PHYS 306   Spring 2010
Wave Motion and Electromagnetic Radiation

Homework Assignment

HW#4
Assignment Date: Feb. 16, 2010
Due Date: Feb. 23, 2010

1. The displacement associated with a wave is given by

$$y(x,t) = 3.0\cos(0.5x - 2t)$$

where x and y are measured in meters and t in seconds.
(1) what is the spatial frequency? and what is the angular frequency?
(2) calculate the wavelength, period, (linear) frequency and wave velocity

2. The displacement associated with a wave is given by

$$y(x,t) = 0.5\cos(6x + 3t)$$

where x and y are measured in meters and t in seconds.
(1) what is the spatial frequency? and what is the angular frequency?
(2) calculate the wavelength, period, (linear) frequency and wave velocity

3. A Gaussian pulse is propagating in the -x (minus x) direction, and at $t=t_0$ the displacement is given by

$$y(x,t=t_0) = a\exp[-\frac{(x-b)^2}{\sigma^2}]$$

Find y(x,t)

4. Consider a wave propagating in the +x direction whose (linear) frequency is 10 s^{-1}. The medium of the wave has a mass density of 0.1 g cm^{-3}. At t =5 s the displacement associated with the wave is given by

$$y(x,t=5) = 0.5\cos(0.2x)$$

where x and y are measured in centimeters and t in seconds
(1) Find y(x,t)
(2) Obtain the displacement (as a function of x) at t=10 s
(3) What are the wavelength and velocity associated with the wave?
(4) What is the wave energy density?
(5) What is the wave intensity?