolate | Jan          | 20            | \$ 2.00      | \$ 1.00                                | \$ 40.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
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| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Toys                      | Ball      | Jan          | 55            | \$ 1.00      | \$ 0.50                                | \$ 55.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
| 5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Food                      | Chocolate | Feb          | 80            | \$ 2.50      | \$ 1.00                                | \$ 200.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
| 6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Clothing                  | Jacket    | Feb          | 10            | \$ 50.00     | \$ 35.00                               | \$ 500.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
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| 9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Toys                      | Ball      | Mar          | 70            | \$ 1.00      | \$ 0.40                                | \$ 70.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
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| 13                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                           |           |              | 42            | \$ 75.00     | \$ 0.40                                | \$3,190.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |      |           |                                           |                                               |                         |         |  |  |  |  |  |  |  |  |  |  |
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## **Aggregate Functions Question**

**Question:** Assume the cells in the range A1 : C4 each contain a number that is equal to their row number (e.g. B3 contains 3). How many of the following statements are TRUE?

1) The number of cells in the range is 12.

- 2) The value of SUM (A1:C4) is 20.
- 3) The value of COUNTIF (A1:B4, ">2") is 4.

4) AVERAGE (A1:C4) > MAX (C2:C3)

 A) 0
 B) 1
 C) 2
 D) 3
 E) 4

#### **Aggregate Functions Question**

**Question:** Assume the three cells in the range A1 : C1 contain numbers. Which of these formula output results is **ALWAYS** the largest?

A) MAX (A1:C1)

B) MIN (A1:C1)

C) COUNT (A1:C1)

**D**) SUM (A1:C1)

**E)** none of the above are always guaranteed to be the largest

## **Other Formatting: Column Width**

| H                                                                                                | <b>5</b> • ∂       |           | sales.xlsx - Excel 🔂 — 🗖 |            |                  |                              |                                                                    |          |            |                                    |                           |            |  |  |  |
|--------------------------------------------------------------------------------------------------|--------------------|-----------|--------------------------|------------|------------------|------------------------------|--------------------------------------------------------------------|----------|------------|------------------------------------|---------------------------|------------|--|--|--|
| F                                                                                                | ile Ho             | ome Inse  | ert Pa                   | ige Layout | Formulas         | s Data                       | Review                                                             | View     | Developer  | Team                               | ♀ Tell me Sign            | in 🗛 Share |  |  |  |
| $\begin{array}{c c} & & \\ & & \\ & & \\ Paste \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ $ |                    |           |                          |            | =<br>=<br>≫<br>· | General<br>\$ ▼ %<br>€.0 .00 | $\begin{array}{c} & & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ & \\ $ |          |            |                                    |                           |            |  |  |  |
| Clipboard 🗊 Font 🗊 Alignment 🗊 Number 🖬 Styles                                                   |                    |           |                          |            |                  |                              |                                                                    |          |            |                                    | Cell Size                 |            |  |  |  |
| A                                                                                                | 1 · K · K Category |           |                          |            |                  |                              |                                                                    |          |            | ↓ Row Height<br>AutoFit Row Height |                           |            |  |  |  |
|                                                                                                  | А                  | в         | С                        | D          | E                | F                            | G                                                                  | н        | I.         | J                                  | Column <u>W</u> idth      |            |  |  |  |
| 1                                                                                                | Category           | Product   | Month                    | Volume     | Price            | Cost                         | Revenue                                                            |          |            |                                    | AutoF <u>i</u> t Column \ | Nidth      |  |  |  |
| 2                                                                                                | Food               | Chocolate | Jan                      | 20         | \$ 2.00          | \$ 1.00                      | \$ 40.00                                                           |          |            |                                    | Default Width             |            |  |  |  |
| 3                                                                                                | Clothing           | Jacket    | Jan                      | 15         | \$ 50.00         | \$ 35.00                     | \$ 750.00                                                          |          |            |                                    | Visibility                |            |  |  |  |
| 4                                                                                                | Toys               | Ball      | Jan                      | 55         | \$ 1.00          | \$ 0.50                      | \$ 55.00                                                           |          |            |                                    | Hide & Unhide             | •          |  |  |  |
| 5                                                                                                | Food               | Chocolate | Feb                      | 80         | \$ 2.50          | \$ 1.00                      | \$ 200.00                                                          |          |            |                                    | Organiza Shaata           |            |  |  |  |
| 6                                                                                                | Clothing           | Jacket    | Feb                      | 10         | \$ 50.00         | \$ 35.00                     | \$ 500.00                                                          |          |            |                                    | Organize sneets           |            |  |  |  |
| 7                                                                                                | Toys               | Ball      | Feb                      | 65         | \$ 1.00          | \$ 0.60                      | \$ 65.00                                                           |          |            |                                    | Rename Sheet              |            |  |  |  |
| 8                                                                                                | Food               | Chocolate | Mar                      | 30         | \$ 2.00          | \$ 1.00                      | \$ 60.00                                                           |          |            |                                    | Move or Copy Sh           | eet        |  |  |  |
| 9                                                                                                | Toys               | Ball      | Mar                      | 70         | \$ 1.00          | \$ 0.40                      | \$ 70.00                                                           |          |            |                                    | Tab Color                 | •          |  |  |  |
| 10                                                                                               | Toys               | Bat       | Mar                      | 10         | \$ 75.00         | \$ 50.00                     | \$ 750.00                                                          |          |            |                                    | Protection                |            |  |  |  |
| 11                                                                                               | Clothing           | Jacket    | Mar                      | 8          | \$ 50.00         | \$ 30.00                     | \$ 400.00                                                          |          |            |                                    | Protect Sheet             |            |  |  |  |
| 12                                                                                               | Food               | Apples    | Mar                      | 100        | \$ 3.00          | \$ 2.00                      | \$ 300.00                                                          |          |            |                                    |                           |            |  |  |  |
| 13                                                                                               |                    |           |                          |            | Total:           |                              | \$ 3,190.00                                                        |          |            |                                    |                           |            |  |  |  |
| 1/                                                                                               |                    | Question  | Calar                    | QuarterSe  | ale a Format     | Quarte                       | - Divet                                                            | <u> </u> |            |                                    | Format C <u>e</u> lls     |            |  |  |  |
|                                                                                                  | 1                  | Quarter   | Sales                    | Quartersa  | llesFormat       | Quarte                       | erpivot                                                            |          | •          |                                    |                           |            |  |  |  |
| Rea                                                                                              | dy 🔠               |           |                          |            |                  |                              |                                                                    | Cour     | nt: 12 🏼 🏦 |                                    | ──                        | + 100%     |  |  |  |

Resizing columns/rows:

Auto-resize by double clicking on border between columns or using the Format option.

Drag row/column border for manual resize.

## **Conditional Formatting**

**Conditional formatting** allows you to change the cell format based on data values. This is accessible under **Styles**.

• Other options: data bars, color scales

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|----------------------------------------------------------------|--------------------------|------------|--------------|---------|-----------|--------------------------|------|---------------------------------------------------------------|--------------|-------------------------------------|------------------------------------------------|-------------|----------|--------------|
| File Hom                                                       | e Insert                 | Page Lay   | out Forr     | nulas   | Data      | Review                   | Viev | w Developer                                                   | Team         | ♀ Tell me                           | Sign in                                        | ₽ Share     |          |              |
| Paste                                                          | alibri<br>8 I <u>U</u> → | - 11 -<br> | A A E        |         |           | Accounting -<br>\$ - % * |      | 🖶 Conditional Forma<br>蒙 Format as Table *<br>😴 Cell Styles * | atting - ₩   | ™Insert ▼<br>×Delete ▼<br>∰Format ▼ | $\sum_{x} \cdot \frac{A}{2} \cdot \frac{1}{2}$ |             |          |              |
| Clipboard 🗊 Font 🗊 Alignment 🐨 Number 😨 Styles Cells Editing 🔨 |                          |            |              |         |           |                          |      |                                                               |              |                                     |                                                |             |          |              |
| G8 · : × · fx =E8*D8                                           |                          |            |              |         |           |                          |      |                                                               |              |                                     |                                                |             |          |              |
| A                                                              | В                        | С          | D            | Е       | F         | G                        |      | Conditional Forma                                             | atting Rules | Manager                             |                                                |             |          | -?           |
| 1 Category                                                     | Product                  | Month      | Volume       | Price   | Cost      | Revenu                   | e    | Show formatting r                                             | ules for:    | urrent Selecti                      | ion 🗖                                          | -           |          |              |
| 2 Food                                                         | Chocolate                | Jan        | 20           | \$ 2.00 | \$ 1.00   | \$ 40.0                  | 0    |                                                               |              | Pute 1                              | Palata Du                                      |             | _        |              |
| 3 Clothing                                                     | Jacket                   | Jan        | 15           | \$50.00 | \$35.00   | \$ 750.0                 | 00   | I New Rule                                                    |              | Rule                                | <u>Delete</u> Rul                              |             | •        |              |
| 4 Toys                                                         | Ball                     | Jan        | 55           | \$ 1.00 | \$ 0.50   | \$ 55.0                  | 00   | Rule (applied in o                                            | order shown  | Format                              |                                                | Applies to  |          | Stop If True |
| 5 Food                                                         | Chocolate                | Feb        | 80           | \$ 2.50 | \$ 1.00   | \$ 200.0                 | 00   | Cell Value >                                                  | 350          | AaBh                                | oCcYv7                                         | =\$G\$2:\$G | \$12     |              |
| 6 Clothing                                                     | Jacket                   | Feb        | 10           | \$50.00 | \$35.00   | \$ 500.0                 | 00   | 6 M. 4                                                        |              |                                     |                                                |             | tta 💷    |              |
| 7 Toys                                                         | Ball                     | Feb        | 65           | \$ 1.00 | \$ 0.60   | \$ 65.0                  | 0    | Cell Value <                                                  | /5           | Aabt                                | Ουστνί                                         | =\$G\$2:\$G | \$12     |              |
| 8 Food                                                         | Chocolate                | Mar        | 30           | \$ 2.00 | \$ 1.00   | \$ 60.0                  | 0    |                                                               |              |                                     |                                                |             |          |              |
| 9 Toys                                                         | Ball                     | Mar        | 70           | \$ 1.00 | \$ 0.40   | \$ 70.0                  | 00   |                                                               |              |                                     |                                                |             |          |              |
| 10 Toys                                                        | Bat                      | Mar        | 10           | \$75.00 | \$50.00   | \$ 750.0                 | 00   |                                                               |              |                                     |                                                |             |          |              |
| 11 Clothing                                                    | Jacket                   | Mar        | 8            | \$50.00 | \$30.00   | \$ 400.0                 | 00   |                                                               |              |                                     |                                                |             |          |              |
| 12 Food                                                        | Apples                   | Mar        | 100          | \$ 3.00 | \$ 2.00   | \$ 300.0                 | 00   |                                                               |              |                                     |                                                |             |          |              |
| 13                                                             |                          |            |              | Tot     | tal:      | \$3,190.0                | 0    | -                                                             |              |                                     |                                                |             | OK Close | Apply        |
| <b>-</b>                                                       | QuarterSa                | es Quai    | rterSalesFor | mat     | QuarterPi | vot                      | (    | • •                                                           |              |                                     |                                                | •           |          |              |
| Ready                                                          |                          |            |              |         |           |                          |      | <b></b>                                                       | E            |                                     | -                                              | + 100%      |          |              |

## **Conditional Formatting Result**

The format painter button allows you to copy formatting to many cells. Select the cell, click paint button, then highlight cells to have identical formatting.

format painter button

| X    |      | 5-                 | (⇒ - =                       |               |            |                                                                                                                                                                                                                                              | 2         | ? 🖈 –      | . 🗆    | ×      |     |       |         |       |       |
|------|------|--------------------|------------------------------|---------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|------------|--------|--------|-----|-------|---------|-------|-------|
| E    | ILE  | HOM                | INSER                        | RT PAGE L     | AYOUT      | FORMULA                                                                                                                                                                                                                                      | AS DA     | TA REVIEV  | V VIEW |        |     |       |         | S     | ign i |
| Pa   | ste  | K<br>C             | alibri<br>8 I <u>U</u> -     | - 11 -        |            | $\begin{array}{c} \blacksquare \blacksquare \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare \\ \blacksquare \blacksquare \blacksquare \blacksquare $ |           |            |        |        |     |       |         |       |       |
| Clip | boa  | rd 🗔               |                              | Font          | Gi .       | Alignment                                                                                                                                                                                                                                    | t G       | Number 🗔   |        | Styles |     | Cells | Editing |       | ^     |
| G    | i2   | Format<br>Like the | Painter<br>look of a par     | ticular       | =E2'       | =E2*D2                                                                                                                                                                                                                                       |           |            |        |        |     |       |         |       | ~     |
|      |      | to other           | content in th                | e document.   | D          | E F                                                                                                                                                                                                                                          |           | G          | н      | 1      | J   | к     | L       | М     | -     |
| 1    | Ca   | To get s           | tarted:                      |               | olume      | Price                                                                                                                                                                                                                                        | Cost      | Revenue    |        |        |     |       |         |       |       |
| 2    | Foc  | 1. Select          | content with                 | the           | 20         | \$ 2.00                                                                                                                                                                                                                                      | \$ 1.00   | \$ 40.00   |        |        |     |       |         |       |       |
| 3    | Clc  | formatti           | ng you like<br>Format Painte | or            | 15         | \$50.00                                                                                                                                                                                                                                      | \$35.00   | \$ 750.00  |        |        |     |       |         |       |       |
| 4    | Τογ  | 3. Select          | 3. Select something else to  |               |            | \$ 1.00                                                                                                                                                                                                                                      | \$ 0.50   | \$ 55.00   |        |        |     |       |         |       |       |
| 5    | Foc  | automat            | tically apply t              | he formatting | 80         | \$ 2.50                                                                                                                                                                                                                                      | \$ 1.00   | \$ 200.00  |        |        |     |       |         |       |       |
| 6    | Clc  | EVI: To a          | upply the form               | natting in    | 10         | \$50.00                                                                                                                                                                                                                                      | \$35.00   | \$ 500.00  |        |        |     |       |         |       |       |
| 7    | Τογ  | multiple           | places, doub                 | ole-click     | 65         | \$ 1.00                                                                                                                                                                                                                                      | \$ 0.60   | \$ 65.00   |        |        |     |       |         |       |       |
| 8    | Foc  | Format I           | Painter.                     |               | 30         | \$ 2.00                                                                                                                                                                                                                                      | \$ 1.00   | \$ 60.00   |        |        |     |       |         |       |       |
| 9    | Τογ  | 2 Tell             | me more                      |               | 70         | \$ 1.00                                                                                                                                                                                                                                      | \$ 0.40   | \$ 70.00   |        |        |     |       |         |       |       |
| 10   | Тоу  |                    |                              |               |            | \$75.00                                                                                                                                                                                                                                      | \$50.00   | \$ 750.00  |        |        |     |       |         |       |       |
| 11   | Clot | thing              | Jacket                       | Mar           | 8          | \$50.00                                                                                                                                                                                                                                      | \$30.00   | \$ 400.00  |        |        |     |       |         |       | _     |
| 12   | Foo  | d                  | Apples                       | Mar           | 100        | .00 \$ 3.00 \$ 2.00                                                                                                                                                                                                                          |           | \$ 300.00  |        |        |     |       |         |       |       |
| 13   |      |                    |                              |               |            | То                                                                                                                                                                                                                                           | tal:      | \$3,190.00 |        |        |     |       |         |       | -     |
|      | 4    | <u>۲</u>           | QuarterSa                    | ales Quar     | terSalesFo | rmat                                                                                                                                                                                                                                         | QuarterPi | /ot /      | + : •  | (      |     |       |         |       |       |
| REA  | DY   |                    |                              |               |            |                                                                                                                                                                                                                                              |           |            |        | Ħ      | ■ ∎ | ]     |         | + 100 | %     |
# **Try it: Conditional Formatting**

