Chapter 7 Review Problem

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Consider an elliptically polarized electromagnetic wave whose electric component is given by

$$\vec{E}(z,t) = \hat{x}E_0 \sin[\omega(t - z/c)] + \hat{y}E_0 \sin[\omega(t - z/c) - \pi/4] \tag{1}$$

where ω is the angular frequency and c is the speed of the wave.

(a) Find the magnetic component $\vec{B}(z,t)$ of the wave.
(b) Calculate the energy density of the wave propagating in free space.
(c) Find the speed with which the energy is propagating.
(d) Find the minimum and maximum value of the Poynting vector.