PHYS-201 Equation Sheet (Midterm Exam 1, 4 February 2010)

$$F_S = -kx \qquad x(t) = A\cos(\omega t + \Phi)$$

$$\omega = \sqrt{\frac{k}{m}} \qquad T = \frac{2\pi}{\omega} = \frac{1}{f}$$

$$E = K + U \qquad E = \frac{1}{2}mv^2 + \frac{1}{2}kx^2 = \frac{1}{2}kA^2$$

$$\omega = \sqrt{\frac{g}{L}} \qquad \omega = \sqrt{\frac{mgd}{I}}$$

$$x(t) = A\exp\left(-\frac{bt}{2m}\right)\cos(\omega t + \Phi) \qquad \omega = \sqrt{\frac{k}{m} - \left(\frac{b}{2m}\right)^2}$$

$$y(t) = A\,\sin(kx - \omega t) \qquad k = \frac{2\pi}{\lambda}$$

$$\omega = \frac{2\pi}{T} = 2\pi f \qquad v = \frac{\omega}{k} = \lambda f$$

$$v = \sqrt{\frac{T}{\mu}} \qquad \mathcal{P} = \frac{1}{2}\mu\omega^2 A^2 v$$

$$f_n = \frac{n}{2L}\sqrt{\frac{T}{\mu}} \qquad (n = 1, 2, 3, ...)$$

$$f_n = n\,\frac{v}{2L} \qquad (n = 1, 2, 3, ...)$$

$$f_n = n\,\frac{v}{4L} \qquad (n = 1, 3, 5, ...)$$

$$\oint \vec{\mathbf{E}} \cdot d\vec{\mathbf{A}} = \frac{q}{\varepsilon_0} \qquad \oint \vec{\mathbf{B}} \cdot d\vec{\mathbf{A}} = 0$$

$$\oint \vec{\mathbf{E}} \cdot d\vec{\mathbf{s}} = -\frac{d\Phi_B}{dt} \qquad \oint \vec{\mathbf{B}} \cdot d\vec{\mathbf{s}} = \mu_0 I + \varepsilon_0\mu_0\frac{d\Phi_E}{dt}$$

$$\vec{\mathbf{F}} = q\vec{\mathbf{E}} + q\vec{\mathbf{v}} \times \vec{\mathbf{B}} \qquad \omega = \frac{1}{\sqrt{LC}}$$

$$\frac{E}{B} = c \qquad c = \frac{1}{\sqrt{\varepsilon_0\mu_0}}$$

$$c = \lambda f \qquad f' = f\sqrt{\frac{c + v}{c - v}}$$

$$\vec{\mathbf{S}} = \frac{1}{\mu_0}\vec{\mathbf{E}} \times \vec{\mathbf{B}} \qquad u = \varepsilon_0 E^2 = \frac{B^2}{\mu_0}$$

$$I = S_{avg} = cu_{avg} \qquad P = \frac{S}{c}$$