**Question:** Format rows so: 1) bold/green if volume > 50, 2) italics/red if volume < 10, 3) yellow background otherwise as below:

| Η    | <b>℃</b> |                       |               |           |           | sale    | s.xlsx - Excel                            |                                          |                                    |         |                                  | <b>— •</b>                                                                                                                                     |         | × |
|------|----------|-----------------------|---------------|-----------|-----------|---------|-------------------------------------------|------------------------------------------|------------------------------------|---------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|---------|---|
| F    | ile Home | Insert                | Page Lay      | out Forr  | nulas     | Data    | Review Vi                                 | iew Deve                                 | eloper T                           | eam G   | ? Tell me                        | Sign in                                                                                                                                        | ₽ Share | e |
| Pas  | te 💉 B   | libri<br>I <u>U</u> - | • 11 •        |           |           | G       | eneral ▼<br><b>▼ % ≯</b><br>.0 .00<br>→.0 | 🖶 Conditio<br>🐺 Format a<br>🐺 Cell Style | nal Formatti<br>Is Table *<br>25 * | ng - ₩1 | Insert ∓<br>Delete ∓<br>Format ∓ | $\sum_{\mathbf{v}} \cdot \frac{\mathbf{A}}{2} \mathbf{v} \cdot \mathbf{v}$ $\bigcup_{\mathbf{v}} \cdot \mathbf{p} \cdot \mathbf{v}$ $\swarrow$ |         |   |
| Clip | board 🕞  | F                     | ont           | 5         | Alignment | Fail I  | Number 🗔                                  | 1                                        | Styles                             |         | Cells                            | Editing                                                                                                                                        |         | ^ |
| D    | 13 -     | : ×                   | $\sqrt{-f_x}$ |           |           |         |                                           |                                          |                                    |         |                                  |                                                                                                                                                |         | * |
|      | А        | в                     | с             | D         | E         | F       | G                                         | н                                        | 1                                  | J       | к                                | L                                                                                                                                              | м       |   |
| 1    | Category | <b>Product</b>        | Month         | Volume    | Price     | Cost    | Revenue                                   |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 2    | Food     | Chocolate             | Jan           | 20        | \$ 2.00   | \$ 1.00 | \$ 40.00                                  |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 3    | Clothing | Jacket                | Jan           | 15        | \$50.00   | \$35.00 | \$ 750.00                                 |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 4    | Toys     | Ball                  | Jan           | 55        | \$ 1.00   | \$ 0.50 | \$ 55.00                                  |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 5    | Food     | Chocolate             | Feb           | 80        | \$ 2.50   | \$ 1.00 | \$ 200.00                                 |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 6    | Clothing | Jacket                | Feb           | 10        | \$50.00   | \$35.00 | \$ 500.00                                 |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 7    | Toys     | Ball                  | Feb           | 65        | \$ 1.00   | \$ 0.60 | \$ 65.00                                  |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 8    | Food     | Chocolate             | Mar           | 30        | \$ 2.00   | \$ 1.00 | \$ 60.00                                  |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 9    | Toys     | Ball                  | Mar           | 70        | \$ 1.00   | \$ 0.40 | \$ 70.00                                  |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 10   | Toys     | Bat                   | Mar           | 10        | \$75.00   | \$50.00 | \$ 750.00                                 |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 11   | Clothing | Jacket                | Mar           | 8         | \$50.00   | \$30.00 | \$ 400.00                                 |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 12   | Food     | Apples                | Mar           | 100       | Ş 3.00    | \$ 2.00 | \$ 300.00<br>·                            |                                          |                                    |         |                                  |                                                                                                                                                |         |   |
| 13   |          |                       |               |           | Tot       | al:     | \$3,190.00                                |                                          |                                    |         |                                  |                                                                                                                                                |         | - |
|      | • • …    | QuarterSal            | esTryIt2      | QuarterSa | lesTryIt3 | (+      | )                                         | : •                                      |                                    |         |                                  |                                                                                                                                                |         | ] |
| Rea  | dy 📰     |                       |               |           |           |         |                                           |                                          |                                    |         | -                                |                                                                                                                                                | + 100%  | 6 |

# **Try it: Conditional Formatting Challenge**

#### **Question:** Take the previous formatting and apply it to whole row:

|      | • د ⊳               |                       |                  |           |                | sale    | s.xlsx ·        | Excel    |                                          |                                             |       |                                  | <b>F -</b>                                                                                                                      |         | ×   |
|------|---------------------|-----------------------|------------------|-----------|----------------|---------|-----------------|----------|------------------------------------------|---------------------------------------------|-------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------------|---------|-----|
| F    | ile Hom             | e Insert              | Page Lay         | out Forr  | nulas          | Data    | Review          | w Vie    | ew Deve                                  | loper T                                     | eam   | ♀ Tell me                        | Sign in                                                                                                                         | R₁ Shai | re  |
| Pas  | te <mark>∢ B</mark> | libri<br>I <u>U</u> → | • 11 •           |           |                |         | ieneral<br>\$ - | *  <br>% | 🔁 Conditio<br>📝 Format a<br>📝 Cell Style | nal Formatti<br>s Table <del>*</del><br>s * | ing • | Insert ▼<br>Delete ▼<br>Format ▼ | $\sum_{\mathbf{v}} \cdot \frac{\mathbf{A}}{\mathbf{Z}} \mathbf{v} \cdot$ $\mathbf{V} \cdot \mathbf{P} \cdot$ $\mathbf{V} \cdot$ |         |     |
| Clip | board 🗔             | F                     | ont              | F2        | Alignment      | - G     | Numb            | er 🗔     | -                                        | Styles                                      |       | Cells                            | Editing                                                                                                                         |         | ^   |
| D    | 13 -                | : ×                   | $\checkmark f_x$ |           |                |         |                 |          |                                          |                                             |       |                                  |                                                                                                                                 |         | ~   |
|      | А                   | в                     | С                | D         | E              | F       |                 | G        | н                                        | 1                                           | J     | к                                | L                                                                                                                               | M       | 1 🔺 |
| 1    | Category            | Product               | Month            | Volume    | Price          | Cost    | Rev             | /enue    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 2    | Food                | Chocolate             | Jan              | 20        | \$ 2.00        | \$ 1.00 | \$              | 40.00    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 3    | Clothing            | Jacket                | Jan              | 15        | \$50.00        | \$35.00 | \$              | 750.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 4    | Toys                | Ball                  | Jan              | 55        | \$ 1.00        | \$ 0.50 | \$              | 55.00    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 5    | Food                | Chocolate             | Feb              | 80        | \$ 2.50        | \$ 1.00 | \$              | 200.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 6    | Clothing            | Jacket                | Feb              | 10        | \$50.00        | \$35.00 | \$              | 500.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 7    | Toys                | Ball                  | Feb              | 65        | \$ 1.00        | \$ 0.60 | \$              | 65.00    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 8    | Food                | Chocolate             | Mar              | 30        | \$ 2.00        | \$ 1.00 | \$              | 60.00    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 9    | Toys                | Ball                  | Mar              | 70        | \$ 1.00        | \$ 0.40 | Ş               | 70.00    |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 10   | Toys                | Bat                   | Mar              | 10        | \$75.00        | \$50.00 | Ş               | 750.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 11   | Clothing            | Jacket                | Mar              | 8         | \$ 50.00       | \$30.00 | Ş               | 400.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 12   | Food                | Apples                | Mar              | 100       | \$ <b>3.00</b> | Ş 2.00  | Ş               | 300.00   |                                          |                                             |       |                                  |                                                                                                                                 |         |     |
| 13   |                     |                       |                  |           | Tot            | tal:    | ş3,             | 190.00   |                                          |                                             |       |                                  |                                                                                                                                 |         | -   |
|      | • · · · · · ·       | QuarterSa             | lesTryIt3        | QuarterSa | lesTryIt4      | (+      | )               |          | : •                                      |                                             |       |                                  |                                                                                                                                 | •       | •   |
| Rea  | dy 🔠                |                       |                  |           |                |         |                 |          |                                          |                                             | E     | ╜ -──                            |                                                                                                                                 | + 1009  | %   |

#### **Date and Type Formats**

Formatting data helps users read and understand data and is especially important for numbers and dates. Use built-in or custom formats.

| lumber                                                                                                                           | Alignment                                         | Font                                                                                                                              | Border                                                        | Fill                                    | Protectio                                   | n                                  |                                     |                                       |                  |
|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|-----------------------------------------|---------------------------------------------|------------------------------------|-------------------------------------|---------------------------------------|------------------|
| ategory:<br>General<br>Number<br>Currency<br>Accounti<br>Date<br>Fraction<br>Fraction<br>Scientific<br>Text<br>Special<br>Custom | ng 🍂                                              | Sample<br>January<br>Iype:<br>14-Mar-1:<br>14-Mar-1:<br>Mar-12<br>March 14<br>3/14/12 1<br>3/14/12 1<br>Locale (loc<br>English (l | 1, 2016<br>2<br>2<br>:30 PM<br>3:30<br>:ation):<br>Jnited Sta | ates)                                   |                                             |                                    |                                     |                                       | •<br>            |
| )ate form<br>n asteris<br>perating                                                                                               | ats display da<br>k (*) respond t<br>system. Form | te and time<br>to changes in<br>ats without                                                                                       | serial nur<br>n regiona<br>an asteris                         | nbers as d<br>Il date and<br>ik are not | ate values.<br>I time settin<br>affected by | Date for<br>ngs that a<br>operatin | mats tha<br>are specif<br>ig system | t begin v<br>fied for t<br>i settings | with<br>he<br>5. |

### **Spreadsheets for Data Management**

A spreadsheet is often used as a "database". A database is an organized representation of information.

• Examples: schedules and calendars, timesheets, expenses and finances, records, notes, and recipes, data research/analysis

We can use a spreadsheet as a database by:

- Using a row to store all the information about something we want to represent.
- Giving each column a meaningful name. A column represents a property or feature of the object stored in the row.
- Using the formulas to calculate new facts from the data.
- Using sorting to organize the data by key features.
- Using simple filtering (querying) to only show the most important data or data of interest.

### **Sorting Data**

# Data can be sorted by selecting the **Sort** option under the **Data** menu. Select the column(s) to sort on and order to sort by.

