Homework 1; Phys 110B; **Due Monday 2/6**

1. Problem 7.8 (same in 3rd Ed.)

2. Problem 7.10 (same in 3rd Ed.)

3. A long solenoid of radius R has n turns of coil per unit length. The current through the solenoid is linearly increasing with time: I(t)=bt. Find the induced electric field everywhere (both inside and outside of the solenoid.) Hint: see section 7.2.2.

4. In each of the below cases, for loop #1 (only!), determine:

a) whether the EMF in loop #1 is due to an electric force or a magnetic force (or both)

b) The direction of the EMF-induced current in loop #1. ("Clockwise" is defined when looking down at each loop from "above" as defined in each problem.)

Hints: a loop with current makes a magnetic field like a magnetic dipole; see the end of chapter 5.

1. Loop #1 is directly above Loop #2, with the same axis. Looking down, the current in Loop #2 is clockwise and increasing in magnitude.

2. Loop #1 is directly above Loop #2, with the same axis. Loop #1 is rising. The current in Loop #2 is clockwise and constant.

3. Loop #1 is directly above Loop #2, with the same axis. Loop #2 is rising. The current in Loop #2 is clockwise and constant.

4. Loop #1 is next to Loop #2, at the same height, like this: loop 1-> O O <-loop 2 The current in Loop #2 is clockwise and decreasing in magnitude.

5. Loop #1 is next to Loop #2, at the same height, like this: loop 1-> O O <-loop 2 Loop #1 is moving towards Loop #2. The current in Loop #2 is clockwise and constant.

6. Loop #1 is next to Loop #2, at the same height, like this: loop 1-> O O <-loop 2 Loop #2 is moving towards Loop #1. The current in Loop #2 is clockwise and constant.