Exam 1 Equation Sheet:

$$p = p_0 + \rho g d$$

$$v_1 A_1 = v_2 A_2$$

$$p_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = p_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$$

$$Y = \frac{\frac{F}{A}}{\frac{\Delta L}{L}}$$

$$B = -\frac{p}{\frac{\Delta V}{V}}$$

$$D(x,t) = A sin\left[2\pi\left(\frac{x}{\lambda} \pm \frac{t}{T}\right) + \varphi_0\right]$$

$$v_{wave} = f\lambda = \frac{\omega}{k}$$

$$\omega = 2\pi f$$

$$f = \frac{1}{T}$$

$$k = \frac{2\pi}{\lambda}$$

$$v_{wave} = \sqrt{\frac{T}{\mu}}$$

$$v_{sound} = \sqrt{\frac{B}{\rho}}$$

$$I = \frac{P}{4\pi r^2}$$

$$f_+ = \frac{f_0}{1 - \frac{v_s}{v}}$$

$$f_- = \frac{f_0}{1 + \frac{v_s}{v}}$$

$$f_+ = \left(1 + \frac{v_o}{v}\right) f_0$$

$$f_- = \left(1 - \frac{v_o}{v}\right) f_0$$

$$f = f_0 \frac{1 \pm \frac{v_o}{v}}{1 \mp \frac{v_s}{v}}$$

$$\lambda_- = \lambda_0 \sqrt{\frac{1 + \frac{v_s}{c}}{1 - \frac{v_s}{c}}}$$

$$\lambda_+ = \lambda_0 \sqrt{\frac{1 - \frac{v_s}{c}}{1 + \frac{v_s}{c}}}$$

$$f = f_0 \sqrt{\frac{1 \pm \frac{v}{c}}{1 \mp \frac{v}{c}}}$$

$$D = D_1 + D_2 = 2a\cos\left(\frac{\Delta\varphi}{2}\right) sin\left[kx_{avg} - \omega t + \varphi_{0,avg}\right]$$

$$\Delta\varphi = 2\pi\frac{\Delta x}{\lambda} + \Delta\varphi_0$$

$$\Delta\varphi = 2\pi\frac{\Delta r}{\lambda} + \Delta\varphi_0$$

$\Delta\varphi = m2\pi$ Constructive

$\Delta\varphi = \left(m + \frac{1}{2}\right)2\pi$ Destructive