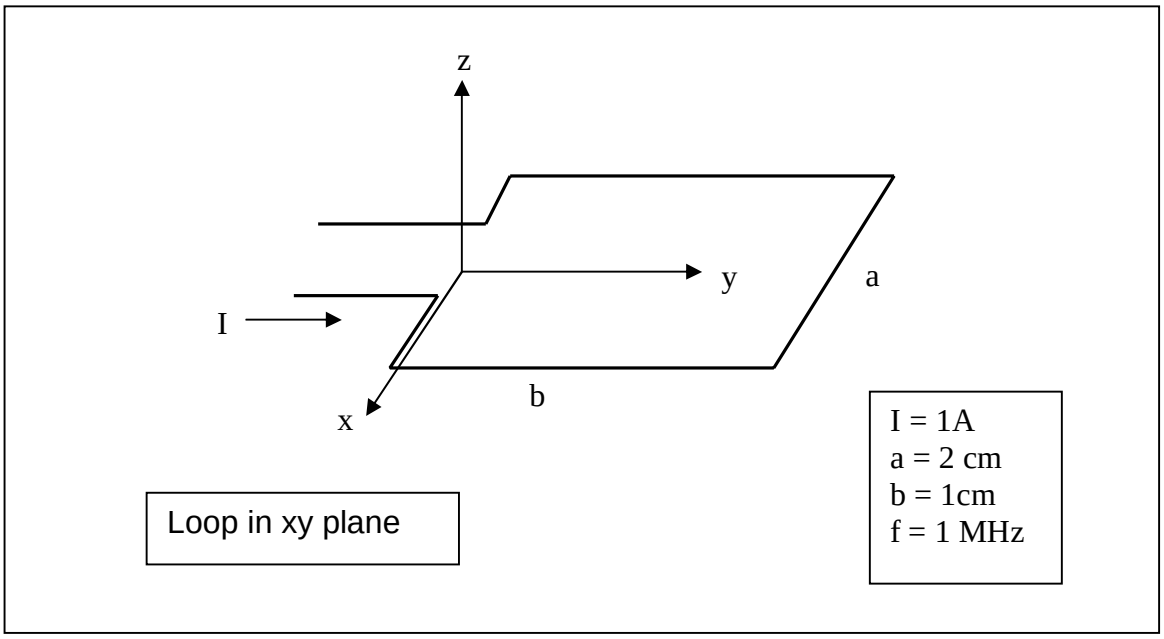
EE533-14 Homework 4
Due Friday, 11/21

Do the following:

Problem text problems: 5.3, 5.10(assume uniform current)

Problem 1 (notes and text):



a) Evaluate E at (x=0, y=5Km, z=0)

b) Evaluate the radiation efficiency if the material is copper and the diameter of the conduction rod is 0.2mm.

Problem 2 (notes and text):

A multi-turn loop on is wound on a square rod with a μ_{eff} = 10,000, N = 100, f = 1 MHz (AM radio), a = 2 cm, and b =1cm.

a) Find the radiation efficiency assuming the same conducting wire as problem 1

b) Evaluate the antenna impedance given:

$$Z_a = R + jX \qquad jX = j\omega L$$

$$L = \frac{N^2 S}{l}\mu$$

$$l = 10cm \quad \mu = \mu_{eff}\mu_0$$

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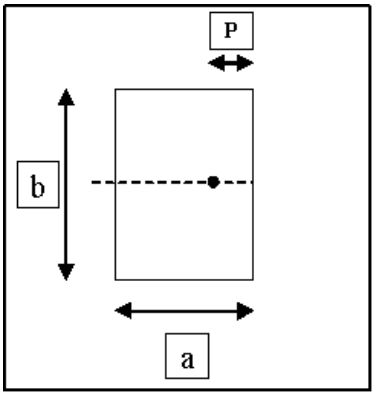
Problem 3 (text and notes):



Design a microstrip antenna at 980 MHz with a substrate material e_r=2.92, t =62 mils (0.062 inches). Find the dimensions a and b.

Assuming a Q=80, find the feed location P.

Evaluate the bore sight angles given:

$$\theta_{BE} = 2\cos^{-1}\left[\sqrt{\frac{7.03\lambda_o^2}{(3a^2+t^2)4\pi^2}}\right]$$

$$\theta_{BH} = 2\cos^{-1}\left[\sqrt{\frac{1}{2+k_0 b}}\right]$$