| H        | ್- ೆ                       |                   |                  |                |                         |                 |         |           |                      |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
|----------|----------------------------|-------------------|------------------|----------------|-------------------------|-----------------|---------|-----------|----------------------|--------------------|-------------------|------|----------------------------|------------------------------|---------|---------------------|------------|-----------|-----------|---------------------|-------|
| F        | ile Ho                     | ome Inse          | ert Pa           | ige Layout     | Formul                  | las             | Data    | Review    |                      | View               | Develop           | er T | eam 🤇                      | 🛛 Tell me                    | Sign ir | n R <sub>4</sub> Sh | are        |           |           |                     |       |
| Get<br>D | External<br>ata ▼ Q<br>Get | New<br>Query + Co | Refresh<br>All + | Connections    | tions Z<br>es Z<br>cs A | ↓ Z Z<br>↓ Sori | t Fi    | ilter TA  | lear<br>eapp<br>dvai | ply T<br>nced Cc   | ext to<br>lumns = | }    | What-If<br>Analysis<br>For | Forecast<br>• Sheet<br>ecast | Utline  |                     | ^          |           |           |                     |       |
| A        | 2                          | • = >             | < ~              | f <sub>x</sub> | ood                     |                 |         |           |                      |                    |                   |      |                            |                              |         |                     | ~          |           |           |                     |       |
|          | А                          | В                 | С                | D              | E                       |                 | F       | G         |                      |                    | 1                 | -    |                            |                              |         |                     |            |           |           |                     |       |
| 1        | Category                   | Product           | Month            | <u>Volume</u>  | <b>Price</b>            | C               | ost     | Revenue   | 2                    | Sort               |                   |      |                            |                              |         |                     |            |           |           | ~~                  | ×     |
| 2        | Food                       | Chocolate         | Jan              | 20             | \$ 2.00                 | ) \$            | 1.00    | \$ 40.0   | 0                    | <sup>+</sup> AJ Ad | d Level           |      | ete Level                  | Copy l                       | evel 🔺  |                     | ption      | s         | 🔽 My d    | ata has <u>h</u> ea | aders |
| 3        | Clothing                   | Jacket            | Jan              | 15             | \$ 50.00                | ) \$ 3          | 35.00   | \$ 750.0  | 0                    | Colum              |                   |      |                            | Sect On                      |         |                     | _          | Order     |           |                     |       |
| 4        | Toys                       | Ball              | Jan              | 55             | \$ 1.00                 | \$              | 0.50    | \$ 55.0   | 0                    | Sort by            | 1<br>Manth        |      |                            | Son On                       |         |                     |            | Una Eab   | Max Ann   | Mary Lung 1         |       |
| 5        | Food                       | Chocolate         | Feb              | 80             | \$ 2.50                 | )\$             | 1.00    | \$ 200.0  | 0                    | Thop by            | Monu              |      |                            | values                       |         |                     |            | pan, reb, | war, Apr, | ividy, Jun, J       |       |
| 6        | Clothing                   | Jacket            | Feb              | 10             | \$ 50.00                | ) \$ 3          | 35.00   | \$ 500.0  | 0                    | inen by            | Catego            | ory  | •                          | Values                       |         |                     | •          | A to Z    |           |                     |       |
| 7        | Toys                       | Ball              | Feb              | 65             | \$ 1.00                 | )\$             | 0.60    | \$ 65.0   | 0                    |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
| 8        | Food                       | Chocolate         | Mar              | 30             | \$ 2.00                 | )\$             | 1.00    | \$ 60.0   | 0                    |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
| 9        | Toys                       | Ball              | Mar              | 70             | \$ 1.00                 | )\$             | 0.40    | \$ 70.0   | 0                    |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
| 10       | Toys                       | Bat               | Mar              | 10             | \$ 75.00                | ) \$ 5          | 50.00   | \$ 750.0  | 0                    |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
| 11       | Clothing                   | Jacket            | Mar              | 8              | \$ 50.00                | ) \$ 3          | 30.00   | \$ 400.0  | 0                    |                    |                   |      |                            |                              |         |                     |            |           |           |                     |       |
| 12       | Food                       | Apples            | Mar              | 100            | \$ 3.00                 | ) \$            | 2.00    | \$ 300.0  | 0                    | -                  |                   |      |                            |                              |         |                     |            |           | ОК        | Cance               | el    |
| 13       |                            |                   |                  |                | T                       | otal:           |         | \$3,190.0 | 0                    |                    | _                 | _    |                            |                              |         |                     |            |           |           |                     | 28    |
| 1/       | • •                        | Quarter           | Sales            | QuarterSa      | alesForma               | at              | Quarte  | erPivot   |                      | . 🕂 :              | •                 |      |                            |                              |         |                     | ) <b>v</b> |           |           |                     |       |
| Rea      | dy 🔠                       |                   |                  |                | A                       | verage:         | 91.9772 | 7273 Co   | unt:                 | 77 Sum:            | 4047              |      |                            | -                            | -       | + 10                | 0%         |           |           |                     |       |

## Try it: Sort

#### **Question:** Sort the data by revenue (desc) then product (asc).

| H        | <b>5</b> • ∂          |                                    |                  |                                                 |                            |          | sales.xlsx - Exc | cel                 |                                      |              |                                             | Ŧ       | - 🗆    | ×        |
|----------|-----------------------|------------------------------------|------------------|-------------------------------------------------|----------------------------|----------|------------------|---------------------|--------------------------------------|--------------|---------------------------------------------|---------|--------|----------|
| F        | ïle Ho                | ome Inse                           | ert Pa           | ige Layout                                      | Formula                    | s Data   | Review           | View                | Developer                            | Team         | ♀ Tell me.                                  | Sign in | ∕£ Sha | ire      |
| Get<br>D | External<br>ata * Get | New<br>Duery + Co<br>t & Transform | Refresh<br>All • | Connect<br>Properti<br>Edit Link<br>connections | tions AJ<br>es ZJ<br>cs AJ | Sort F   | ilter Clea       | ar<br>pply<br>anced | Text to<br>Columns 🕉 🗸<br>Data Tools | Wh<br>@ Anal | at-If Forecast<br>lysis v Sheet<br>Forecast | 0utline |        | *        |
|          | А                     | в                                  | с                | D                                               | E                          | F        | G                | Н                   | 1                                    | J            | к                                           | L       | м      |          |
| 1        | Category              | Product                            | Month            | Volume                                          | Price                      | Cost     | Revenue          |                     |                                      |              |                                             |         |        |          |
| 2        | Toys                  | Bat                                | Mar              | 10                                              | \$ 75.00                   | \$ 50.00 | \$ 750.00        |                     |                                      |              |                                             |         |        |          |
| 3        | Clothing              | Jacket                             | Jan              | 15                                              | \$ 50.00                   | \$ 35.00 | \$ 750.00        |                     |                                      |              |                                             |         |        |          |
| 4        | Clothing              | Jacket                             | Feb              | 10                                              | \$ 50.00                   | \$ 35.00 | \$ 500.00        |                     |                                      |              |                                             |         |        |          |
| 5        | Clothing              | Jacket                             | Mar              | 8                                               | \$ 50.00                   | \$ 30.00 | \$ 400.00        |                     |                                      |              |                                             |         |        |          |
| 6        | Food                  | Apples                             | Mar              | 100                                             | \$ 3.00                    | \$ 2.00  | \$ 300.00        |                     |                                      |              |                                             |         |        |          |
| 7        | Food                  | Chocolate                          | Feb              | 80                                              | \$ 2.50                    | \$ 1.00  | \$ 200.00        |                     |                                      |              |                                             |         |        |          |
| 8        | Toys                  | Ball                               | Mar              | 70                                              | \$ 1.00                    | \$ 0.40  | \$ 70.00         |                     |                                      |              |                                             |         |        |          |
| 9        | Toys                  | Ball                               | Feb              | 65                                              | \$ 1.00                    | \$ 0.60  | \$ 65.00         |                     |                                      |              |                                             |         |        |          |
| 10       | Food                  | Chocolate                          | Mar              | 30                                              | \$ 2.00                    | \$ 1.00  | \$ 60.00         |                     |                                      |              |                                             |         |        |          |
| 11       | Toys                  | Ball                               | Jan              | 55                                              | \$ 1.00                    | \$ 0.50  | \$ 55.00         |                     |                                      |              |                                             |         |        |          |
| 12       | Food                  | Chocolate                          | Jan              | 20                                              | \$ 2.00                    | \$ 1.00  | \$ 40.00         |                     |                                      |              |                                             |         |        |          |
| 13       |                       |                                    |                  |                                                 | Tot                        | tal:     | \$3,190.00       |                     |                                      |              |                                             |         |        |          |
| 14       | <b>∢</b> →            | . Quarter                          | rSalesTry        | It4 Tryl                                        | ItSort                     | +        |                  |                     |                                      |              |                                             |         |        | LI▼<br>▶ |
| Rea      | dy 📰                  |                                    |                  |                                                 |                            |          |                  |                     | E                                    |              | ─                                           |         | + 100  | 9%       |

# Filtering

A *filter* shows a subset of the rows in the spreadsheet that pass a given condition (test).

Select Auto Filter under the Data then Filter menu.

Once you select Auto Filter, each column heading has a dropdown list. By selecting a filtering criteria from the list, you can limit the rows that are displayed.

It is possible to filter on more than one column at the same time.

### **Filter Example**

Filter on Revenue column: Select value(s), Top 10, or custom filter.

| H   | <b>৲</b> ্     |                             |                |                                   | sales.xlsx                         | - Excel    |                                                                  |              |                               | <b>F</b>                                                                                                                           | - □     | ×   |
|-----|----------------|-----------------------------|----------------|-----------------------------------|------------------------------------|------------|------------------------------------------------------------------|--------------|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------|---------|-----|
| I   | ile Hom        | e Insert P                  | Page Layout    | Formulas                          | Data Revie                         | w View     | v Developer                                                      | Team         | ♀ Tell me                     | Sign in                                                                                                                            | ∕A_ Sha | are |
| Pa  | ste 💉 B        | alibri ▼<br>IU▼   ⊞<br>Font | 11 · A A       | E = =<br>E = =<br>€ 3 3 Alignment | Genera<br>Genera<br>S<br>S<br>Numb | I ▼ F      | Conditional Form<br>Format as Table ▼<br>Cell Styles ▼<br>Styles | natting -    | Delete •<br>Format •<br>Cells | $\sum_{x} \frac{A_{z}}{2} \frac{1}{x}$ $\bigcup_{x} \frac{A_{z}}{2} \frac{1}{x}$ $\underbrace{\bigcup_{x}}{2} \frac{1}{x}$ Editing |         | ~   |
| F   | 13 -           | : × ✓                       | $f_{x}$        |                                   |                                    |            |                                                                  |              |                               |                                                                                                                                    |         | ~   |
|     | Α              | B                           | С              | D                                 | E                                  | F          | G                                                                | Н            | 1                             | J                                                                                                                                  | K       |     |
| 1   | Category       | Product                     | <u>Month</u> ▼ | Volume                            | Price                              | Cost v     | Revenue 🖅                                                        |              |                               |                                                                                                                                    |         |     |
| 5   | Food           | Chocolate                   | Feb            | Ź↓                                | Sort Smallest to                   | Largest    | -                                                                |              |                               |                                                                                                                                    |         |     |
| 0   | Food           | Jacket                      | Mar            | Ä.                                | Sort Largest to                    | Smallest   | -                                                                |              |                               |                                                                                                                                    |         |     |
| 14  | roou           | Apples                      | IVIdI          |                                   | Sor <u>t</u> by Color              |            |                                                                  |              |                               |                                                                                                                                    |         |     |
| 15  |                |                             |                | 5                                 | <u>Clear</u> Filter From           | n "Revenue |                                                                  |              |                               |                                                                                                                                    |         |     |
| 16  |                |                             |                |                                   | Filter by Color                    |            |                                                                  |              |                               |                                                                                                                                    |         |     |
| 17  |                |                             |                |                                   | Number <u>Filters</u>              |            | ) - F                                                            | Equa         | lls                           |                                                                                                                                    |         |     |
| 18  |                |                             |                |                                   | Conroh                             |            | 0                                                                | Does         | Not Equal                     |                                                                                                                                    |         |     |
| 19  |                |                             |                | 1                                 | Search                             |            | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~                          | 000          |                               |                                                                                                                                    |         |     |
| 20  |                |                             |                | ¥                                 |                                    | u)         |                                                                  | <u>G</u> rea | ter Inan                      |                                                                                                                                    |         |     |
| 21  |                |                             |                |                                   |                                    |            |                                                                  | Grea         | ter Than <u>O</u> r Equa      | al Io                                                                                                                              |         | _   |
| 22  |                |                             |                |                                   | S60.00                             |            | =                                                                | <u>L</u> ess | Than                          | -                                                                                                                                  |         | -   |
| 73  | <b>4 b</b> .   | OuarterSalesFi              | Iter Quart     | erSalesTr                         | \$70.00                            |            | =                                                                | Less         | Than Or Egual T               | o                                                                                                                                  |         |     |
| Des |                | and found 97                | Quart          | c. cares ri                       |                                    |            |                                                                  | Betw         | een                           |                                                                                                                                    | 1 100   | -   |
| Кеа | iuy 5 of 12 re | toras round 🔠               |                |                                   |                                    |            |                                                                  | Top          | 10                            |                                                                                                                                    | - 100   | 170 |
|     |                |                             |                |                                   |                                    |            | -                                                                | Abo          | /e Average                    |                                                                                                                                    |         |     |
|     |                |                             |                |                                   |                                    |            |                                                                  | Belo         | w Average                     |                                                                                                                                    |         |     |
|     |                |                             |                |                                   |                                    | ОК         | Cancel                                                           | Curt         | Filter                        |                                                                                                                                    |         |     |
|     |                |                             |                |                                   | _                                  |            |                                                                  | Cust         | om <u>F</u> ilter             |                                                                                                                                    |         |     |

#### **Custom Filter Example**

Filter on Revenue column: Custom filter with Revenue > 150

| Custom AutoFilter                                                                      | ? <b>×</b> |
|----------------------------------------------------------------------------------------|------------|
| Show rows where:<br>Revenue                                                            |            |
| is greater than 🔽 150                                                                  | -          |
|                                                                                        |            |
| ▼                                                                                      | •          |
| Use ? to represent any single character<br>Use * to represent any series of characters |            |
| ОК                                                                                     | Cancel     |

#### **Custom Filter Result**

Filter on Revenue: Custom filter result with Revenue > 150

| File       Home       Insert       Page Layout       Formulas       Data       Review       View       Developer       Team       Q Tell me       Sign in         Image: Get External Data *       New Query * Co       Refresh All *       Properties       All *       Sort       Image: Get Links                                                                                                                                                                                                                                                                                                                                            | A Share  |
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| Get & Transform     Connections     Sort & Filter     Data Tools     Forecast       G14        •       •       •       •       •                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | ~        |
| A B C D E F G H I J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | ĸ        |
| 1 <u>Category</u> <u>Product</u> <u>Month</u> <u>Volume</u> <u>Price</u> <u>Cost</u> <u>Revenue</u>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |          |
| 3 Clothing Jacket Jan 15 \$ 50.00 \$ 35.00 \$ 750.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |
| 5 Food Chocolate Feb 80 \$ 2.50 \$ 1.00 \$ 200.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |          |
| 6 Clothing Jacket Feb 10 \$ 50.00 \$ 35.00 \$ 500.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |          |
| 10 Toys Bat Mar 10 \$ 75.00 \$ 50.00 \$ 750.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |          |
| 11         Clothing         Jacket         Mar         8         \$ 50.00         \$ 30.00         \$ 400.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |          |
| 12 Food Apples Mar 100 \$ 3.00 \$ 2.00 \$ 300.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
| 13 Total: \$ 3,190.00                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |          |
| 14                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| 17                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |
| 19                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <b>v</b> |
| Image: Market Sales Filter     Quarter Sales TryIt1     Quarter Sales     Image: Market Sales                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | •        |
| Ready 7 of 12 records found 🔠                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | + 100%   |

