

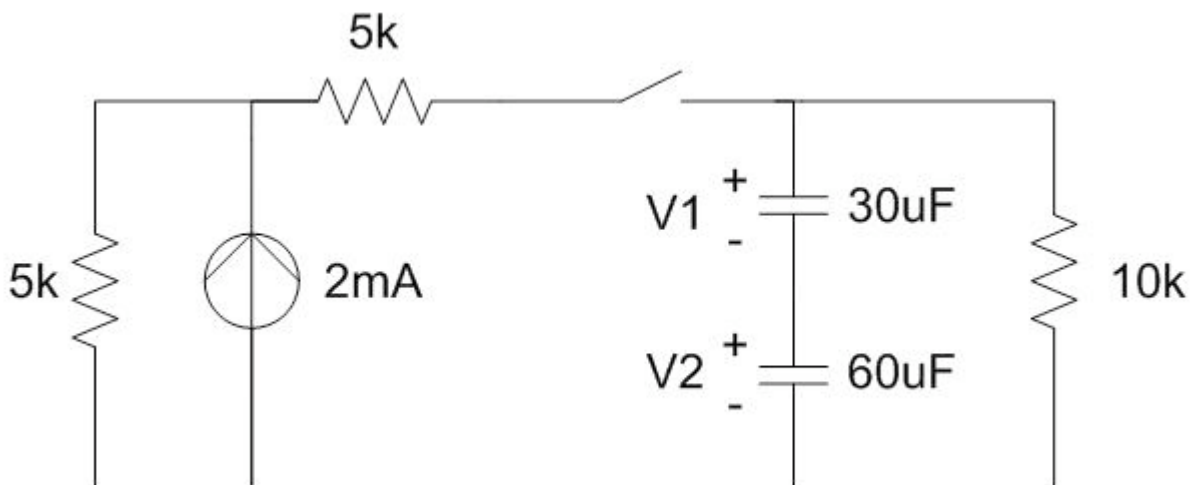
**EECS 40/42/100, Spring 2007**  
**Prof. Chang-Hasnain**

**Homework #4**

Due at 6 pm in 240 Cory on Wednesday, 2/14/07  
 Total Points: 100

- Put (1) your name and (2) **discussion section number** on your homework.
- You need to put down all the derivation steps to obtain full credits of the problems. Numerical answers alone will at best receive low percentage partial credits.
- No late submission will be accepted expect those with prior approval from Prof. Chang-Hasnain.

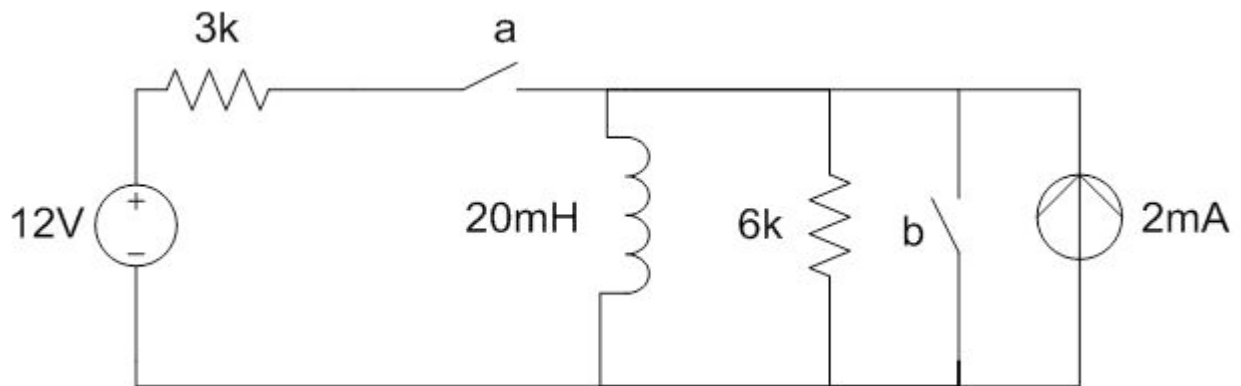
1. Hambley, P3.25
2. Hambley, P3.43
3. Hambley, P4.7
4. Hambley, P4.8
5. Hambley, P4.9
6. Hambley, P4.14
7. Hambley, P4.26
8. Hambley, P3.26. Do not assume constant current as stated in the problem.
9. Consider the following circuit:



Assume the switch has been open for a very long time before closing at time  $t=0$ . We want to derive an expression for  $V_1(t)$  for  $t>0$ .

- (a) Re-draw an equivalent series RC circuit (using Thevenin and combining the capacitors in series)
- (b) Solve for  $V_1+V_2$  in your simplified circuit.
- (c) Use your result from problem 1 to obtain an expression for  $V_1(t)$ .

10. Consider the following circuit:



Assume switch a has been open, and b closed for a very long time. Then at time  $t=0$ , switch a closes and b opens.

We will solve for the inductor current  $i_L$  (going from top to bottom) in two ways:

(a) Norton equivalent:

- i. Draw a Norton equivalent for the circuit before time  $t=0$  and find the value of  $i_L(0^-)$ .
- ii. Draw a Norton equivalent for the circuit after time  $t=0$  and use this to solve for  $i_L(t)$  for  $t>0$ . (Notice that we could not just draw one Norton equivalent for all times, because we can't include the switches.)

(b) Superposition:

- i. Zero the current source and solve for the part of  $i_L(t)$  due to the voltage source.
- ii. Zero the voltage source and solve for the part of  $i_L(t)$  due to the current source.
- iii. Add these together to get the total current.
- iv. Do your results agree with part (a)? Why or why not?