

ECSE 2010  
Electric Circuits  
Exam 2  
Fall 2007

Name \_\_\_\_\_

Section (please circle one)

10-12  
Millard

12-2  
Zhang

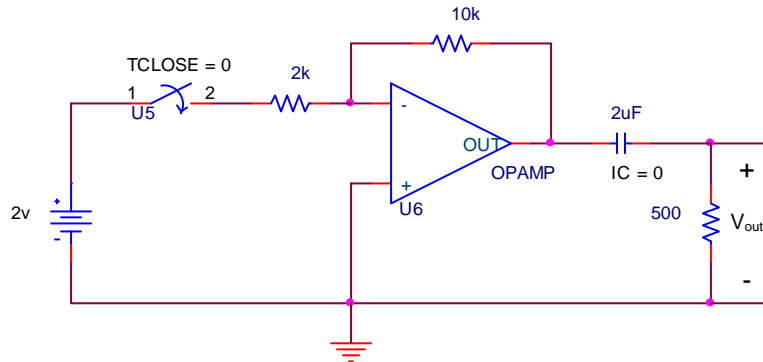
Problem No.	Pts.	Score
1	10pts	
2	30pts	
3	15pts	
4	30pts	
5	15pts	
Total	100pts	

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)

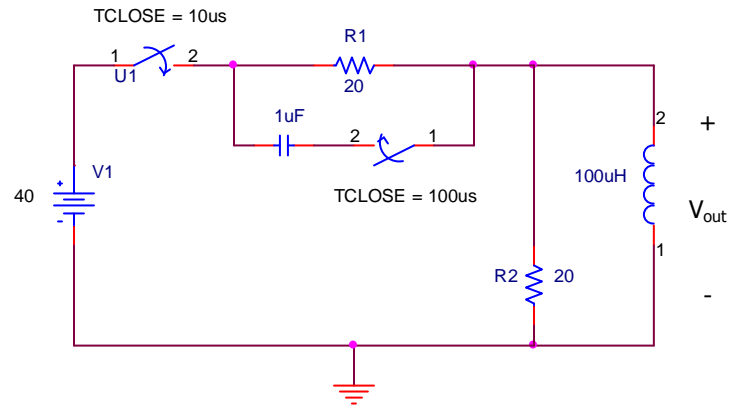
Find an expression for  $V(t)$  in the circuit shown for  $t \geq 0$  across the 500 ohm resistor (assume the Op Amp's supplies are appropriate).



$V(t)$	
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## Problem 2 (25pts)

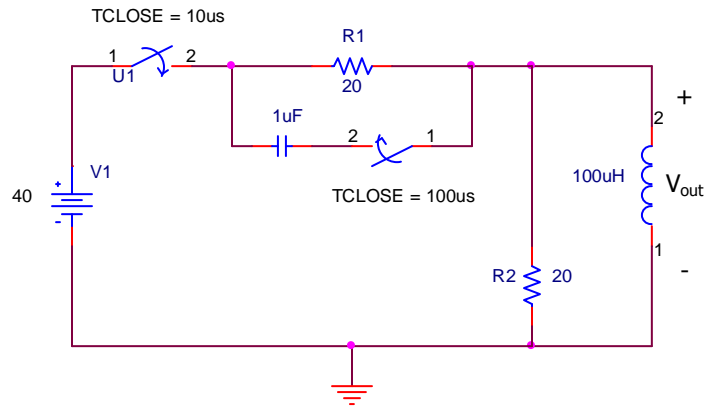
a.) Find  $V_{out}$  (across the inductor) at each of the times indicated for the circuit shown, assuming that no energy was stored before  $t=0$ . (15pts)



