**Date: 12 Feb. 2002**

Name: _____     Id: _____     Sect: _____

Two sinusoidal waves are described by

$$y_1(x,t) = 3\sin[\pi(2x - 400t)]$$
$$y_2(x,t) = 3\sin[\pi(2x - 400t + 2)]$$

where x and $y_1$ and $y_2$ are in meters and t is in seconds.

(a) What is the phase difference, in radian, between the two waves $y_1$ and $y_2$?

$$\phi = \underline{2\pi} \ rad$$

(b) What is the amplitude of the resultant wave?

$$y'_m = 2y_m \cos \frac{\phi}{2} = 2 * 3 * \cos\pi = \underline{-6m}$$

(c) What is the speed of the resultant wave?

$$V = \frac{\omega}{K} = \frac{400\pi}{2\pi} = \underline{200 \ m/s}$$

(d) What is the wavelength of the resultant wave?

$$\lambda = \frac{2\pi}{K} = \frac{2\pi}{2\pi} = \underline{1 \ m}$$

(e) Write the equation of the transverse velocity of the particles.

$$\text{displacement: } y' = 2y_m \cos\frac{\phi}{2} \sin(Kx - \omega t + \frac{\phi}{2})$$

$$U = \frac{dy'}{dt} = -2y_m \omega \cos\frac{\phi}{2} \cos(Kx - \omega t + \frac{\phi}{2})$$

$$\boxed{U = 7540 \ \cos(2\pi x - 400\pi t + \pi)}$$