Department of Electrical and Computer Engineering
Fall 2023 BREADTH EXAM

TTG Area: Circuits and Systems   ECGR-3121/3122 Electromagnetic field and Waves

Consider a plane wave which generates an electric field intensity $\vec{E} = -\hat{y}E_o\cos(\omega t - kz)$ **[V/m]**, where $E_o = 100\ V/m$ and $f = 300\ MHz$. Propagation is in free space. Assume lossless propagation.

a. What is the direction of propagation of the wave?
b. Calculate the instantaneous and time-averaged power densities in the wave.
c. Calculate the total instantaneous and time-averaged power transmitted by the wave.
d. Suppose a receiving dish antenna is 1 m in diameter. How much power is received by the receiving antenna if the surface of the dish is perpendicular to the direction of propagation of the wave?