$V_{out} (10\mu s^+)$	
$V_{out} (100\mu s^+)$	
$V_{out} (500\mu s)$	

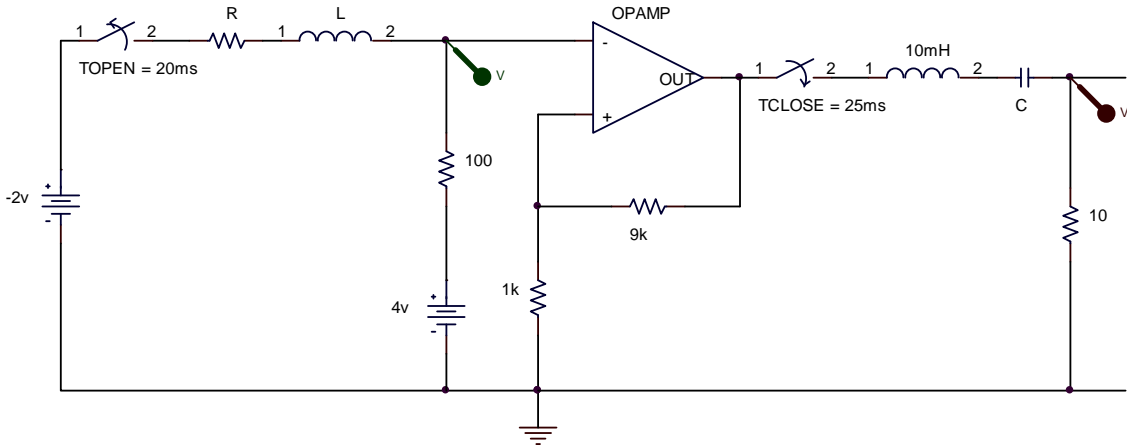
## Problem 2 (cont)

b.) Sketch  $V_{\text{out}}(t)$  (across the inductor) for  $0 \leq t < 600\mu\text{s}$ ; 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  $t=0$ . (15pts)

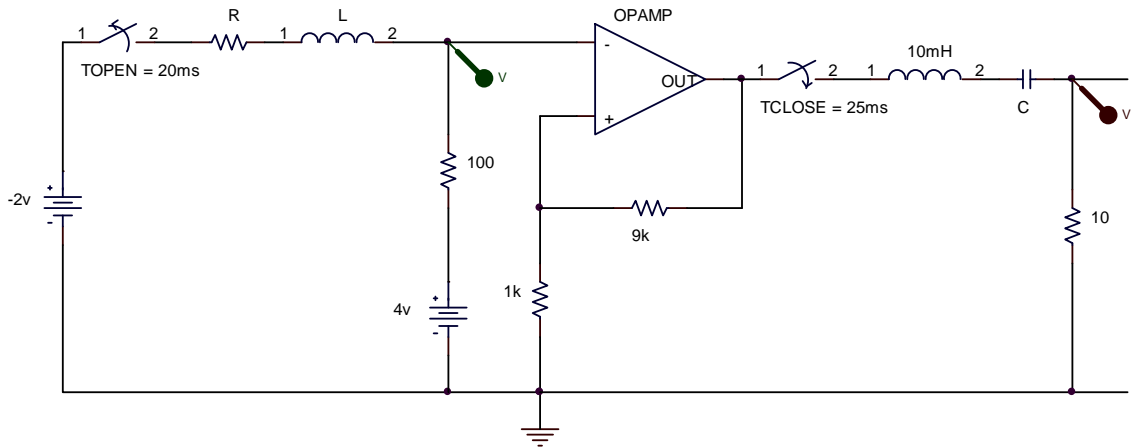


### Problem 3 (15pts)

Find the values of the circuit's components (L, R, and C) in circuit shown below, given the corresponding plots that result from the voltage markers.



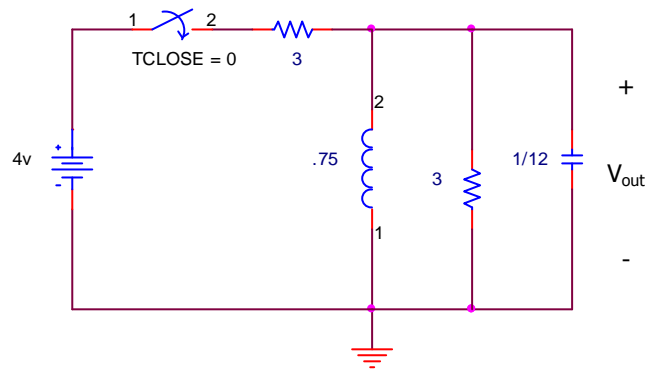
### Problem 3 (cont)



R	
L	
C	

Problem 4 (30pts)

