ECSE 2010
Electric Circuits
Exam 2
Spring 2008

Name _____

Section (please circle one)

MWR 10-11 MWR 11-12

Problem No.	Pts.	Score
1	10pts	
2	30pts	
3	20pts	
4	30pts	
5	10pts	
Total	100pts	

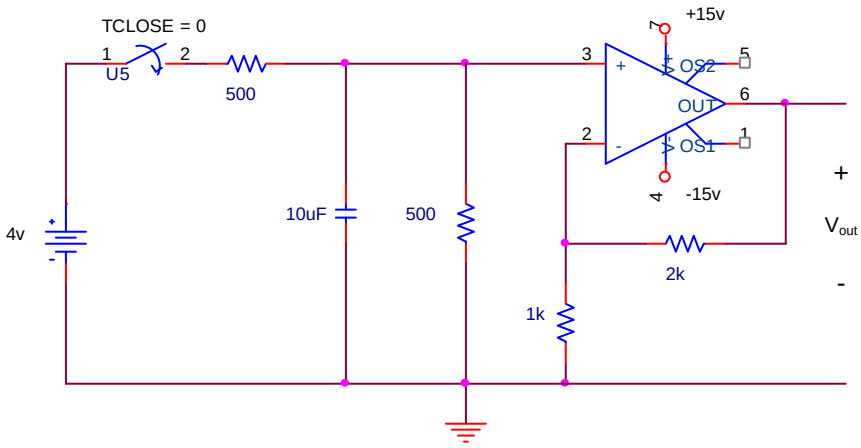
Please Note:

* Place all your answers in the spaces provided.
* You MUST show your work to receive any credit.

*** Assume ALL sources are turned ON at t=0, unless noted otherwise.**

Problem 1 (10pts)

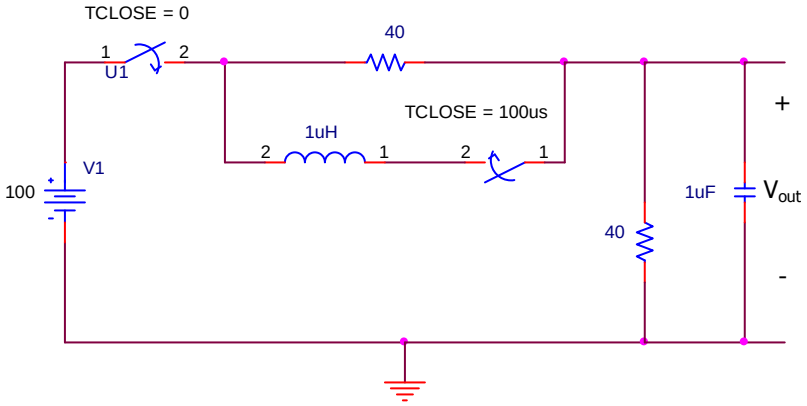
Find an expression for $V_{out}(t)$ in the circuit shown for $t \geq 0$.



V(t)	

Problem 2 (30pts)

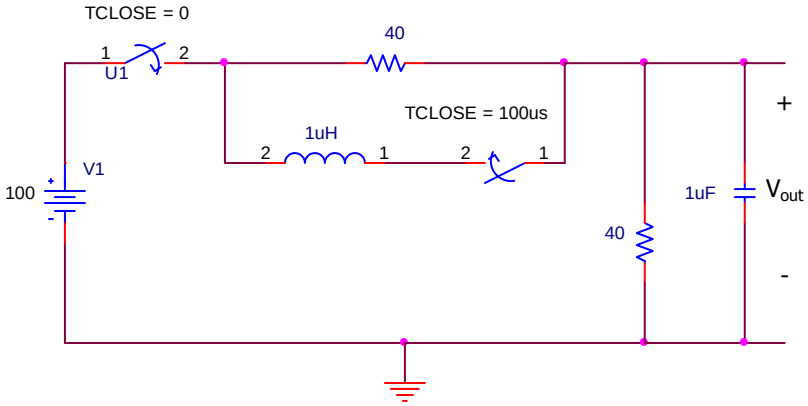
a.) Find V_{out} (across the capacitor) at each of the times indicated for the circuit shown, assuming that no energy was stored before t=0. (20pts)



