

Dec. 22, 2012

EE214000 Electromagnetics, Fall, 2012

Homework#7,

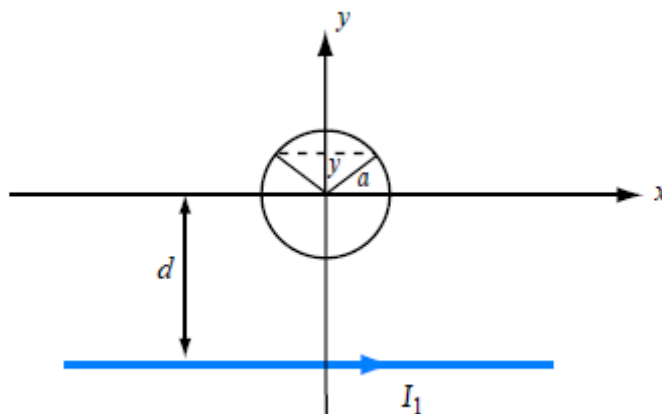
Problems 1-9 due in class, Wednesday, Dec. 26, 2012

Problem 10 due on Monday, Dec. 31<sup>st</sup>, 2012 (turn in electronically)

Total credit points = 120

**Problem 1** A solenoid is a stack of current loops. (1) Given the expression of the magnetic field at the center of a current loop in EXPAMPLE 6-6, would you be able to derive an expression for the solenoid field in EXAMPLE 6-3? (5 points) (2) Use Eq. (6-65) and correct interpretation to derive the solenoid field Eq. (6-14). (5 points)

**Problem 2** Determine the mutual inductance between the circular loop and the linear current shown in the following. (5 points)



**Problem 3** P. 6-10 in Cheng's textbook. (5 points)

**Problem 4** P. 6-18 in Cheng's textbook (20 points)

**Problem 5** P. 6-22 in Cheng's textbook (10 points)

**Problem 6** P. 6-27 in Cheng's textbook. (15 points)

**Problem 7** Refer to Example 6-16 in your textbook. Assume the air part of the coaxial cable is now filled with a magnetic material having a permeability of  $\mu$  and the outer conductor has thickness between  $b < r < b + d$ . What is the self inductance per unit length of this coaxial cable? (10 points)

**Problem 8** P.6-53 in Cheng's textbook.(5 points)

**Problem 10** Visit the electronics stores again to learn about different inductors and magnetic circuits/switches. Email the TA ([dk0933304592@hotmail.com](mailto:dk0933304592@hotmail.com)) and me

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*EE214000 Nonlinear Optics, Fall 2012*

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(ychuang@ee.nthu.edu.tw) a pdf file for this problem. (40 points)