## EE533 Homework 3 Due Friday, 10/27/2014

Do problems 4-22a, 4-23ab, 6.3(1 and 2 only) in the text. Also do the following:

Problem 1 (notes): Consider a short dipole with

$$\vec{J}(\vec{r}') = I_o \delta(y') \delta(z') T(x') \hat{x}$$
where
$$T(x') = \begin{cases} 1 - \frac{2|x'|}{L} & \text{for } |x'| < \frac{L}{2} \\ 0 & \text{otherwise} \end{cases}$$

Derive the far-field expressions for  $E_r$  ,  $E_\theta$  ,  $E_\varphi$  ,  $H_r$  ,  $H_\theta$  , and  $H_\varphi$ 

## Problem 2 (notes and text):

Consider a short dipole with a constant current distribution, where L = 20 cm, f = 100KHz, and a = 2mm where "a" is the radius of the element wire. Evaluate the antenna efficiency.

This antenna is used as a transmitter with a transmitting power of 1Watt. What is the Power density at the distance of 5Km., at a maximum radiation point. Assume free space propagation.

## Problem 3 (notes):

A circular reflector antenna has a measured gain of 30 dBi. If the aperture diameter is 18", and the operating frequency is 12.8 GHz, Evaluate the aperture efficiency.