PHYS 121 Midterm Formula Sheet

$g = 9.81 \text{ m/s}^2$

$k_{\mathrm{e}} = \dfrac{1}{4\pi\varepsilon_0} = 8.99 \times 10^9 \text{ N m}^2/\text{C}^2$

$m_{\mathrm{e}} = 9.11 \times 10^{-31} \text{ kg}$

$m_{\mathrm{p}} = 1.67 \times 10^{-27} \text{ kg}$

$e = 1.60 \times 10^{-19} \text{ C}$

$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$v = v_0 + a_{\mathrm{c}}\Delta t$

$\Delta x = v_0 \Delta t + \dfrac{1}{2} a_{\mathrm{c}} \left(\Delta t\right)^2$

$v^2 = v_0^2 + 2a_{\mathrm{c}}\Delta x$

$\omega = \dfrac{2\pi}{T} = \sqrt{\dfrac{g}{\ell}}$

$\vec{F}_{12} = \dfrac{k_{\mathrm{e}} q_1 q_2}{r^2} \hat{r}_{12}$

$\vec{F}_{\mathrm{e}} = q\vec{E}$

$\vec{E}_q = \dfrac{1}{4\pi\varepsilon_0} \dfrac{q}{r^2} \hat{r}$

$E_{\mathrm{line}} = \dfrac{|\lambda|}{2\pi\varepsilon_0 r}$

$\vec{E}_{\mathrm{ring}} = \dfrac{k_{\mathrm{e}} Q z}{\left(r^2 + z^2\right)^{3/2}} \hat{k}$

$E_{\mathrm{plane}} = \dfrac{|\sigma|}{2\varepsilon_0}$

$\Phi_{\mathrm{e}} = \displaystyle\int_{\mathrm{surface}} \vec{E} \cdot d\vec{A}$

$\displaystyle\oint \vec{E} \cdot d\vec{A} = \dfrac{q_{\mathrm{encl}}}{\varepsilon_0}$

$U_{\mathrm{elec}} = \dfrac{k_{\mathrm{e}} q_1 q_2}{r}$

$V = \dfrac{U}{q}$

$\Delta V = -\displaystyle\int_1^2 \vec{E} \cdot d\vec{\ell}$

$V_q = \dfrac{k_{\mathrm{e}} q}{r}$

$E_s = -\dfrac{dV}{ds}$