Assignment #6

Due: Tuesday, December 6, noon

You are being evaluated on the presentation, as well as the correctness, of your answers. Try to answer questions in a clear, direct, and efficient way. Sloppy or incorrect use of technical terms will lower your mark.

1. Determine the order of the pole at $z = 0$.

(a) $f(z) = \dfrac{\cosh z}{z^3}$ (b) $f(z) = \dfrac{e^{4z} - 1}{\sin^2 z}$

2. Find and classify the isolated singularities:

(a) $f(z) = \dfrac{1}{z(e^z - 1)}$ (b) $g(z) = \dfrac{\sin z}{z^2 - z}$ (c) $h(z) = \dfrac{\tan z}{z}$

3. Let C be the circle $|z| = 5$ with positive orientation. Evaluate the following integrals:

(a) $\displaystyle\oint_C \sin\left(\tfrac{1}{z}\right) dz$ (b) $\displaystyle\oint_C z\sin\left(\tfrac{1}{z}\right) dz$ (c) $\displaystyle\oint_C z^2 \sin\left(\tfrac{1}{z}\right) dz$

4. Compute Res $(f\ ;0)$

(a) $f(z) = z^2 e^{1/z}$ (b) $f(z) = \dfrac{1 + e^z}{1 - e^z}$ (c) $f(z) = \dfrac{e^z - 1}{\sin z}$