V_{out} ($20us^{+}$)	
V_{out} ($60us^{+}$)	
V_{out} (100us)	
V_{out} (500us)	

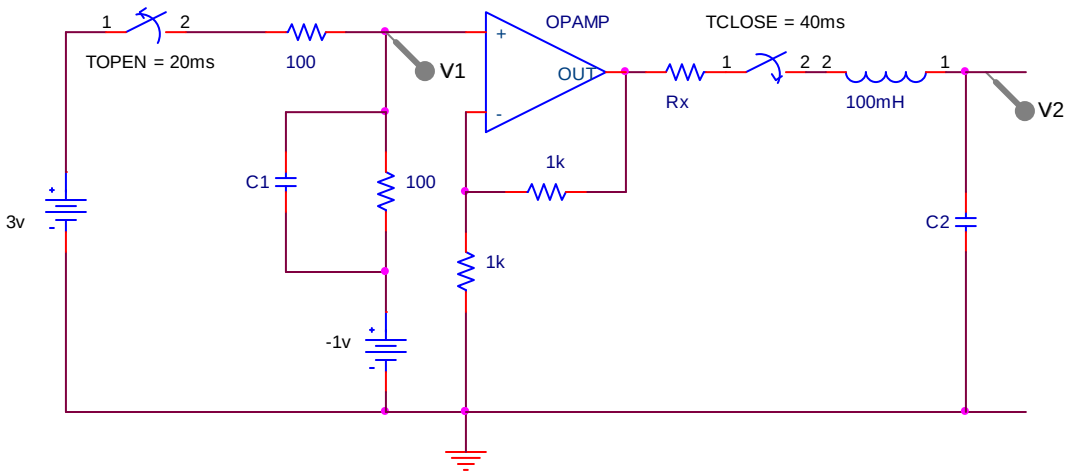
Problem 2 (cont)

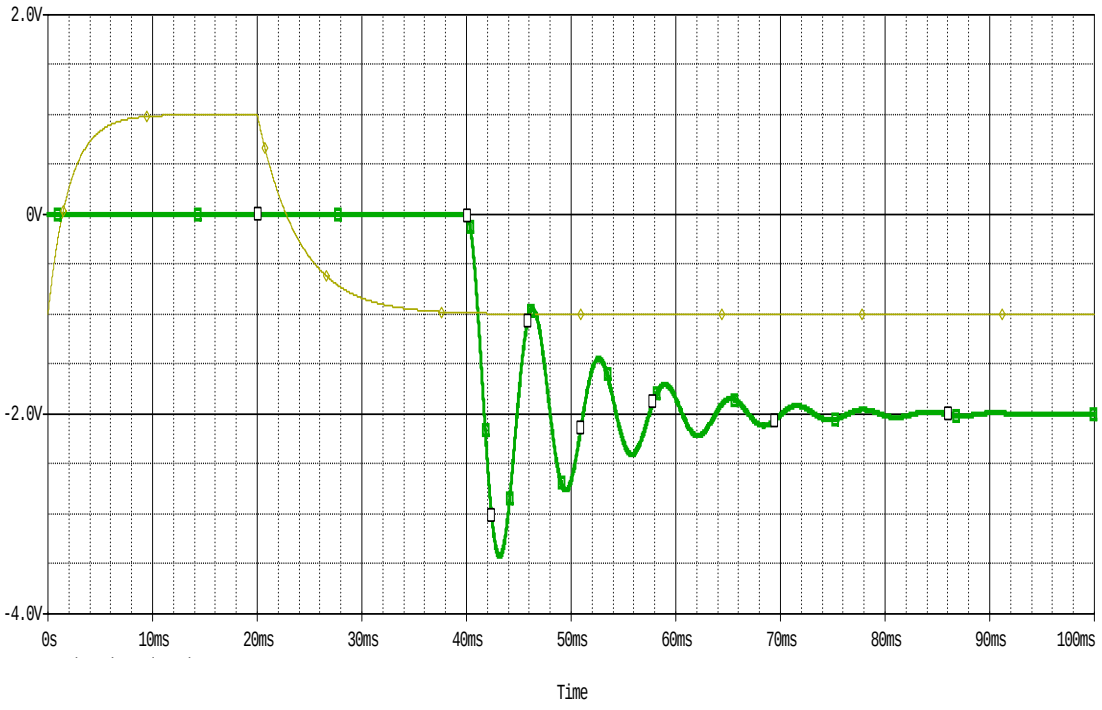
b.) Sketch V_{out} (t) (across the inductor) for 0 ≤ t < 600us; showing **ALL** pertinent values at the critical points in time (e.g. time constants). Assume both the capacitor and inductor have no stored energy before t=0. (10pts)



