

NAME: \_\_\_\_\_

Department of Electrical and Computer Engineering  
BREADTH EXAM

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

Consider a plane wave which generates an electric field intensity  $\vec{E} = -\hat{y}E_0\cos(\omega t - kz)$  [V/m], where  $E_0 = 1000$  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?