PHYS 225: Applications of Modern Physics **Marie Lopez del Puerto**

HW #9

1. a) What is oscillating as light propagates?
   i) the air molecules
   ii) the electric field
   iii) the magnetic field
   iv) nothing

   b) If two waves are out of phase by a _____ number of wavelengths, they interfere destructively.
   i) integer
   ii) half-integer

2. Show that $E_y(x,t) = E_0 \sin(kx - wt)$ is a solution to the wave equation

$$\frac{\partial^2 E}{\partial x^2} = \frac{1}{c^2}\frac{\partial^2 E}{\partial t^2}$$

3. Show that the right-hand-side of the equation for the intensity of light, $I = \frac{1}{2} c \varepsilon_0 E_0^2$, has units of energy per unit area per second.

4. **(PHYS 112 review)** Two coherent, in-phase microwave sources separated by d = 20.0 cm create an interference pattern. At a center-line distance of D = 150 cm from the sources, the separation between the central axis and fifth maximum (m = 5) equals 60.0 cm. What is the wavelength of the microwave source?

Note: Find the path length difference directly from the geometry since the approximation d << D is of questionable validity here.