Massachusetts Institute of Technology *Spring Term 2005*

8.02x Electricity and Magnetism

Problem Set 10

Issued: **Sun, April 17**
Due: **Fri, April 22, 4PM <- note Date & Time!**

Reading suggestions from Young & Freedman
Mon, 4/18 Patriots day vacation
Wed, 4/20: AC Circuits, Inductors, RL Circuits 31.2, 30.2,30.4
Fri, 4/22: RLC circuits, Oscillations: 30.5, 30.6

Problem 1 (6 points):
Compare the oscillations of an LRC circuit to the vibration of a mass m on a spring. What do L and C correspond to in the mechanical system? What is the mechanical analog to R?

Problem 2(6 points)
You have probably noticed that when a circuit carrying a large current is interrupted, a spark occurs between the poles of the switch (or the poles of a plug that is pulled).

(a) Explain this phenomenon. Where does the energy for the spark come from?
(b) Assume an inductor L=1mH and a resistor R=10Ω are connected in series to a battery providing V=100V. How much energy is stored in the inductor a long time after the circuit is closed?.

Problem 3 (6 points) Young&Freedman, Problem 30.10
Problem 4 (6 points) Young&Freedman, Problem 30.14
Problem 5 (6 points) Young&Freedman, Problem 30.26