## **Try it: Filter**

# **Question:** Filter the data so only products with volume < 50 and revenue < \$100 are shown.

| ۵          | ي درج             |                                     |                  |             |                         |            | sales.xlsx - Exc | el                 |                      |           |                                                | ħ            | - 🗆   | ×  |
|------------|-------------------|-------------------------------------|------------------|-------------|-------------------------|------------|------------------|--------------------|----------------------|-----------|------------------------------------------------|--------------|-------|----|
| F          | ile H             | Home Inse                           | ert Pa           | ige Layout  | Formula                 | s Data     | Review           | View               | Developer            | Team      | ♀ Tell me.                                     | Sign in      | ₽ Sha | re |
| Get I<br>D | External<br>ata ~ | New<br>Query - Co<br>et & Transform | Refresh<br>All + | Connections | tions A<br>es Z<br>cs A | Sort Sort  | Filter           | r<br>oply<br>anced | Text to<br>Columns S | ∎•• [<br> | /hat-If Forecast<br>alysis + Sheet<br>Forecast | Outline<br>• |       | ~  |
| G          | 14                | • : >                               | < 🗸              | fx          |                         |            |                  |                    |                      |           |                                                |              |       | ~  |
|            | А                 | В                                   | С                | D           | E                       | F          | G                | н                  | 1                    | J         | К                                              | L            | м     |    |
| 1          | Catego            | Produc 👻                            | Mon 👻            | Volum 🖅     | Price 👻                 | Cost 👻     | Revenu 🖅         |                    |                      |           |                                                |              |       |    |
| 10         | Food              | Chocolate                           | Mar              | 30          | \$ 2.00                 | \$ 1.00    | \$ 60.00         |                    |                      |           |                                                |              |       |    |
| 12         | Food              | Chocolate                           | Jan              | 20          | \$ 2.00                 | \$ 1.00    | \$ 40.00         |                    |                      |           |                                                |              |       |    |
| 14         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 15         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 16         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 17         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 18         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 19         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 20         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 21         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 22         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 23         |                   |                                     |                  |             |                         |            |                  |                    |                      |           |                                                |              |       |    |
| 2/1        | • ►               | Quarter                             | SalesTry         | It4 TryI    | tSort T                 | ryItFilter | +                | 1                  | : •                  |           |                                                |              |       |    |
| Rea        | dy 2 of 1         | .2 records foun                     | d 📰              |             |                         |            |                  |                    | B                    |           | ─ -                                            | -            | + 100 | %  |

# **Try it: Filter Challenge**

**Question:** Filter the data so only products with volume < 20 **or** revenue

< \$65 are shown.

| File Home Insert Page Layout Formulas                                  | Data     | Review    | View Develope                | r Team         | Q Tell me                                  | cian in      | 0.0      |           |
|------------------------------------------------------------------------|----------|-----------|------------------------------|----------------|--------------------------------------------|--------------|----------|-----------|
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| Get External<br>Data ▼<br>Query ▼ Co<br>Get & Transform<br>Connections | Sort F   | Filter    | y Text to<br>Columns Columns | Ire What Analy | at-If Forecast<br>/sis = Sheet<br>Forecast | Outline<br>T |          | ^         |
| G18 • : × ✓ fx                                                         |          |           |                              |                |                                            |              |          | ~         |
| A B C D E                                                              | F        | G         | н і                          | J              | к                                          | L            | м        |           |
| 1 Volume                                                               |          | Revenue   |                              |                |                                            |              |          | $\square$ |
| 2 <20                                                                  |          |           |                              |                |                                            |              |          |           |
| 3                                                                      |          | <65       |                              |                |                                            |              |          |           |
| 4                                                                      |          |           |                              |                |                                            |              |          |           |
| 5 Category Product Month Volume Price                                  | Cost     | Revenue   |                              |                |                                            |              |          |           |
| 6 Toys Bat Mar 10 \$ 75.00                                             | \$ 50.00 | \$ 750.00 |                              |                |                                            |              |          |           |
| 7 Clothing Jacket Jan 15 \$ 50.00                                      | \$ 35.00 | \$ 750.00 |                              |                |                                            |              |          |           |
| 8 Clothing Jacket Feb 10 \$ 50.00                                      | \$ 35.00 | \$ 500.00 |                              |                |                                            |              |          |           |
| 9 Clothing Jacket Mar 8 \$ 50.00                                       | \$ 30.00 | \$ 400.00 |                              |                |                                            |              |          |           |
| 14 Food Chocolate Mar 30 \$ 2.00                                       | \$ 1.00  | \$ 60.00  |                              |                |                                            |              |          |           |
| 15 Toys Ball Jan 55 \$ 1.00                                            | \$ 0.50  | \$ 55.00  |                              |                |                                            |              |          |           |
| 16 Food Chocolate Jan 20 \$ 2.00                                       | \$ 1.00  | \$ 40.00  |                              |                |                                            |              |          |           |
| 18                                                                     |          |           |                              |                |                                            |              |          |           |
| 19                                                                     |          |           |                              |                |                                            |              |          |           |
| TryItSort TryItFilter     TryItFilter                                  | 2 (+     | •         | E                            |                |                                            |              | •        |           |
| Ready 7 of 12 records found 📲                                          |          |           |                              |                | ····                                       | 1            | + 100%   | 6         |

#### **Removing Duplicates**

To remove duplicates, select your Data then Remove Duplicates.



# **Sorting Question**

#### **Question:** Given this spreadsheet and sort order, what is the output?

| Num | Char   | Column  |            |     | Sort On |     | (    | Order          |                 |          |
|-----|--------|---------|------------|-----|---------|-----|------|----------------|-----------------|----------|
| 1   | ٨      | Sort by | Num        |     | Values  |     |      | Largest to Sma | illest          |          |
| T   | A      | Then by | Char       | •   | Values  |     | •    | A to Z         |                 | <b>•</b> |
| 1   | а      |         | Num        | Cha | r       | Num | Char |                | Num             | Char     |
| 1   | В      |         | Num        |     | '<br>B) | Num | Chai | C)             | 1 <b>1</b> 0111 | Char     |
| 1   | h      | •       | <b>7</b> 3 | В   |         | 3   | а    |                | 3               | а        |
|     |        |         | 3          | а   |         | 3   | В    |                | 3               | В        |
| 2   | A      |         | 2          | Δ   |         | 2   | Δ    |                | 2               | А        |
| 2   | b      |         | -          |     |         |     |      |                | -               | 1.       |
| 2   | 2      |         | 2          | b   |         | 2   | b    |                | 2               | D        |
| 5   | a<br>- |         | 1          | Α   |         | 1   | а    |                | 1               | A        |
| 3   | В      |         | 1          | В   |         | 1   | А    |                | 1               | а        |
|     |        |         | 1          | а   |         | 1   | b    |                | 1               | В        |
|     |        |         | 1          | b   |         | 1   | В    |                | 1               | b        |
|     |        |         | 1          |     |         |     |      |                |                 |          |

# **Filtering Question**

**Question:** Given this spreadsheet, how many of these statements are **TRUE**?

|                   | А      | В           |
|-------------------|--------|-------------|
| 1                 | Number | Letter      |
| 2                 | 1      | La          |
| 3                 | 2      | 2 b         |
| 4                 | 3      | 3 с         |
| 5                 | 4      | 1 d         |
| 6                 | 5      | 5 e         |
| 7                 |        |             |
| <mark>A)</mark> C |        | <b>B)</b> 1 |

The data is sorted ascending by Number.
 Filter Number > 3 shows 3 rows.
 Filter Letter >= "c" shows 3 rows.
 Filter Number < 3 OR Letter > "b" shows 5 rows.

**C)** 2 **D)** 3 **E)** 4

#### Charts

A *chart* is a graphical representation of spreadsheet data.

A chart is of a particular type (line, bar, etc.) and requires the user to supply the data that will be displayed in the chart.

# Chart: Select Data and Type

#### Select Insert, then click Chart Icon, and pick the chart type.



## **Chart Options**

**Chart Tools** allows you to modify the data in the chart, change the chart type, and move the chart in the Worksheet.

| Η                | ۴,          | • ° -                 |         |             |              | sales.xlsx | - Excel    |            |          |           |      | Chart <sup>-</sup>         | Tools          |                              | A                         | - 🗆    | ×        |
|------------------|-------------|-----------------------|---------|-------------|--------------|------------|------------|------------|----------|-----------|------|----------------------------|----------------|------------------------------|---------------------------|--------|----------|
| Fi               | le          | Home                  | Insert  | Page Layout | Formulas     | Data       | Review     | View       | Develop  | oer Tea   | m D  | esign                      | Format         | ♀ Tell                       | me Sign in                | ∕₽, Sh | are      |
| Add<br>Elen<br>C | Cha<br>nent | art Quick<br>t Layout | Change  |             | <u>. Iu</u>  | Chart St   | yles       |            |          |           | Swi  | tch Row/<br>Column<br>Data | Select<br>Data | Change<br>Chart Type<br>Type | Move<br>Chart<br>Location |        | ^        |
| С                | na          | ar                    | : ×     | √ fs        | r            |            |            |            |          |           |      |                            |                |                              |                           |        | ~        |
|                  |             | G                     | н       | 1           | J            | к          | L          |            | м        | N         |      | 0                          | Р              | Q                            | R                         | S      |          |
| 1                | Re          | venue                 |         | ĭ           |              |            |            | Dave       | <b>^</b> | -         |      |                            |                | Ŭ.                           | F.                        |        |          |
| 2                | \$          | 40.00                 |         |             |              |            |            | Keve       | enue     |           |      |                            |                |                              |                           |        |          |
| 3                | \$          | 750.00                |         | \$800.00    |              | _          |            |            |          |           |      | _                          |                |                              | Un all                    |        |          |
| 4                | \$          | 55.00                 |         | \$700.00    |              |            |            |            |          |           |      |                            |                |                              |                           |        |          |
| 5                | \$          | 200.00                |         | \$500.00    |              |            |            |            |          |           |      |                            |                | 4                            |                           |        |          |
| 6                | \$          | 500.00                |         | \$400.00    |              |            |            |            |          |           |      |                            | _              |                              |                           |        |          |
| 7                | \$          | 65.00                 |         | \$300.00    |              |            |            |            |          |           |      | _                          |                | — ĭ                          |                           |        |          |
| 8                | \$          | 60.00                 |         | \$200.00    |              |            |            |            |          |           |      |                            |                | _                            |                           |        |          |
| 9                | \$          | 70.00                 |         | \$100.00    | _            |            |            |            |          |           |      |                            |                |                              |                           |        |          |
| 10               | \$          | 750.00                |         | 5-          | lan          | an la      | n Eeb      | Feb        | Feb      | Mar       | Mar  | Mar                        | Mar M          | ar                           |                           |        |          |
| 11               | \$          | 400.00                |         |             |              |            |            |            |          |           | D.U  |                            |                |                              |                           |        |          |
| 12               | \$          | 300.00                |         | 6           | ¢nocolate Ja | скет Ва    | ii unocola | ite Jacket | O        | unocolate | Ball | Bat 1                      | acket   Ap     |                              |                           |        |          |
| 13               | \$3         | ,190.00               |         | Ŭ           |              |            |            |            | 0        |           |      |                            |                |                              |                           |        |          |
| 1/               |             |                       |         |             |              |            |            |            |          | 0         |      |                            |                |                              |                           |        |          |
| 1                |             | · …                   | Quarter | SalesChart  | Absolut      | eAddres    | s   Qu     | arterSa    | ilesFi   | (+)       |      |                            |                |                              |                           |        | <b>F</b> |
| Read             | iy          |                       |         |             |              |            |            |            |          |           |      | =                          |                | ─ - ─                        |                           | + 10   | 0%       |

Set Intercept

Display <u>Equation on chart</u>
Display <u>R</u>-squared value on chart

0.0

## Trendlines



# Try it: Chart

#### **Question:** Create a chart that makes it easy to see the best selling

product.



# **Sparklines**

A *sparkline* is a tiny chart in a worksheet cell for a quick data overview.

• Insert then select a Sparkline (line, column, win/loss). May put text in sparkline cell.

|                         | 5- ి -                  |                         |                                          | sales.                                                               | xlsx - Excel      |                  |                   |                  | Sparkline Tools   |                  |                                |                             |                 |                             | [             | ≖ – □     | ×   |
|-------------------------|-------------------------|-------------------------|------------------------------------------|----------------------------------------------------------------------|-------------------|------------------|-------------------|------------------|-------------------|------------------|--------------------------------|-----------------------------|-----------------|-----------------------------|---------------|-----------|-----|
| File                    | Home                    | Insert Page Lay         | out For                                  | mulas Da                                                             | ta Review         | v View           | Developer         | Team             | Design            | ♀ Tell m         | e what you wa                  | nt to do                    |                 |                             | Sig           | n in 🎗 Sh | are |
| Edit<br>Data<br>Sparkli | Line Colum              | nn Win/<br>Loss Neg     | h Point<br>Point<br>ative Points<br>Show | <ul> <li>First Point</li> <li>Last Point</li> <li>Markers</li> </ul> |                   | $\sim$           | $\sim$            |                  | ityle             | $\sim$           | ▲ 🗹 Sparl<br>▼ 🖶 Mark<br>▼     | kline Color ▼<br>ær Color ▼ | Axis<br>Group   | iroup<br>Ingroup<br>Clear - |               |           | ~   |
| 05                      | 5 -                     | $\times \checkmark f_x$ |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | *   |
|                         | А                       | В                       | с                                        | D                                                                    | E                 | F                | G                 | н                | 1.1.1             | J                | к                              | L                           | м               | N                           | 0             |           |     |
| 1                       |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           |     |
| 2 0                     | verall Reve             | nue by Month            |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           |     |
| 3                       |                         |                         | •                                        |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           |     |
| 4                       |                         | lan                     | Feh                                      | Mar                                                                  | Anr               | May              | lune              | tuly             | Διισ              | Sent             | Oct                            | Nov                         | Dec             | Grand Total                 | Monthly Sales |           | -   |
| 5 5                     | im of Revenue           | \$ 8/15.00              | \$765.00                                 | \$1 580 00                                                           | \$1.610.00        | \$2.080.00       | \$3.600.00        | \$2 530 00       | \$3.600.00        | \$1.080.00       | \$1,420,00                     | \$2,200,00                  | \$3,350,00      | \$ 24 840 00                |               | /         |     |
| 6                       | anonevenue              | y 045.00                | <b>J</b> 703.00                          | <b>J</b> 1,500.00                                                    | <i>Ş</i> 1,010.00 | <i>32,000.00</i> | <i>y</i> 3,030.00 | <i>92,330.00</i> | <i>y 3,030.00</i> | <b>91,000.00</b> | <i>ş</i> 1, <del>4</del> 20.00 | <i>¥2,200.00</i>            | <i>3,330.00</i> | Ş24,040.00                  | _             |           |     |
| 7                       |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | -   |
| 8                       |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | -   |
| 0                       |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | _   |
| 10                      |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | _   |
| 11                      |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | _   |
| 12                      |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           | -   |
| 12                      |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           |     |
| 13                      |                         |                         |                                          |                                                                      |                   |                  |                   |                  |                   |                  |                                |                             |                 |                             |               |           |     |
| -                       | <ul> <li>Qua</li> </ul> | arterSales Quai         | rterSalesFoi                             | rmat Qua                                                             | arterPivot        | AnnualSale       | s Annual          | Pivot Sp         | arkline A         | ı (+)            | •                              | -                           |                 | -                           |               |           | •   |
| Deed                    |                         |                         |                                          |                                                                      | 1                 |                  | 1                 |                  |                   | -                | -                              |                             |                 |                             | -             |           |     |

## What-If

What-If scenarios help understand different possibilities.

