**EE 483/583 Antennas for Wireless Communications (Spring 2026)**

**Homework 2**

**Wednesday, January 28, 2026**

1) 2.33b, c, & g. Assume $E_y = 1$ V/m and for (b) assume that $E_x = 2E_y$. Also, in each case, write-out a time-domain equation for the electric field, plot the polarization ellipse with wave propagating into page, annotate RH/LH instead of CW/CCW, and find tilt angle wrt the $+E_y$-axis (CCW direction).

2) A plane wave $\overline{E} = \hat{a}_x 20\cos(\omega t + 40^\circ + \beta y) + \hat{a}_z 20\cos(\omega t - 50^\circ + \beta y)$ (V/m) is incident on an infinitesimal dipole located at the origin and oriented along the *z*-axis. What direction is the plane wave traveling? Sketch the polarization ellipse of the plane wave and annotate with its polarization. What is the PLF when $\theta = 90°$ and $\phi = 140°$? [Hints: Look at Chapter 4 and remember how to convert from spherical to Cartesian unit vectors.]

3) **EE 483 only:** 2.53 Hint: Look at Chapter 4 section on $\lambda/2$ dipoles.

4) **EE 583 only:** 2.53 Assume the generator has a lossless 50 Ω transmission line of length $1.2\lambda$ connecting it to the antenna. Hint: Look at Chapter 4 section on $\lambda/2$ dipoles.

5) 2.57 Change the wire conductivity to that of brass $\sigma_{brass} = 1.1\times10^7$ S/m. Hint: Look at Chapter 4 section on infinitesimal dipoles.

6) 2.69

7) A 92.3 MHz uniform plane wave, propagating along the *x*-axis in the *-x*-direction in free space, is incident on the infinitesimal dipole (length $\lambda/60$) of the previous problem. If the incident wave has a power density of 0.25 W/m$^2$ and electric field pointed upward from the ground, determine the phasor incident vector electric field $\overline{E}^i$ (Cartesian & spherical) and open circuit voltage $V_{oc}$ induced at the terminals of the dipole.

**Due Monday, February 2, 2026.**