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
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 $V_1(t)$. 

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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?