A what-if scenario is created under Data then What-If Analysis then Scenario Manager.

To define a scenario, give it a name and list the cells that will change with this scenario.

## What-If Scenarios Example

Consider what happens with a cold winter and we predict to sell **50** jackets instead of the normal **15**.

| S <u>c</u> enarios:<br>Cold Winter<br>Normal | <u>A</u> dd<br><u>D</u> elete<br><u>E</u> dit<br><u>M</u> erge |
|----------------------------------------------|----------------------------------------------------------------|
|                                              | S <u>u</u> mmary                                               |
| Comment:                                     | ow Close                                                       |

| Edit Scenario                                           |
|---------------------------------------------------------|
| Scenario <u>n</u> ame:                                  |
| Cold Winter                                             |
| Changing <u>c</u> ells:                                 |
| D3                                                      |
| Ctrl+click cells to select non-adjacent changing cells. |
| C <u>o</u> mment:                                       |
| A                                                       |
| *                                                       |
| Protection                                              |
| Prevent changes                                         |
| Hi <u>d</u> e                                           |
| OK Cancel                                               |
| Scenario Values                                         |
| Enter values for each of the changing cells             |
| 1. CDC2 F0                                              |
| T: 2022 DA                                              |
|                                                         |
| OK Cancel                                               |

## **What-If Scenarios Example**

#### User can easily select scenario and see the result.

| ۵        |                            |                                    |                  |                                     |                   |          | sales.xlsx - Exc | el:                |                      |                           | <u> </u>                                     | - 🗆 🗙  |                               |
|----------|----------------------------|------------------------------------|------------------|-------------------------------------|-------------------|----------|------------------|--------------------|----------------------|---------------------------|----------------------------------------------|--------|-------------------------------|
| F        | ile Ho                     | ome Inse                           | ert Pa           | age Layout                          | Formula           | as Data  | Review           | View               | Developer            | Team                      | Scenario Manag                               | er     | ? 🔀                           |
| Get<br>D | External<br>ata * C<br>Get | New<br>Query + Co<br>t & Transform | Refresh<br>All * | Connect<br>Propertie<br>Connections | tions 2↓<br>es Z↓ | Sort F   | ilter            | r<br>oply<br>anced | Text to<br>Columns S | Mhat-<br>Mhat-<br>Analysi | S <u>c</u> enarios:<br>Cold Winter<br>Normal |        | <u>A</u> dd<br><u>D</u> elete |
|          | А                          | В                                  | С                | D                                   | E                 | F        | G                | н                  | I                    | J                         |                                              |        |                               |
| 1        | <b>Category</b>            | Product                            | Month            | <u>Volume</u>                       | Price             | Cost     | Revenue          |                    |                      |                           |                                              |        | Merge                         |
| 2        | Food                       | Chocolate                          | Jan              | 20                                  | \$ 2.00           | \$ 1.00  | \$ 40.00         |                    |                      |                           |                                              |        |                               |
| 3        | Clothing                   | Jacket                             | Jan              | 50                                  | \$ 50.00          | \$ 35.00 | \$2,500.00       |                    |                      |                           |                                              |        | S <u>u</u> mmary              |
| 4        | Toys                       | Ball                               | Jan              | 55                                  | \$ 1.00           | \$ 0.50  | \$ 55.00         |                    |                      |                           |                                              |        | -                             |
| 5        | Food                       | Chocolate                          | Feb              | 80                                  | \$ 2.50           | \$ 1.00  | \$ 200.00        |                    |                      |                           |                                              |        |                               |
| 6        | Clothing                   | Jacket                             | Feb              | 10                                  | \$ 50.00          | \$ 35.00 | \$ 500.00        |                    |                      |                           | Changing cells:                              | \$D\$3 |                               |
| 7        | Toys                       | Ball                               | Feb              | 65                                  | \$ 1.00           | \$ 0.60  | \$ 65.00         |                    |                      |                           | Comment:                                     |        |                               |
| 8        | Food                       | Chocolate                          | Mar              | 30                                  | \$ 2.00           | \$ 1.00  | \$ 60.00         |                    |                      |                           |                                              |        |                               |
| 9        | Toys                       | Ball                               | Mar              | 70                                  | \$ 1.00           | \$ 0.40  | \$ 70.00         |                    |                      |                           |                                              |        |                               |
| 10       | Toys                       | Bat                                | Mar              | 10                                  | \$ 75.00          | \$ 50.00 | \$ 750.00        |                    |                      |                           |                                              |        |                               |
| 11       | Clothing                   | Jacket                             | Mar              | 8                                   | \$ 50.00          | \$ 30.00 | \$ 400.00        |                    |                      |                           |                                              |        |                               |
| 12       | Food                       | Apples                             | Mar              | 100                                 | Ş 3.00            | \$ 2.00  | \$ 300.00        |                    |                      |                           |                                              |        |                               |
| 13       |                            |                                    |                  |                                     | То                | tal:     | \$4,940.00       |                    |                      |                           |                                              |        | Show Close                    |
| 1/       | • •                        | Quarte                             | rSales           | QuarterSa                           | lesFormat         | Quarte   | erPivot .        | 🕂                  |                      |                           |                                              |        |                               |
| Rea      | dy 🔠                       |                                    |                  |                                     |                   |          |                  |                    | E                    |                           |                                              | + 100% |                               |

### Try it: What-If Scenario

# **Question:** Create a what-if scenario that wherever balls are sold, the volume is double than normal.

| н          | • ਹਾ ਟ                     |                  |                  |                |                   | sal      | es.xlsx - Excel |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             | <u>F</u> – |         | ×      |
|------------|----------------------------|------------------|------------------|----------------|-------------------|----------|-----------------|---------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|------------|---------|--------|
| F          | ile Ho                     | ome Inse         | rt Pa            | ge Layout      | Formulas          | Data     | Review          | View    | Developer           | Team                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | ♀ Tell me                                   | Sign in    | ₽ Share | :      |
| Get I<br>D | External<br>ata * Q<br>Get | New<br>uery + Co | Refresh<br>All - | Connections    | tions AJ<br>es AJ | Sort F   | ilter           | anced C | Text to<br>olumns S | International I | hat-If Foreca<br>alysis - Sheet<br>Forecast | st Outline |         | ~      |
| Н          | 13                         | • = >            | < 🗸              | f <sub>x</sub> |                   |          |                 |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         | *      |
|            | Α                          | В                | С                | D              | E                 | F        | G               | Н       | 1                   | J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | K                                           | L          | М       |        |
| 1          | Category                   | Product          | Month            | Volume         | Price             | Cost     | Revenue         |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 2          | Food                       | Chocolate        | Jan              | 20             | \$ 2.00           | \$ 1.00  | \$ 40.00        |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 3          | Clothing                   | Jacket           | Jan              | 15             | \$ 50.00          | \$ 35.00 | \$ 750.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 4          | Toys                       | Ball             | Jan              | 110            | \$ 1.00           | \$ 0.50  | \$ 110.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| о<br>с     | Clothing                   | Lockot           | Feb              | 80             | \$ 2.50           | \$ 1.00  | \$ 200.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 0          | Tours                      | Jacket           | Feb              | 120            | \$ 50.00          | \$ 35.00 | \$ 500.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| ,<br>,     | Food                       | Chocolato        | Mar              | 130            | \$ 2.00           | \$ 1.00  | \$ 130.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 0<br>0     | Tovs                       | Ball             | Mar              | 140            | \$ 1.00           | \$ 0.40  | \$ 140.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         | $\Box$ |
| 10         | Toys                       | Bat              | Mar              | 140            | \$ 75.00          | \$ 50.00 | \$ 750.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 11         | Clothing                   | lacket           | Mar              | 8              | \$ 50.00          | \$ 30.00 | \$ 400.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 12         | Food                       | Apples           | Mar              | 100            | \$ 3.00           | \$ 2.00  | \$ 300.00       |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 13         |                            |                  |                  | 200            | Tot               | tal:     | \$3,380.00      |         |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |
| 14         |                            |                  |                  |                |                   | -        | ,               |         | -                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         | -      |
|            | < >                        | . TryItSor       | t Tr             | yItFilter      | TryItFilter2      | 2 TryIt( | Chart           | ÷ :     | 4                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            | Þ       |        |
| Rea        | dy 🔠                       |                  |                  |                |                   |          |                 | + 100%  | ,                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                             |            |         |        |

## Try it: What-If Scenario Challenge

# **Question:** Create a what-if scenario that all costs go up by 10% and volume down by 20%.

| Η          | <b>5</b> • ∂               |                                  |                  |                                     |                           | sal      | es.xlsx - Exce | el                               |                      |                       |                                           | <b>A</b> –         |         | × |
|------------|----------------------------|----------------------------------|------------------|-------------------------------------|---------------------------|----------|----------------|----------------------------------|----------------------|-----------------------|-------------------------------------------|--------------------|---------|---|
| F          | ile Ho                     | ome Inse                         | rt Pag           | ge Layout                           | Formulas                  | Data     | Review         | View                             | Developer            | Team                  | ♀ Tell me                                 | Sign in 💡          | ♀ Share | 2 |
| Get I<br>D | External<br>ata • Q<br>Get | New<br>Juery + Co<br>& Transform | Refresh<br>All - | Connect<br>Propertie<br>Connections | tions Art<br>es<br>zs Art | Sort F   | ilter          | ear<br>apply<br><b>Ivanced</b> ( | Text to<br>Columns S | VI<br>Mi<br>Mi<br>Ana | hat-If Foreca<br>lysis + Shee<br>Forecast | Ist Outline<br>t T |         | ^ |
| K          | 10                         | • : >                            | < <              | fx                                  |                           |          |                |                                  |                      |                       |                                           |                    |         | ~ |
|            | Α                          | В                                | С                | D                                   | E                         | F        | G              | н                                | 1                    | J                     | К                                         | L                  | M       |   |
| 1          | Category                   | Product                          | Month            | Volume                              | Act. Vol.                 | Price    | Cost           | Act. Cost                        | Revenue              |                       |                                           |                    |         |   |
| 2          | Food                       | Chocolate                        | Jan              | 20                                  | 16                        | \$ 2.00  | \$ 1.00        | \$ 1.10                          | \$ 32.00             |                       | Costs                                     | 10%                |         |   |
| 3          | Clothing                   | Jacket                           | Jan              | 15                                  | 12                        | \$ 50.00 | \$ 35.00       | \$ 38.50                         | \$ 600.00            |                       | Volume                                    | -20%               |         |   |
| 4          | Toys                       | Ball                             | Jan              | 55                                  | 44                        | \$ 1.00  | \$ 0.50        | \$ 0.55                          | \$ 44.00             |                       |                                           |                    |         |   |
| 5          | Food                       | Chocolate                        | Feb              | 80                                  | 64                        | \$ 2.50  | \$ 1.00        | \$ 1.10                          | \$ 160.00            |                       |                                           |                    |         |   |
| 6          | Clothing                   | Jacket                           | Feb              | 10                                  | 8                         | \$ 50.00 | \$ 35.00       | \$ 38.50                         | \$ 400.00            |                       |                                           |                    |         |   |
| 7          | Toys                       | Ball                             | Feb              | 65                                  | 52                        | \$ 1.00  | \$ 0.60        | \$ 0.66                          | \$ 52.00             |                       |                                           |                    |         |   |
| 8          | Food                       | Chocolate                        | Mar              | 30                                  | 24                        | \$ 2.00  | \$ 1.00        | \$ 1.10                          | \$ 48.00             |                       |                                           |                    |         |   |
| 9          | Toys                       | Ball                             | Mar              | 70                                  | 56                        | \$ 1.00  | \$ 0.40        | \$ 0.44                          | \$ 56.00             |                       |                                           |                    |         |   |
| 10         | Toys                       | Bat                              | Mar              | 10                                  | 8                         | \$ 75.00 | \$ 50.00       | \$ 55.00                         | \$ 600.00            |                       |                                           |                    |         |   |
| 11         | Clothing                   | Jacket                           | Mar              | 8                                   | 6                         | \$ 50.00 | \$ 30.00       | \$ 33.00                         | \$ 320.00            |                       |                                           |                    |         |   |
| 12         | Food                       | Apples                           | Mar              | 100                                 | 80                        | \$ 3.00  | \$ 2.00        | \$ 2.20                          | \$ 240.00            |                       |                                           |                    |         |   |
| 13         |                            |                                  |                  |                                     |                           | Tot      | tal:           |                                  | \$2,552.00           |                       |                                           |                    |         |   |
| 14         | < → <u>.</u> .             | . TryItCha                       | art T            | ryItWhatIf                          | TryItW                    | hatIf2   | +              | :                                | 4                    |                       |                                           |                    | •       | - |
| Rea        | dy 🔠                       |                                  |                  |                                     |                           |          |                |                                  |                      |                       |                                           |                    | - 100%  | 5 |



#### **Pivot tables** allow for easily aggregating and exploring large data sets.

• For example, our data set can be summarized by revenue by month.

