

Reading Assignment:

Cheng: Finish Chapter 6, Start Chapter 7
Cartoon Guide: Chapters 19-20

Homework #6**Due: Friday 6 November 2009**

- 1) A long hollow conducting tube has an inside radius a and outside radius b . Using Ampere's law, find the magnetic field at all points in space, $0 < r < \infty$, assuming the tube carries a current I (in the axial direction). Make a plot of the magnetic field as a function of distance from the center, $B(r)$.
- 2) Do P.6-7 in Cheng (note: you can't use Ampere's law here. The supplementary notes on the course website may be helpful).
- 3) Do P.6-10 in Cheng. The strip is infinitely long.
- 4) Do P.6-12 in Cheng. In order to do this problem, you must find the magnetic field as a function of x . For parts (b) and (c), you must insert $x = d/2$ *after* taking the appropriate derivatives, not before!
- 5) Do P.6-13 in Cheng. Yes, I know the answer is in the back: show your work!!
- 6) Do P.6-14 in Cheng.
- 7) Find an expression for the mutual inductance between a long straight wire and a rectangular loop, shown here. We'll use this result in a future assignment in connection with Faraday's law of induction.