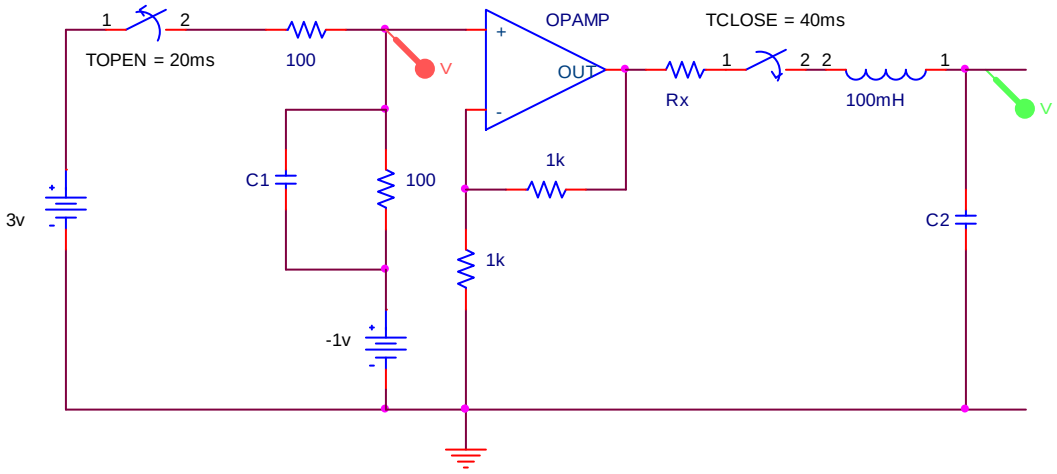
Problem 3 (20pts)

Find the values of the circuit's components (C1, Rx, and C2) in circuit shown below, given the corresponding plots that result from the voltage markers. Designate which marker corresponds to the waveforms shown.





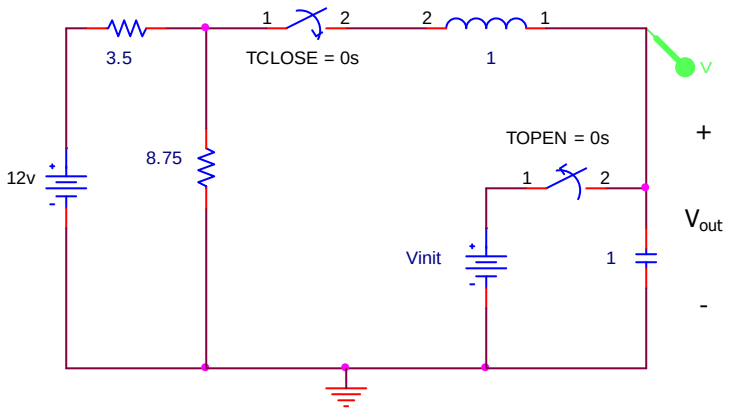
Problem 3 (cont)



R	
C1	
C2	

Problem 4 (30pts)