| ۵           | •∙                |                |                        |                                                           |                  |                                                      |             |             | sales.xlsx | - Exce               | I                  |                    |                                        |              |                                          |                                              | F -                     | - 🗆    | × |
|-------------|-------------------|----------------|------------------------|-----------------------------------------------------------|------------------|------------------------------------------------------|-------------|-------------|------------|----------------------|--------------------|--------------------|----------------------------------------|--------------|------------------------------------------|----------------------------------------------|-------------------------|--------|---|
| Fi          | le                | Home           | Ir                     | nsert Page Li                                             | ayout            | Formulas                                             | Data        | Review      | . View     | [                    | )evelo             | per Tean           | n Ç                                    | Tell me      | what you want                            | to do                                        | Sign in                 | A Shar | e |
| Get E<br>Di | ixternal<br>ata ∗ | New<br>Query • | S 📰 S<br>F 🛄 F<br>Co F | Show Queries<br>From Table<br>Recent Sources<br>Transform | Refresh<br>All - | Connectio<br>Properties<br>Cdit Links<br>Connections | ns 2↓<br>∡↓ | ZAZ<br>Sort | Filter     | Clea<br>Reap<br>Advi | r<br>oply<br>anced | Text to<br>Columns | ₽7  +•<br> +  ¤;<br> ≼ ▼ (6)<br> Fools | Wha<br>Analy | t-If Forecast<br>sis • Sheet<br>Forecast | Group -<br>Congroup<br>E Subtotal<br>Outline | د<br>المال المال<br>الم |        | ~ |
| E           | 9                 | -              | :                      | $\times \checkmark f_x$                                   |                  |                                                      |             |             |            |                      |                    |                    |                                        |              |                                          |                                              |                         |        | ~ |
|             |                   | А              |                        | В                                                         | С                | D                                                    |             | Е           | F          | G                    | н                  | I.                 | J                                      | к            | L M                                      | N                                            | 0                       |        |   |
| 1           |                   |                |                        |                                                           |                  |                                                      |             |             |            |                      |                    |                    |                                        |              |                                          |                                              |                         |        |   |
| 2           | Over              | all Rev        | veni                   | ue by Mont                                                | h                |                                                      |             |             |            |                      |                    |                    | To                                     | tal R        | evenue                                   |                                              |                         |        |   |
| 3           | Row La            | bels           | <b>▼</b> S             | um of Revenue                                             | e                |                                                      |             |             |            | \$21                 | 00.00              | ۱                  |                                        |              |                                          |                                              |                         | _      |   |
| 4           | Jan               |                | ;                      | \$ 845.0                                                  | 0                |                                                      |             |             |            | 92,                  |                    |                    |                                        |              |                                          |                                              |                         |        |   |
| 5           | Feb               |                |                        | \$ 765.0                                                  | 0                |                                                      |             |             |            | \$1,                 | 500.00             | )                  |                                        |              |                                          |                                              |                         | _      |   |
| 6           | Mar               |                |                        | \$ 1,580.0                                                | 0                |                                                      |             |             |            | \$1,0                | 00.00              | ) —                | _                                      |              |                                          |                                              |                         | -      |   |
| 7           | Grand             | Total          | 1                      | \$ 3,190.0                                                | 0                |                                                      |             |             |            | Ş                    | 500.00             | , <u> </u>         |                                        |              |                                          |                                              |                         | _      |   |
| 8           |                   |                |                        |                                                           |                  |                                                      |             |             | -          |                      | S-                 |                    |                                        |              |                                          |                                              |                         |        | - |
| 9           |                   |                |                        |                                                           |                  |                                                      |             |             | -          |                      | Ŷ                  | '                  | Jan                                    |              | Feb                                      | M                                            | ar                      | '      | - |
| 10          |                   |                |                        |                                                           |                  |                                                      |             |             |            | Mor                  | th -               |                    |                                        |              |                                          |                                              |                         |        | - |
| 11          |                   |                |                        |                                                           |                  |                                                      |             |             |            | 101                  | iur +              |                    |                                        |              |                                          |                                              |                         |        | - |
| 12          | _                 |                |                        |                                                           |                  |                                                      |             | _           |            |                      |                    |                    |                                        |              |                                          |                                              |                         |        | - |
| 13          | Over              | all Re         | ven                    | ue by Mont                                                | h per C          | ategory/                                             | Produc      | ct _        |            |                      |                    |                    |                                        |              |                                          |                                              |                         |        | - |
|             | • •               |                | Quart                  | terSales Qu                                               | iarterSale       | sFormat                                              | Quarter     | Pivot       | AnnualS    | ales                 | (                  | + : •              |                                        |              |                                          |                                              |                         | Þ      |   |
| Rea         | dy 🔠              |                |                        |                                                           |                  |                                                      |             |             |            |                      |                    |                    |                                        |              |                                          |                                              |                         | + 100% | 6 |

### **Creating a Pivot Table**

#### To create, select the data and then Insert, Pivot Table.



# **Creating a Pivot Table**

- Add fields to pivot table.
- Field may either be:
- Row value
- Column value
- Cell value (aggregated)
- Used in a filter

| H                                | <b>চ</b> • ∂∗                          | ÷                                         | Si         | ales.xlsx | - Exc | cel                                                                              | F                      | - 🗆 🗙            |
|----------------------------------|----------------------------------------|-------------------------------------------|------------|-----------|-------|----------------------------------------------------------------------------------|------------------------|------------------|
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| A                                | .3 -                                   | : × ✓ fs                                  | Ro         | w La      | ab    | els                                                                              |                        | ~                |
| 1<br>2<br>3<br>4<br>5<br>6       | A<br>Row Labels 💌<br>Jan<br>Feb<br>Mar | B<br>Sum of Revenue<br>845<br>765<br>1580 | С          | D         |       | PivotTable Field<br>Choose fields to add to rep<br>Search<br>Month               | dS<br>port:            | × ×<br>• \$      |
| 7<br>8<br>9<br>10<br>11          | Grand Total                            | 3190                                      |            |           |       | <ul> <li>○ Volume</li> <li>○ Price</li> <li>○ Cost</li> <li>✓ Revenue</li> </ul> |                        |                  |
| 12<br>13<br>14<br>15<br>16<br>17 |                                        |                                           |            |           |       | FILTERS                                                                          | Elow:                  | NS               |
| 18<br>19<br>20<br>21<br>22<br>23 |                                        |                                           |            |           |       | ■ ROWS<br>Month ▼                                                                | Σ VALUES<br>Sum of Rev | renue 🔻          |
| Rea                              | <b>∢ ▶</b>   •                         | Quar 🕂 🗄                                  | •          | •         |       | Defer Layout Update                                                              |                        | UPDATE<br>+ 100% |

# **Creating a Pivot Table Example**

#### Products are rows.

- Months are columns.
- Each cell is a sum of revenue per product for that month.
- Filter on product.

| ۵   | <b>5</b> • ∂∘ |            |           | :       | sales.xlsx - E | kcel      |            |            |              | Pivo             | tTab | le Tools |                | Ā            | - 🗆   | ×   |
|-----|---------------|------------|-----------|---------|----------------|-----------|------------|------------|--------------|------------------|------|----------|----------------|--------------|-------|-----|
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| A   | 3 -           | :          | × v       | fx      | Sum            | 0         | f Rev      | e          | nue          |                  |      |          |                |              |       | ~   |
|     | А             |            | В         |         | С              |           | D          |            | E            |                  | *    |          |                |              |       |     |
| 1   |               |            |           |         |                |           |            |            |              |                  |      | Pivo     | t I able F     | ields        |       | r X |
| 2   |               | _          |           |         |                |           |            |            |              | н                |      | Choose   | fields to add  | to report:   | - O   | -   |
| 3   | Sum of Reve   | nue        | Column La | abels 💌 | Tab            |           | _          | <b>C</b> - | and Total    |                  |      |          |                |              |       |     |
| 4   | ROW Labels    | <b>₩</b> . | jan<br>¢  | 55.00   | ¢ 65.00        | ivia<br>¢ | r<br>70.00 | Gr         | 190.00       | -                |      | Search   |                |              |       | P   |
| 6   | Bat           |            | Ş         | 33.00   | \$ 05.00       | ç         | 750.00     | ç          | 750.00       | Н                |      | Cat      | egopy          |              |       |     |
| 7   | Chocolate     |            | Ś         | 40.00   | \$200.00       | ś         | 60.00      | Ś          | 300.00       | Н                |      |          | duct           |              | T     | F   |
| 8   | Jacket        |            | ŝ         | 750.00  | \$500.00       | \$        | 400.00     | \$         | 1,650.00     | Н                |      | ✓ Mo     | nth            |              |       |     |
| 9   | Grand Total   |            | \$        | 845.00  | \$765.00       | \$1       | ,280.00    | \$         | 2,890.00     |                  |      | Vol      | ume            |              |       |     |
| 10  |               |            |           |         |                |           |            |            |              |                  |      | Price    | e              |              |       | Ŧ   |
| 11  |               |            |           |         |                |           |            |            |              |                  |      |          |                |              |       |     |
| 12  |               |            |           |         |                |           |            |            |              |                  |      | Drag fi  | elds between a | areas belov  | v:    |     |
| 13  |               |            |           |         |                |           |            |            |              |                  |      | T FIL    | TERS           | III COL      | UMNS  |     |
| 14  |               |            |           |         |                |           |            |            |              |                  |      |          |                | Month        |       | •   |
| 15  |               |            |           |         |                |           |            |            |              | $\square$        |      |          |                |              |       |     |
| 10  |               |            |           |         |                |           |            |            |              | $\left  \right $ |      |          |                |              |       |     |
| 18  |               |            |           |         |                |           |            |            |              | +                |      |          |                |              |       |     |
| 19  |               |            |           |         |                |           |            |            |              | +                |      | ≡ RC     | WS             | $\Sigma$ VAL | JES   |     |
| 20  |               |            |           |         |                |           |            |            |              |                  |      | Produ    | uct 🔻          | Sum of       | Reven | •   |
| 21  |               |            |           |         |                |           |            |            |              |                  |      |          |                |              |       |     |
| 22  |               |            |           |         |                |           |            |            |              |                  |      |          |                |              |       |     |
| 23  |               |            |           |         |                |           |            |            |              |                  | -    |          |                |              |       |     |
|     | < →           | Qua        | rterSales | Q1      | . 🕂 :          | 4         |            |            |              | ►                |      | Def      | er Layout Upd  | ate          | UPDA  | ATE |
| Rea | dy 🔝          |            |           |         |                |           |            |            |              | Ħ                |      | E        | J              | 1            | + 10  | 0%  |

# Try it: Pivot Table

**Question:** Create a pivot table using the annual sales data that shows revenue per month by category/product.

| B   | <b>ర</b> ా ∂ా |              |                  |          |            |              |            | sales.     | xlsx - Excel |              |                |            |            |            | Ē           | 五 —     | ⊐ ×   |   |
|-----|---------------|--------------|------------------|----------|------------|--------------|------------|------------|--------------|--------------|----------------|------------|------------|------------|-------------|---------|-------|---|
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| 12  | 2 -           | : ×          | √ f <sub>x</sub> |          |            |              |            |            |              |              |                |            |            |            |             |         | Ŷ     |   |
|     | А             |              | В                | С        | D          | E            | F          | G          | н            | 1            | J              | К          | L          | м          | N           | 0       | 1     | - |
| 1   | Overall Re    | venue b      | y Month          | per Cate | gory/Pro   | duct         |            |            |              |              |                |            |            |            |             |         |       |   |
| 2   |               |              |                  | 1        |            |              |            |            |              |              | 1              |            |            |            |             |         |       | 1 |
| 3   | Sum of Reven  | ue Colum     | in Labels 💌      |          |            |              |            |            |              | ı            | •              |            |            |            |             |         |       |   |
| 4   | Row Labels    | 🔻 Jan        |                  | Feb      | Mar        | Apr          | Мау        | June       | July         | Aug          | Sept           | Oct        | Nov        | Dec        | Grand Total |         |       |   |
| 5   | Clothing      | \$           | 750.00           | \$500.00 | \$ 400.00  | \$ 250.00    | \$ 100.00  | \$ 800.00  | \$1,800.00   | \$3,000.00   | \$ 400.00      | \$ 500.00  | \$1,500.00 | \$2,500.00 | \$12,500.00 |         |       |   |
| 6   | Jacket        | \$           | 750.00           | \$500.00 | \$ 400.00  | \$ 250.00    | \$ 100.00  |            |              |              |                | \$ 500.00  | \$1,500.00 | \$2,500.00 | \$ 6,500.00 |         |       | 1 |
| 7   | Shorts        |              |                  |          |            |              |            | \$ 800.00  | \$1,800.00   | \$3,000.00   | \$ 400.00      |            |            |            | \$ 6,000.00 |         |       |   |
| 8   | Food          | \$           | 40.00            | \$200.00 | \$ 360.00  | \$ 520.00    | \$ 380.00  | \$ 520.00  | \$ 580.00    | \$ 510.00    | \$ 530.00      | \$ 820.00  | \$ 620.00  | \$ 650.00  | \$ 5,730.00 |         | /     |   |
| 9   | Apples        |              |                  |          | \$ 300.00  | \$ 360.00    | \$ 330.00  | \$ 420.00  | \$ 480.00    | \$ 390.00    | \$ 450.00      | \$ 420.00  | \$ 540.00  | \$ 450.00  | \$ 4,140.00 |         |       |   |
| 10  | Chocolate     | e \$         | 40.00            | \$200.00 | \$ 60.00   | \$ 160.00    | \$ 50.00   | \$ 100.00  | \$ 100.00    | \$ 120.00    | \$ 80.00       | \$ 400.00  | \$ 80.00   | \$ 200.00  | \$ 1,590.00 |         |       |   |
| 11  | Toys          | \$           | 55.00            | \$ 65.00 | \$ 820.00  | \$ 840.00    | \$1,600.00 | \$2,370.00 | \$ 150.00    | \$ 180.00    | \$ 150.00      | \$ 100.00  | \$ 80.00   | \$ 200.00  | \$ 6,610.00 |         |       |   |
| 12  | Ball          | \$           | 55.00            | \$ 65.00 | \$ 70.00   | \$ 90.00     | \$ 100.00  | \$ 120.00  | \$ 150.00    | \$ 180.00    | \$ 150.00      | \$ 100.00  | \$ 80.00   | \$ 200.00  | \$ 1,360.00 |         |       |   |
| 13  | Bat           |              |                  |          | \$ 750.00  | \$ 750.00    | \$1,500.00 | \$2,250.00 | -            | -            | -              |            | -          |            | \$ 5,250.00 |         |       |   |
| 14  | Grand Total   | \$           | 845.00           | \$765.00 | \$1,580.00 | \$1,610.00   | \$2,080.00 | \$3,690.00 | \$2,530.00   | \$3,690.00   | \$1,080.00     | \$1,420.00 | \$2,200.00 | \$3,350.00 | \$24,840.00 |         | 7     |   |
| 15  | L             |              |                  |          |            |              |            |            |              |              |                |            |            |            |             |         |       | , |
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#### **×** Pivot Charts