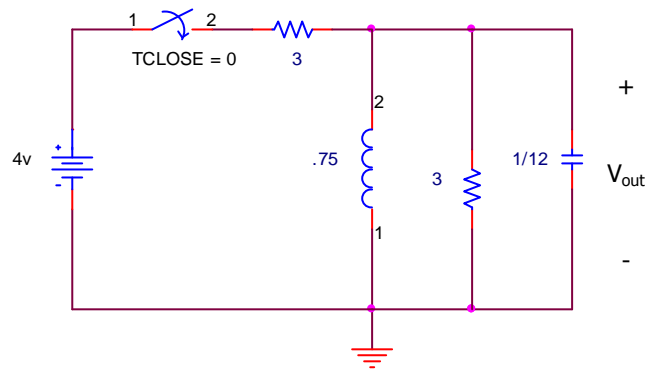
Given the following circuit with the output taken across the capacitor:



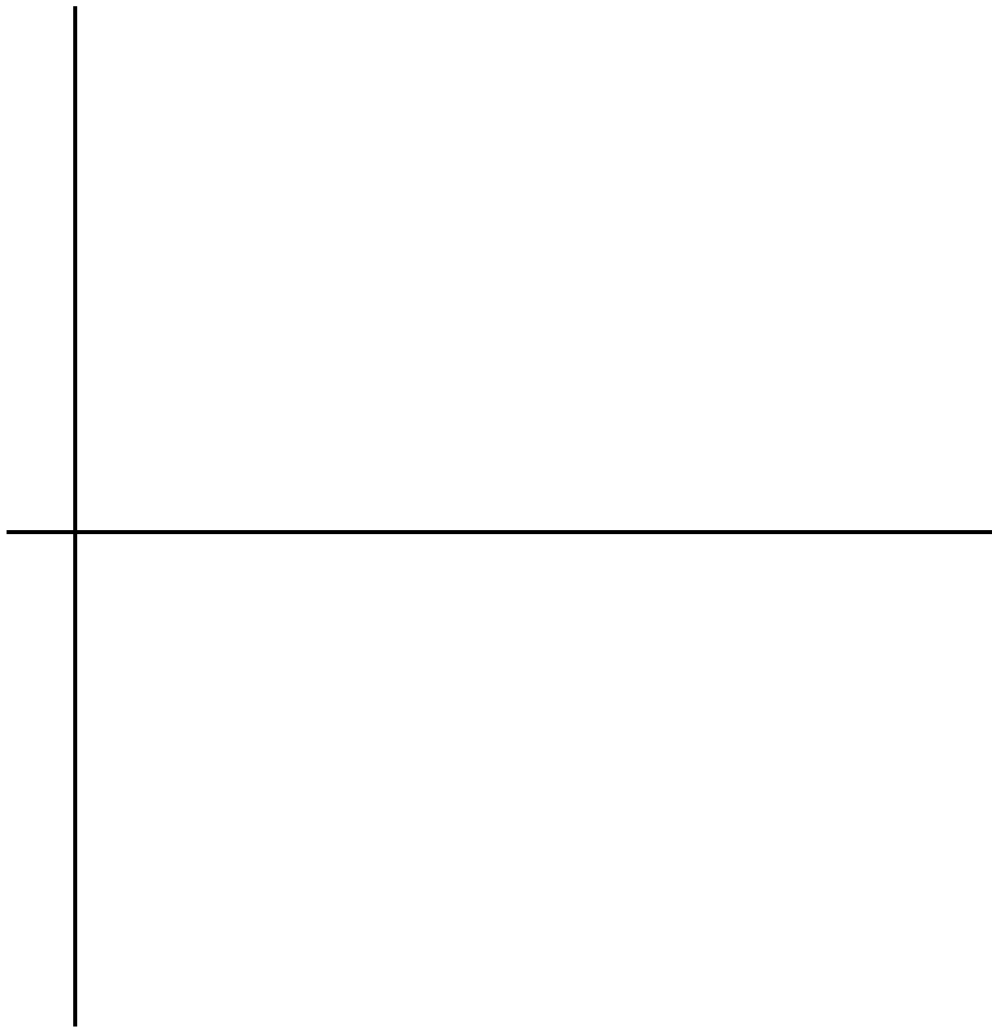
a.) Find  $V_{out}(s)$  for the circuit shown above. (10pts)

