

Homework 1.

- 1) In free space,  $\vec{E}(z,t) = \hat{a}_y 100 e^{-jkz + j\omega t}$ . Obtain  $\vec{H}(z,t)$ .
- 2) In the medium with  $\epsilon_r = 2$  and  $\mu_r = 1$ ,  $\vec{H}(z,t) = \hat{a}_x 10 e^{-jkz + j\omega t}$ . Obtain  $\vec{E}(z,t)$ .
- 3) In a uniform dielectric medium,  $\vec{E}(z,t) = \hat{a}_x 300 e^{-jkz + j\omega t}$ ,  $\vec{H}(z,t) = 2\hat{a}_y e^{-jkz + j\omega t}$ . Determine the characteristic impedance of the medium.
- 4) For a plane wave in free space,  $\hat{E} = \frac{1}{\sqrt{2}}(-\hat{a}_x + \hat{a}_y)$ ,  $\hat{H} = \hat{a}_z$ . Determine the propagation direction of the wave.