# A *pivot chart* is a chart attached to a pivot table. Create it under Insert then Pivot Chart.

| B   | ي. ج. ا     |          |                         |           |      |          |             |           |     |        | sales.xlsx | - Excel |           |      |      |         |           |      |   |   |   | F      | -   |        | ×  |
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| 1   | File Home   | 2        | Insert Page Lay         | yout For  | mula | as Da    | ta Review   | View      | ۵   | )evel  | oper T     | eam     | 🛛 Tell me | what |      | t to do |           |      |   |   |   | Sign i | n R | L Shar | re |
| C   | :9 ·        | :        | $\times \checkmark f_x$ |           |      |          |             |           |     |        |            |         |           |      |      |         |           |      |   |   |   |        |     |        | ~  |
|     | A           |          | в                       | С         |      | D        | E           | F         | G   | н      | 1 I.       | J       | KI        | L    | М    | N       | N         | о    | P |   | Q | R      |     | s      |    |
| 13  | Overall Re  | even     | ue by Month             | per Cate  | ego  | ry/Pro   | duct        |           |     |        |            |         |           |      |      |         |           |      |   |   |   |        |     |        |    |
| 14  |             |          |                         |           |      |          |             |           |     |        |            |         |           |      |      |         |           |      |   |   |   |        | _   |        |    |
| 15  | Sum of Reve | nue      | Column Labels 🔤         | •         |      |          |             |           | 100 | %      |            |         |           |      | _    |         | _         |      |   |   |   |        |     |        |    |
| 16  | Row Labels  | <b>T</b> | lan                     | Feb       | Ma   | ar       | Grand Total |           | 90  | % +    | _          | _       | _         |      |      |         | _         |      |   |   |   |        |     |        |    |
| 17  | Clothing    |          | \$ 750.00               | \$500.00  | \$   | 400.00   | \$ 1,650.00 |           | 80  | % +    |            | _       |           |      |      | _       | _         |      |   |   |   |        |     |        |    |
| 18  | Jacket      |          | \$ 750.00               | \$500.00  | \$   | 400.00   | \$ 1,650.00 |           | 70  | % +    |            |         |           |      |      |         | _         |      |   |   |   |        |     |        |    |
| 19  | ■ Food      |          | \$ 40.00                | \$200.00  | \$   | 360.00   | \$ 600.00   |           | 60  | % +    |            | _       |           |      |      |         | Mont      | th 🔻 |   |   |   |        |     |        |    |
| 20  | Apples      |          |                         |           | \$   | 300.00   | \$ 300.00   |           | 50  | % +    |            |         |           |      |      |         | M         | lar  |   |   |   |        |     |        |    |
| 21  | Chocolat    | te       | \$ 40.00                | \$200.00  | \$   | 60.00    | \$ 300.00   |           | 40  | % +    |            |         |           |      |      |         | -<br>E Fe | -b   |   |   |   |        |     |        |    |
| 22  | ■Toys       |          | \$ 55.00                | \$ 65.00  | \$   | 820.00   | \$ 940.00   |           | 30  | * †    |            |         |           |      |      |         |           |      |   |   |   |        |     |        | -  |
| 23  | Ball        |          | \$ 55.00                | \$ 65.00  | \$   | 70.00    | \$ 190.00   |           | 20  | ~<br>~ |            |         |           |      |      |         |           | -    |   |   |   |        |     |        | -  |
| 24  | Bat         |          |                         |           | \$   | 750.00   | \$ 750.00   |           | 10  | ~ I    |            |         |           |      |      |         | _         | _    |   |   |   |        |     |        | -  |
| 25  | Grand Total |          | \$ 845.00               | \$ 765.00 | \$1  | 1,580.00 | \$ 3,190.00 |           |     |        | Jacket     | Apples  | Chocolate | e    | Ball | Bat     |           | -    |   |   |   |        |     |        | -  |
| 26  |             |          |                         |           |      |          |             |           |     |        | Clothing   | F       | od        |      | To   | 15      |           | -    |   |   |   |        |     |        | -  |
| 27  |             |          |                         |           | -    |          |             |           | ~ . | 1      | Ciotining  |         |           | I    | 101  | 73      |           | _    |   |   |   |        |     |        | -  |
| 28  |             |          |                         | _         | -    |          |             |           | Cat | egory  | Produc     | t •     |           |      |      |         |           |      |   |   |   |        |     |        |    |
|     | • →         | Qua      | rterSalesFormat         | Quarter   | Pivo | t Anr    | nualSales   | AnnualPiv | ot  | A      | nnualSale  | sTable  | 🕂         | : [  | 4    |         |           |      |   |   |   |        |     | Þ      | ·] |
| Rei | ady 🔝       |          |                         |           |      |          |             |           |     |        |            |         |           |      |      |         |           | E    |   | 凹 | - | -      | +   | 1009   | %  |

#### Try it: Pivot Chart

#### **Question:** Create a pivot chart for previous pivot table.

| Η   | ۍ.    |            | Ŧ           |               |        |          |             |           | sales.    | xlsx - Excel |              |                |             |   |   |   | <b>b</b> –   | ×    |   |
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| K   | 24    | Ŧ          | ×           | $\sqrt{-f_x}$ |        |          |             |           |           |              |              |                |             |   |   |   |              | ¥    |   |
|     |       | А          |             | В             | С      | D        | E           | F         | G         | н            | 1            | J              | К           | L | м | N | 0            |      | ] |
| 16  | -     |            |             |               |        |          |             |           |           |              |              |                |             |   |   |   |              | _    |   |
| 17  | 100%  |            |             |               |        |          |             |           |           |              | -            |                |             |   |   |   |              |      |   |
| 18  | 90%   |            |             |               |        |          |             |           |           |              | Month 👻      |                |             |   |   |   |              |      |   |
| 19  | 80%   |            | _           |               |        |          |             |           |           |              | Dec –        |                |             |   |   |   |              |      |   |
| 20  | 70%   |            |             |               |        |          |             |           |           |              | Nov          |                |             |   |   |   |              |      | 1 |
| 21  | 60%   |            |             |               |        |          |             |           |           |              | <br>∎ Oct    |                |             |   |   |   |              |      |   |
| 22  | 40%   |            |             |               |        |          |             |           |           |              | Sont         |                |             |   |   |   |              |      |   |
| 23  | 30%   |            |             |               |        |          |             |           |           |              | = 3ept       |                |             |   |   |   |              |      |   |
| 25  | 20%   |            |             |               |        |          |             |           |           |              | Aug          |                | · · · · · · |   |   |   |              |      |   |
| 26  | 10%   |            |             |               |        |          |             | _         |           |              | July         |                |             |   |   |   |              |      |   |
| 27  | 0%    |            |             |               |        |          |             |           |           |              | June         |                |             |   |   |   |              |      |   |
| 28  |       | st         | acket       | Shorts        |        | Apples   | Chocolate   | Ba        | I         | Bat          | ■ May        |                |             |   |   |   |              |      |   |
| 29  |       |            | Clo         | thing         |        |          | Food        |           | Toys      |              |              |                |             |   |   |   |              |      |   |
| 30  | Cated | norv 💌 Pri | oduct 💌     |               |        |          |             | 1         |           |              |              |                |             |   |   |   |              |      |   |
| 31  |       | ,,         |             |               |        |          |             |           |           |              |              |                |             |   |   |   |              |      |   |
| 22  |       | 1          |             | 1             | 1      |          |             |           |           |              |              |                |             |   |   |   |              |      | 1 |
|     | • ►   |            | TryItFilter | TryItFilte    | er2 Tr | yItChart | TryItWhatIf | TryItWhat | If2 TryIt | Pivot        | (+)          | 4              |             |   |   |   |              |      |   |
| Rea | dy 🔠  | 1          |             |               |        |          |             |           |           |              |              |                |             |   |   |   | + 1          | .00% |   |

E) 4

# What-if and Pivot Tables Question

<mark>B)</mark> 1

- **Question:** How many of the following statements are **TRUE**?
- 1) A what-if scenario can have multiple cells change not just one.
- 2) A pivot table field can be used in ROWS and COLUMNS at the same time.
- 3) A pivot table field can be used in VALUES more than once.
- 4) In our sales spreadsheet example, if Product and Category are both used in ROWS then the order they are list does not matter.

**D**) 3

5) It is not possible for a field that is a string to be used in VALUES.

## **Conditions and Decisions**

A *condition* is an expression that is either TRUE or FALSE.

Conditions are used to make decisions and perform different actions depending on the condition value.

#### Excel condition and decision functions:

- FALSE () returns FALSE
- TRUE () returns TRUE
- AND (cond1, cond2) returns TRUE if both cond1 and cond2 are true
- OR (cond1, cond2) returns TRUE if either or both of cond1 and cond2 are true
- NOT (cond) returns TRUE if cond is FALSE

# Decisions using IF()

The IF() function is used to make a decision based on a condition.

• IF(condition, value\_if\_true, value\_if\_false)

Example: If cell A2 is less than 5, return 10 otherwise return 20.

#### = IF(A2 < 5, 10, 20)

| Function Arguments                                                                                                                                                                       |        | ? 💌       |  |  |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-----------|--|--|--|--|--|
| IF                                                                                                                                                                                       |        |           |  |  |  |  |  |
| Logical_test                                                                                                                                                                             | A2 < 5 | = TRUE    |  |  |  |  |  |
| Value_if_true                                                                                                                                                                            | 10     | = 10      |  |  |  |  |  |
| Value_if_false                                                                                                                                                                           | 20     | = 20      |  |  |  |  |  |
| = 10<br>Checks whether a condition is met, and returns one value if TRUE, and another value if FALSE.<br>Logical_test is any value or expression that can be evaluated to TRUE or FALSE. |        |           |  |  |  |  |  |
| Formula result = 10<br>Help on this function                                                                                                                                             |        | OK Cancel |  |  |  |  |  |
# Try it: Conditions and IF()

#### **Question:** Create two conditions:

- 1) If cell B2 >= 10, then show C2, otherwise D2.
- 2) If cell B2 < 15 and C2 > 20, return B2\*C2, otherwise if D2 < 10, return 1, else 4.

|     | * ়-        |               |                | sale    | es.xlsx - Ex | cel  |           |      |           | <u>ب</u> | - □_    | ×_ |
|-----|-------------|---------------|----------------|---------|--------------|------|-----------|------|-----------|----------|---------|----|
| F   | ile Home    | e Insert Page | Layout Formul  | as Data | Review       | View | Developer | Team | ♀ Tell me | Sign in  | ₽ Share | 2  |
| D   | 6 -         | : × •         | f <sub>x</sub> |         |              |      |           |      |           |          |         | *  |
|     | А           | В             | с              | D       |              | Е    | F         |      | G         | н        | 1.1     |    |
| 1   | What-If Con | ditions       |                |         |              |      |           |      |           |          |         |    |
| 2   | 4           | 10            | 15             |         | 20           |      |           |      |           |          |         |    |
| 3   | Q1:         |               | Q2:            |         |              |      |           |      |           |          |         |    |
| 4   | 15          |               | 4              |         |              |      |           |      |           |          |         |    |
| 5   |             |               |                |         | _            |      |           |      |           |          |         |    |
| 6   |             |               |                |         | _            |      |           |      |           |          |         |    |
| 7   |             |               |                |         |              |      |           |      |           |          |         |    |
| 8   |             |               |                |         |              |      |           |      |           |          |         |    |
| 9   |             |               |                |         |              |      |           |      |           |          |         |    |
| 10  |             |               |                |         |              |      |           |      |           |          |         |    |
| 11  |             |               |                |         |              |      |           |      |           |          |         |    |
| 13  |             |               |                |         |              |      |           |      |           |          |         |    |
| 14  |             |               |                |         |              |      |           |      |           |          |         |    |
| 15  |             |               |                |         |              |      |           |      |           |          |         |    |
| 16  |             |               |                |         |              |      |           |      |           |          |         |    |
| 17  |             |               |                |         | ~            |      |           |      |           |          |         | -  |
|     | • • …       | TryItWhatIf2  | TryItPivot     | TryItIf | (+)          |      | •         |      |           |          | ► F     |    |
| Rea | dy 📰        |               |                |         |              |      |           |      |           | 1        | + 100%  |    |

# Decisions using IF() Question

**Question:** How many of these statements are **TRUE**? **A1=40**, **A2=10** 

- 1) = AND (FALSE(), TRUE())
- 2) = OR (FALSE(), NOT (TRUE()))
- **3)** = IF (A1=40, 5, 10) returns 10.
- **4)** = IF (OR (A1=40, A2>10), 1, 2) returns 2.
- 5) = IF (A2=10, IF (A1=40, FALSE()), TRUE())

