Problem Set 10

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 $L=1$mH and a resistor $R=10 \Omega$ are connected in series to a battery providing $V=100$V. 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