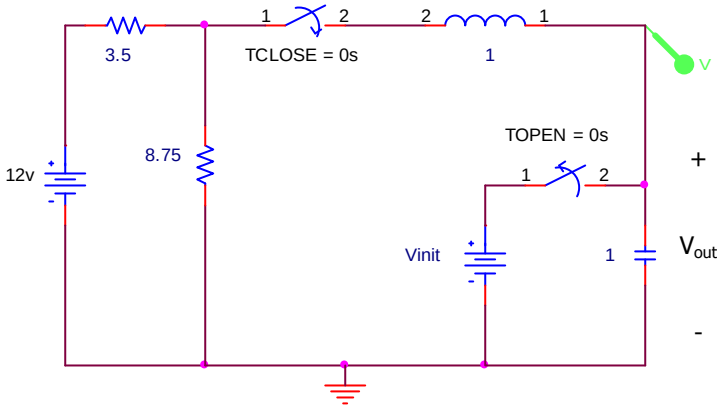
Given the following circuit with the output taken across the capacitor:



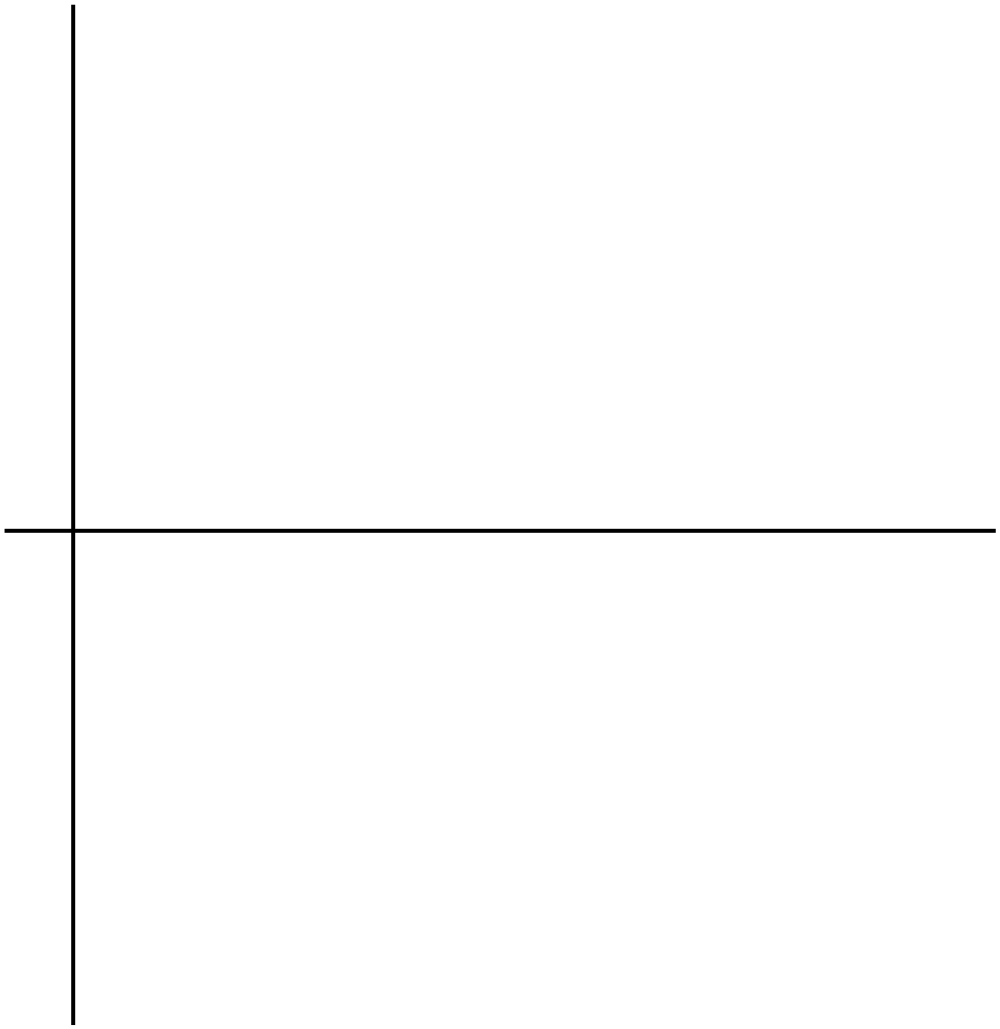
a.) Find $V_{out}(s)$ for t>0, if V_{init} = 1v. (10pts)

$V_{out}(s)$	

Problem 4 (cont)

