E11 Assignment 7, 2006
(Somewhat long, but only three different circuits)

Problem 1: Problem 8.43 from textbook

For the circuit below, the output is the voltage across the capacitor:

Problem 2: Find the characteristic equation.

Problem 3: If the switch is in the position shown for a long time, and then goes to the upper position, find the voltage across the capacitor as a function of time. Use R1=5, R2=1, C1=1/2, L=1.

Problem 4: If the voltage on the left node of R1 is called $V_{in}$, and the voltage across the capacitor is $V_{out}$, find the differential equation relating $V_{in}$ and $V_{out}$.

For the circuit below, the output is the current through the inductor:

Problem 5: Find the differential equation relating input ($I_{in}(t)$) and output ($I_{o}(t)$, the current through the inductor). What is the characteristic equation?

Problem 6: Use R1=0.25, R2=2, C1=2, C2=2, L=0.5. What are the characteristic values (roots of characteristic equations)? What are the values for the three initial conditions on $I_{o}(t)$ at $t=0^+$?

Problem 7: Find $I_{o}(t)$ for $t>0$. 