Homework 1, due Friday 8/30 in class.

(1) Define the following parameters/quantities:

Electric field intensity, Electric flux density, Electric permittivity, Magnetic flux density, Magnetic field intensity, Magnetic permeability

(2) What is Biot-Savart law?

(3) A wave equation is given by:

 $y(x,t) = 2sin(4\pi t + 10\pi x)$ (cm)

Determine (a) the direction of wave travel, (b) the reference phase φ_0 , (c) the frequency, (d) the wavelength, and (e) the phase velocity.

(4) Two waves on a string are given by the following functions:

 $y_1(x,t) = 4 \cos (20t-30x)$ (cm) $y_2(x,t) = -4\cos(20t+30x)$ (cm)

where x is in centimeters. The waves are said to interfere constructively when their superposition $|y_s|=|y_1+y_2|$ is a maximum and they interfere destructively when $|y_s|$ is a minimum.

(a) What are the directions of propagation of waves $y_1(x,t)$ and $y_2(x,t)$?

(b) At $t=(\pi/50)$ s, at what location x do the two waves interfere constructively, and what is the corresponding value of y_s ?

(c) At $t = (\pi/50)$ s, at what location x do the two waves interfere destructively, and what is the corresponding value of $|y_s|$?

(5) Given two waves characterized by:

 $y_1(t)=3cos(\omega t)$

 $y_2(x,t)=3cos(\omega t+36^{\circ})$

Does $y_2(t)$ lead or lag $y_1(t)$ and by what phase angle?