Problem 6: ***Electromagnetic Plane Waves.*** The electric field of a traveling plane sinusoidal electromagnetic wave in free space is given by

$$E_x = 0 \qquad E_y = E_0 \sin(kx + \omega t) \qquad E_z = 0$$

a) Find the relation between ω and k so that this field can satisfy Maxwell's equations. Suppose $\omega = 10^{10}\, rad/s$ and $E_0 = 1.5\times 10^3\, V/m$. What is the wavelength in centimeters?

b) Find the magnetic field associated with this wave.

c) What is the time averaged intensity associated with this wave?