$V(s)$	
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Problem 4 (cont)

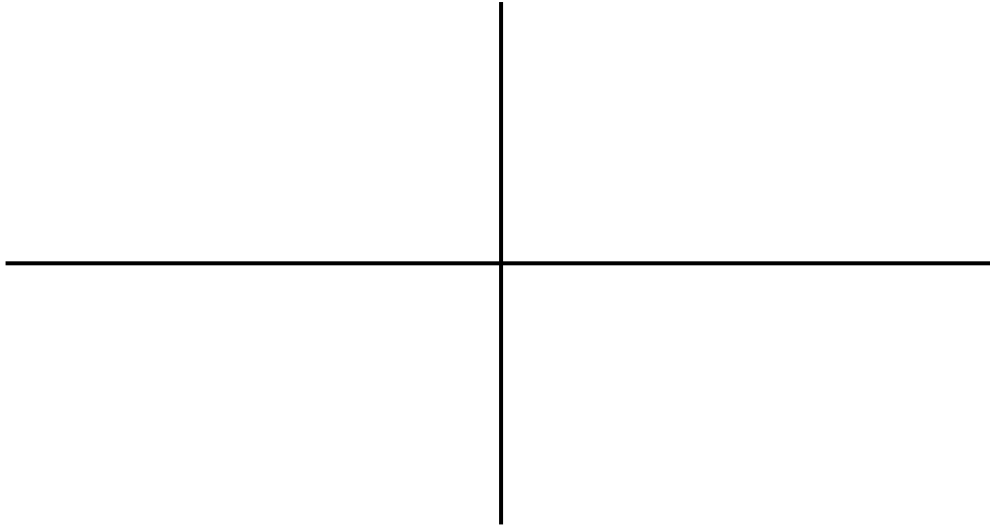


b.) Sketch  $V_{out}(t)$  for the circuit. (10pts)



Problem 4 (cont)

c.) Sketch the pole/zero diagram of  $V_{out}(s)$ . (5pts)

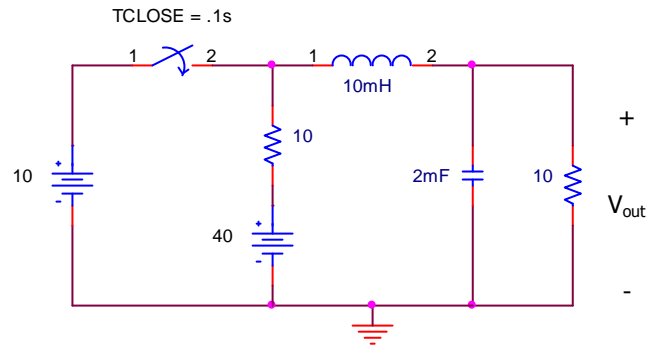


d.) Solve for  $V_{out}(t)$ . (5pts)

$V_{out}(t)$	
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Problem 5 (10pts)

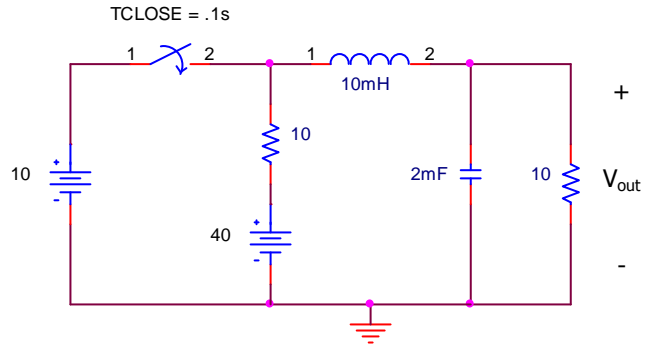
a.) Assuming there is no stored energy in the L or C prior to  $t=0$ , find  $V_{out}(t)$  (across the capacitor) in the circuit shown at:  $t = .1s$  (5pts)



$V_{out}$ $t = .1s$	
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### Problem 5 (cont)

b.) Find  $V_{out}(s)$  and the response type (over, critically, or under) in the circuit shown below for  $t > .1s$  (10pts)



$V_{out}(s)$	
Type	

Extra space (if needed)

Name \_\_\_\_\_

Extra space (if needed)

Name \_\_\_\_\_