 A) 0
 B) 1
 C) 2
 D) 3
 E) 4

## Goal Seek

**Goal seek** is used to have Excel solve for a variable given the target value of another cell.

• Example: How many balls would we have to sell in January to have total revenue for first 3 months of \$4000? Answer: 865

|             | <b>€</b> -          |                   |                  |               |                           |          |                |                     |                            |                                        |                |           |         |        |     |
|-------------|---------------------|-------------------|------------------|---------------|---------------------------|----------|----------------|---------------------|----------------------------|----------------------------------------|----------------|-----------|---------|--------|-----|
| Fi          | le Ho               | ome Inse          | rt Pa            | ge Layout     | Formulas                  | Data     | Review         | View                | Develo                     | per Te                                 | am             | ♀ Tell me | Sign in | ∕£ Sh  | are |
| Get E<br>Da | ita * Q<br>Get      | New<br>Luery - Co | Refresh<br>All - | Connect       | ions AU<br>es AU<br>is AU | Sort F   | ilter          | ir<br>oply<br>anced | Text to<br>Columns<br>Data | EF 1+0<br>1+1 = 44<br>EK = 16<br>Tools | What<br>Analys | Forecast  | Outline |        | ~   |
| D           | D4 • : × ✓ £ 55 · · |                   |                  |               |                           |          |                |                     |                            |                                        |                |           |         |        |     |
|             | Α                   | В                 | С                | D             | Е                         | F        | G              | Н                   | - I                        | J                                      |                | K         | L       | M      |     |
| 1           | Category            | Product           | <u>Month</u>     | <u>Volume</u> | <b>Price</b>              | Cost     | <b>Revenue</b> |                     |                            |                                        |                |           |         |        |     |
| 2           | Food                | Chocolate         | Jan              | 20            | \$ 2.00                   | \$ 1.00  | \$ 40.00       |                     |                            |                                        |                |           |         |        |     |
| 3           | Clothing            | Jacket            | Jan              | 15            | \$ 50.00                  | \$ 35.00 | \$ 750.00      |                     |                            | Goal Seek                              | c              |           | ? 💌     |        |     |
| 4           | Toys                | Ball              | Jan              | 55            | \$ 1.00                   | \$ 0.50  | \$ 55.00       |                     |                            | Set cells                              |                | C12       | (Sec)   |        |     |
| 5           | Food                | Chocolate         | Feb              | 80            | \$ 2.50                   | \$ 1.00  | \$ 200.00      |                     |                            | Ta valuar                              |                | 015       |         |        |     |
| 6           | Clothing            | Jacket            | Feb              | 10            | \$ 50.00                  | \$ 35.00 | \$ 500.00      |                     |                            | To value:                              |                |           |         |        |     |
| 7           | Toys                | Ball              | Feb              | 65            | \$ 1.00                   | \$ 0.60  | \$ 65.00       |                     |                            | By <u>c</u> hang                       | ing cell       | SD\$4     |         |        |     |
| 8           | Food                | Chocolate         | Mar              | 30            | \$ 2.00                   | \$ 1.00  | \$ 60.00       |                     |                            |                                        | ОК             |           | ancel   |        |     |
| 9           | Toys                | Ball              | Mar              | 70            | \$ 1.00                   | \$ 0.40  | \$ 70.00       |                     |                            |                                        |                |           |         |        |     |
| 10          | Toys                | Bat               | Mar              | 10            | \$ 75.00                  | \$ 50.00 | \$ 750.00      |                     |                            |                                        |                |           |         |        |     |
| 11          | Clothing            | Jacket            | Mar              | 8             | \$ 50.00                  | \$ 30.00 | \$ 400.00      |                     |                            |                                        |                |           |         |        | _   |
| 12          | Food                | Apples            | Mar              | 100           | \$ 3.00                   | \$ 2.00  | \$ 300.00      |                     |                            |                                        |                |           |         |        | _   |
| 13          |                     |                   |                  |               | Tot                       | al:      | \$3,190.00     |                     |                            |                                        |                |           |         |        |     |
| 14          |                     |                   |                  |               |                           |          |                |                     |                            |                                        |                |           |         |        | -   |
|             | •                   | Quarter           | Sales            | QuarterSa     | llesFormat                | Quarte   | erPivot        | . +                 | -                          |                                        |                |           |         |        | •   |
| Ente        | r 🔝                 |                   |                  |               |                           |          |                |                     |                            | ## I                                   | 巴              |           | +       | - + 10 | 0%  |

# **Linear Programming with Solver**

Solver performs linear programming to maximize or minimize a given function by changing multiple variables subject to constraints.

|    | А                                            |    | В          |  |  |  |  |  |
|----|----------------------------------------------|----|------------|--|--|--|--|--|
| 1  | Solver Example: Maximum House You Can Afford |    |            |  |  |  |  |  |
| 2  |                                              |    |            |  |  |  |  |  |
| 3  | House Value:                                 | \$ | 500,000.00 |  |  |  |  |  |
| 4  | Down payment:                                | \$ | 20,000.00  |  |  |  |  |  |
| 5  | Mortgage amount:                             | \$ | 480,000.00 |  |  |  |  |  |
| 6  | Amoritization in years:                      |    | 25         |  |  |  |  |  |
| 7  | Monthly mortgage expense:                    |    | \$2,533.62 |  |  |  |  |  |
| 8  |                                              |    |            |  |  |  |  |  |
| 9  | Monthly income:                              | \$ | 5,000.00   |  |  |  |  |  |
| 10 | Mortgage rate:                               |    | 4%         |  |  |  |  |  |
| 11 |                                              |    |            |  |  |  |  |  |
| 12 | Maximum mortgage expense percentage:         |    | 30%        |  |  |  |  |  |
| 13 | Maximum mortgage expense amount:             | \$ | 1,500.00   |  |  |  |  |  |
| 14 |                                              |    | \$1,033.62 |  |  |  |  |  |

| Set Objective:                                                               |                                                            | \$B\$7                                         |                                 |                      |                                    |   |
|------------------------------------------------------------------------------|------------------------------------------------------------|------------------------------------------------|---------------------------------|----------------------|------------------------------------|---|
| fo: (0) <u>M</u> ax                                                          | ) Mi <u>n</u>                                              | <u> </u>                                       | 0                               |                      |                                    |   |
| <u>3</u> y Changing Varia                                                    | ble Cells:                                                 |                                                |                                 |                      |                                    |   |
| \$B\$3                                                                       |                                                            |                                                |                                 |                      |                                    |   |
| S <u>u</u> bject to the Con                                                  | straints:                                                  |                                                |                                 |                      |                                    |   |
| \$B\$13 >= \$B\$7<br>\$B\$3 >= 0                                             |                                                            |                                                |                                 | *                    | <u>A</u> dd                        |   |
| ¢B\$9 ≻= 4000                                                                |                                                            |                                                |                                 |                      | <u>C</u> hange                     |   |
|                                                                              |                                                            |                                                |                                 |                      | <u>D</u> elete                     |   |
|                                                                              |                                                            |                                                |                                 |                      | <u>R</u> eset All                  |   |
|                                                                              |                                                            |                                                |                                 | -                    | Load/Save                          | _ |
| 📝 Ma <u>k</u> e Unconsti                                                     | ained Variables N                                          | Ion-Negative                                   |                                 |                      |                                    |   |
| S <u>e</u> lect a Solving<br>Method:                                         | Simplex LP                                                 |                                                |                                 | •                    | 0 <u>p</u> tions                   |   |
| Solving Method<br>Select the GRG N<br>Simplex engine fo<br>problems that are | onlinear engine f<br>or linear Solver Pri<br>: non-smooth. | or Solver Problems th<br>oblems, and select th | nat are smoot<br>ne Evolutionar | h nonlin<br>y engine | ear. Select the LP<br>a for Solver |   |

## Analysis ToolPak

The Analysis ToolPak is an Excel add-in that has a set of statistical and data analysis tools such as ANOVA, covariance, regression, and t-test.

Analysis ToolPak is not installed by default.

- To install: File → Options → Add-Ins
- Select Excel Add-ins inn the Manage: box and select Go...
- Choose AnalysisToolPak and select OK

You should now see Data Analysis under the Data tab

#### Regression

*Linear regression* models the relationship between a dependent variable *y* and explanatory variables *X*.

- Simple linear regression has one explanatory variable:  $y = Bx + \varepsilon$
- Used to fit a predictor model on observed data and also used to determine the strength of the relationship between y and X variables.

*Trend lines* are often calculated using linear regression.

The technique provides a way to determine patterns in the data set and model the data so that new values can be predicted.

# **Regression in Excel**

Excel provides a regression function that will calculate:

• R<sup>2</sup>

- ANOVA table
- regression equation coefficients
- standardized and unstandardized residuals

Example: Given a data set of car weight and acceleration, determine if there is any relationship between them.

Scatterplot shows weak relationship with no strong patterns, and we would expect to see this shown in the regression analysis.



### **Regression Example**

Regression computes constants *m* and *b* in formula:

weight = *m*\*acceleration + *b* 

Weight is the dependent variable and acceleration is the independent variable.

To start select, Data Analysis from the data tab and then select Regression and OK.



# **Regression Example Settings**

#### Settings:

- Response (dependent) data for the Input Y Range
- Columns for the explanatory (independent) data (X Range).
- For residual information select, Residuals, Standardized Residuals, and Residual Plots from the Residuals section.

|                                                                                                                                                    | Regression                                                             | ? ×                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|------------------------------|
| Input<br>Input <u>Y</u> Range:<br>Input <u>X</u> Range:<br>Labels<br>Confidence Level:                                                             | \$D\$2:\$D\$393<br>\$C\$2:\$C\$393<br>Constant is <u>Z</u> ero<br>95 % | ОК<br>Cancel<br><u>H</u> elp |
| Output options<br>Output Range:<br>New Worksheet <u>P</u> ly:<br>New <u>W</u> orkbook                                                              |                                                                        |                              |
| Residuals           Residuals           Residuals           Standardized Residuals           Normal Probability           Normal Probability Plots | ✓ Resi <u>d</u> ual Plots Line Fit Plots                               |                              |

#### **Regression Example Results**

|   | A                 | D            | C              | D            | C           | Г              | G            |              |              |   |
|---|-------------------|--------------|----------------|--------------|-------------|----------------|--------------|--------------|--------------|---|
| 1 | SUMMARY OUTPUT    |              |                |              |             |                |              |              |              |   |
| 2 |                   |              |                | - 2          |             |                |              |              |              |   |
| 3 | Regression St     | atistics     |                | r R2         | * 100%      | 6 = perc       | entage       | of vari      | ation in     | 1 |
| 4 | Multiple R        | 0.416839202  |                |              |             |                |              |              |              |   |
| 5 | R Square          | 0.17375492   | )              | de           | pender      | nt varia       | ble exp      | lained l     | 0V           |   |
| 6 | Aujusted R Square | 0 171630343  |                |              |             |                | '            |              | •            |   |
| 7 | Standard Error    | 2.510965983  |                | ind          | lepend      | ent var        | iable        |              |              |   |
| 8 | Observations      | 392          |                |              |             |                |              |              |              |   |
| 9 |                   |              |                |              |             |                |              |              |              |   |
| 0 | ANOVA             |              |                |              |             |                | - cc.        |              |              |   |
| 1 |                   | df           | SS             | MS           | F           | Significance F | Coeffic      | cients fo    | or the       |   |
| 2 | Regression        | 1            | 517.0999442    | 517.0999442  | 82.01491373 | 6.56562E-18    |              |              |              |   |
| 3 | Residual          | 390          | 2458.930566    | 6.304950169  |             |                | regres       | sion eq      | uation       |   |
| 4 | Total             | 391          | 2976.03051     |              |             |                | Ŭ            |              |              |   |
| 5 |                   |              |                |              |             |                |              |              |              |   |
| 6 |                   | Coefficients | Standard Error | t Stat       | P-value     | Lower 95%      | Upper 95%    | Lower 95.0%  | Upper 95.0%  |   |
| 7 | Intercept         | 19.57266581  | 0.462860061    | 42.28635703  | 9.5445E-148 | 18.66265269    | 20.48267893  | 18.66265269  | 20.48267893  |   |
| 8 | X Variable 1      | -0.001353896 | 0.000149499    | -9.056208574 | 6.56562E-18 | -0.001647821   | -0.001059971 | -0.001647821 | -0.001059971 |   |
| 0 |                   |              |                |              |             |                |              |              |              | _ |

All of the output is put into a new sheet. Read the values off of the table and form the regression equation:

• weight = -0.001\*acceleration + 19.572

### **Regression Example Results (cont.)**

Below the previous tables are the predicted y values (from the regression equation) as well as the residuals and standardized residuals. All plots are placed to the right of the charts.

| 13 |             |             |              |                    |
|----|-------------|-------------|--------------|--------------------|
| .4 | Observation | Predicted Y | Residuals    | Standard Residuals |
| .5 | 1           | 14.82861427 | -2.828614269 | -1.127947728       |
| 6  | 2           | 14.57272793 | -3.072727927 | -1.22529131        |
| 7  | 3           | 14.9206792  | -3.920679196 | -1.563423207       |
| 8  | 4           | 14.92474088 | -2.924740884 | -1.1662795         |
| 9  | 5           | 14.90307855 | -4.403078548 | -1.755786393       |
| 0  | 6           | 13.69540333 | -3.695403327 | -1.473591445       |
| 1  | 7           | 13.67780268 | -4.67780268  | -1.865336311       |
| 2  | 8           | 13.73466631 | -5.234666311 | -2.087393123       |
| 3  | 9           | 13.58167606 | -3.581676065 | -1.428241179       |
| 4  | 10          | 14.36016626 | -5.860166257 | -2.336819583       |
| 5  | 11          | 14.74873441 | -4.748734406 | -1.893621284       |



Expected a weak relationship and this is demonstated by the R<sup>2</sup> value.
Only 17.4% of the variation in weight is explained by acceleration.

## **Try It: Regression**

**Question:** Perform a regression analysis between weight (dependent) and displacement (independent) variable.



# Conclusion

*Spreadsheets* are general purpose tools for data analysis that consist of a table of cells which contain data and formulas.

Formulas contain data values, cell references, and functions.

- Aggregate functions summarize multiple data values into a single value.
- Functions exist for statistics, string manipulation, lookup/indexing, and decisions.

Spreadsheets provide tools for data sorting, filtering, visualization using charts, and summarization (pivot tables).

• Also contain tools for what-if scenarios, goal seek, linear solvers, and statistical analysis tools.

# Objectives

- Explain what a spreadsheet is.
- Explain how cells are addressed in a spreadsheet.
- List some of the ways to select cells in a spreadsheet.
- Define and explain: formula, function, argument, concatenation
- Use these functions: concatenate, lookup, index
- Explain the difference between an absolute and relative address.
- Explain how an aggregate function works. List some examples.
- Explain how to use conditional formatting.
- Explain how spreadsheets can be used as a database. Use sorting and filtering.
- Be able to create and edit charts and use chart features: trendlines, sparklines
- Explain the usefulness of: what-if scenarios, goal seek, solver
- Use and create pivot tables and charts.
- Evaluate and create conditions. Use IF() to make decisions.