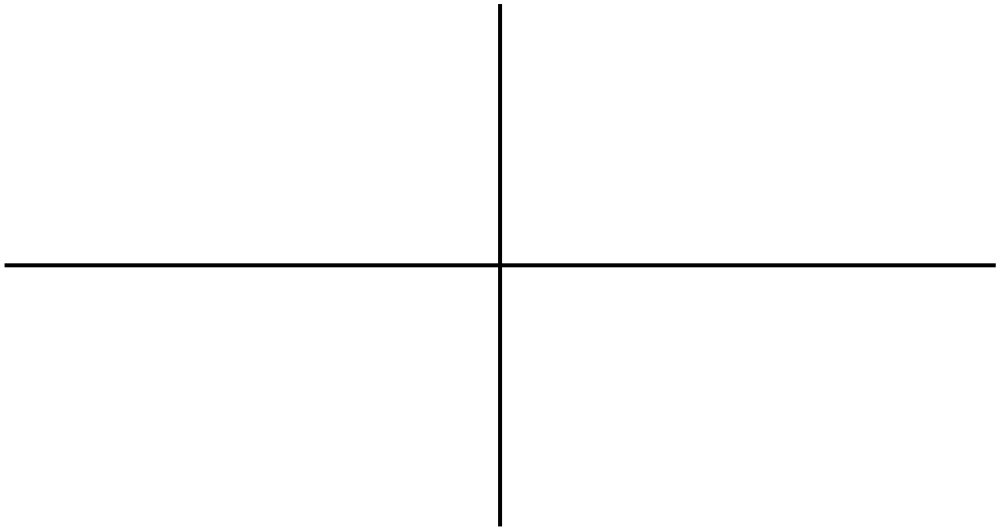


b.) Sketch $V_{out}(t)$ for the circuit if V_{init} = 1v. (10pts)



Problem 4 (cont)

c.) Sketch the pole/zero diagram of $V_{out}(s)$ if V_{init} = 1v. (5pts)

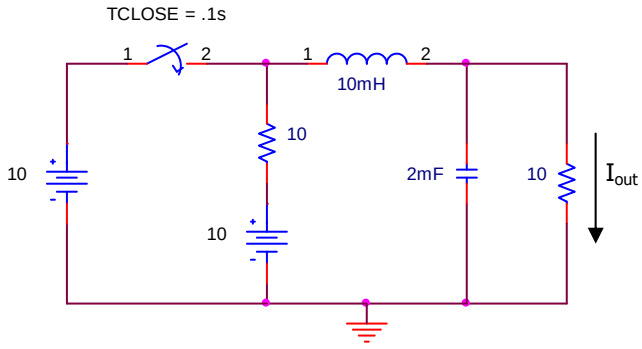


d.) Solve for $V_{out}(t)$ if the voltage source on the capacitor $\mathbf{V_{init} = 0v}$. (5pts)

$V_{out}(t)$	

Problem 5 (10pts)

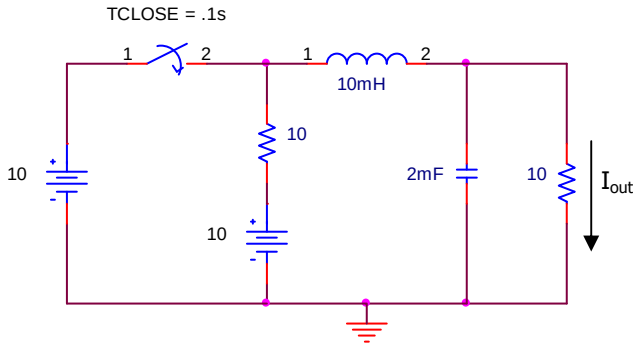
a.) Assuming there is no stored energy in the L or C prior to t=0, find $I_{out}(t)$ (through the resistor) in the circuit shown at: $t = .1s^{+}$ (4pts)



I_{out} $t = .1s^{+}$	

Problem 5 (cont)

b.) Find $I_{out}(s)$ and the response type (overdamped, critically damped, or underdamped) in the circuit shown below for t > .1s (6pts)



$I_{out}(s)$	
Type	

Extra space (if needed) Name _____

Extra space (if needed) Name _____