

Name: _____

ID #: _____

Physics 222 - Spring 2020
★ Homework ★
Chapter 16 & 17

1) 16.3

2) 16.6

3) 16.9

4) 16.10

5) 17.2

6) 17.3

7) 17.5

8) A region carries a current density, \mathbf{J} , that produces an electric field $\mathbf{E} = E_o t e^{-ax} \hat{\mathbf{y}}$ and a magnetic field $\mathbf{B} = B_o \sin(y) e^{-ax} \hat{\mathbf{z}}$, where E_o , B_o and a are constants. What is \mathbf{J} ?

9) An electromagnetic wave in vacua has \mathbf{k} in the $+\hat{\mathbf{z}}$ directions, with a magnitude of $k = \frac{\omega}{c}$. The corresponding electric and magnetic fields are given by:

$$\mathbf{E} = E_o \sin(kz - \omega t) \hat{\mathbf{x}}$$

$$\mathbf{B} = B_o \sin(kz - \omega t) \hat{\mathbf{y}}.$$

- a) How does E_o related to B_o ? (Hint: Use the differential form of Faraday's Law.)
- b) What is the electromagnetic energy density, u_{EM} , in terms of ϵ_o and E_o ?
- c) What is the Poynting vector, \mathbf{S}_p ?