EE 483/583 Antennas for Wireless Communications
Quiz #2 (Spring 2017)

Name Key A

Instructions: Open book & notes. Place answers in indicated spaces and show all work for credit.

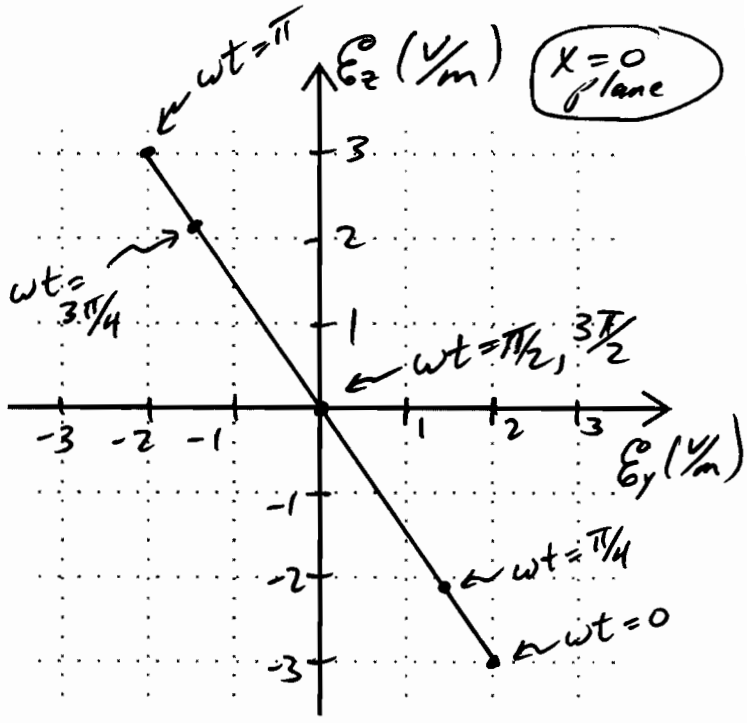
An antenna has a far-zone electric field $\bar{\mathcal{E}}(x,t) = \hat{a}_y 2\cos(\omega t + 96x) - \hat{a}_z 3\sin(\omega t + 96x + \pi/2)$ (V/m) at some point in free space. In what direction is the wave propagating? Sketch the polarization ellipse on the provided axes so that the direction of wave propagation is into the page. Include all appropriate labels such as scale, plane of space, etcetera. Determine the polarization of the electric field (e.g., LH circular, RH elliptical, linear, …). Determine the axial ratio (AR) of the polarization ellipse.

From "+96x" term, wave propagates in -x-direction.

For polarization ellipse, choose x=0 plane where

$\bar{\mathcal{E}}(0,t) = \hat{a}_y 2\cos(\omega t) - \hat{a}_z 3\sin(\omega t + \pi/2)$ (V/m)

ωt	$\bar{\mathcal{E}}$ (V/m)
0	$2\hat{a}_y - 3\hat{a}_z$
$\pi/2$	$0\hat{a}_y + 0\hat{a}_z$
π	$-2\hat{a}_y + 3\hat{a}_z$
$3\pi/2$	$0\hat{a}_y + 0\hat{a}_z$
$\pi/4$	$1.41\hat{a}_y - 2.1\hat{a}_z$
$3\pi/4$	$-1.41\hat{a}_y + 2.1\hat{a}_z$



Direction of propagation is -x-direction

Polarization is linear AR = ∞