EECS 211 – Electrical Engineering II
Fall 2001
Problem set #2, Issued: Sept. 14, 2001
Due: Sept. 21, 2001, at beginning of lecture

Current reading: Chapter 7 in Nilsson and Riedel

Problems:

#1 A researcher working with an electromagnet (inductance of 10 mH), as shown in the
figure, notices that when the electromagnet is turned off, a large spark appears at the
switch contacts. Briefly explain, in no more then 2-3 sentences, why the spark occurs.
Suggest a way to suppress the spark by adding one element only.

#2 Nilsson & Riedel, problem 9.29 (a) (don’t do part (b) from the book)
   (b) How much energy is stored in the capacitor at t = 0?
   (c) How much energy is stored in the capacitor 250 µs after the switch is thrown?

#3 Nilsson & Riedel, problem 7.46
#4 Nilsson & Riedel, problem 7.52 [initial value of i_0(t) is i_0(0^+)].
#5 Find the step response v_C(t) of the following circuit when v_s = 20u(t) V. The initial voltage
   v_C(0) is zero. Sketch v_C(t) and state in one phrase what the step function is doing to the
circuit.

#6 Find v(t) for t > 0 for the circuit drawn. Assume steady-state at t = 0^+.

#7 A circuit model of an electrical megaphone that amplifies speech is drawn below. Find v(t)
for v_s = 10(sin 100t)u(t), which could represent a person whistling or singing a pure tone.