PHYS-201 Equation Sheet for Midterm Exam #1
(05/03/2012, MAIN AUDITORIUM, 8:00-8:50 am)

Periodic Motion

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

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

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

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

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

Mechanical Waves

Note that F is a tension in a string.

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

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

$$v = \sqrt{\frac{F}{\mu}} \qquad P_{av} = \frac{1}{2}\mu\omega^2 A^2 v = \frac{1}{2}\sqrt{F\mu}\omega^2 A^2$$

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

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

Sound Waves

$$y(x,t) = A\,\cos(kx - \omega t) \qquad p(x,t) = -B\frac{\partial y(x,t)}{\partial x}$$

$$p_{max} = BkA \qquad v = \sqrt{\frac{B}{\rho}}$$

$$I = \frac{1}{2}B\omega kA^2 = \frac{1}{2}\sqrt{\rho B}\omega^2 A^2 \qquad I = \frac{p_{max}^2}{2\rho v} = \frac{p_{max}^2}{2\sqrt{\rho B}}$$

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

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