Department of Electrical Engineering
New Mexico Institute of Mining and Technology

EE 101: Introduction to Electrical Engineering

Exam 1

Fall 2013

Oct. 1st, 2013

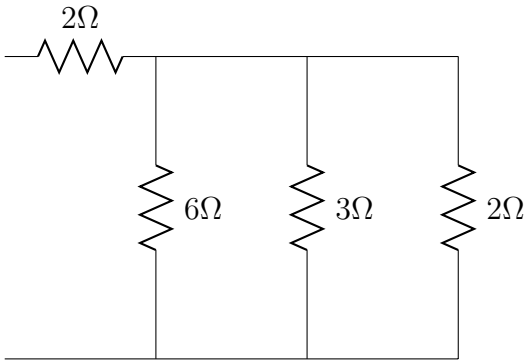
Name: _____

Instructor: Aly El-Osery

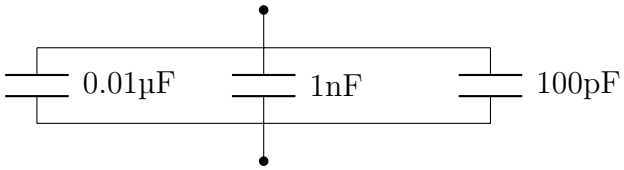
Answer all questions in the space provided on the question sheets.
When applicable justify your answers. The problem solving process is more important than the answer. Partial credit can be earned.
Make sure you list all the units
You must show all your work to get full credit.

1. (15 points)

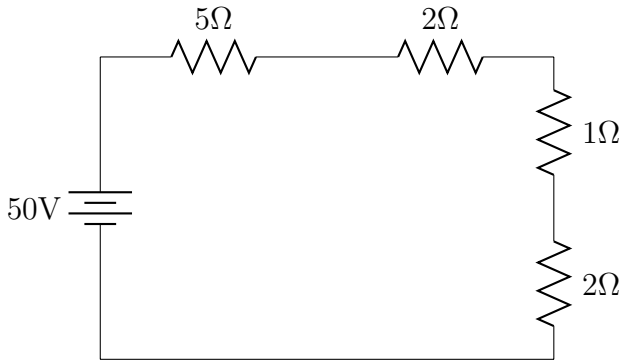
   (a) Given the schematic below, find the equivalent resistance



   (b) Given the schematic below, find the equivalent capacitance



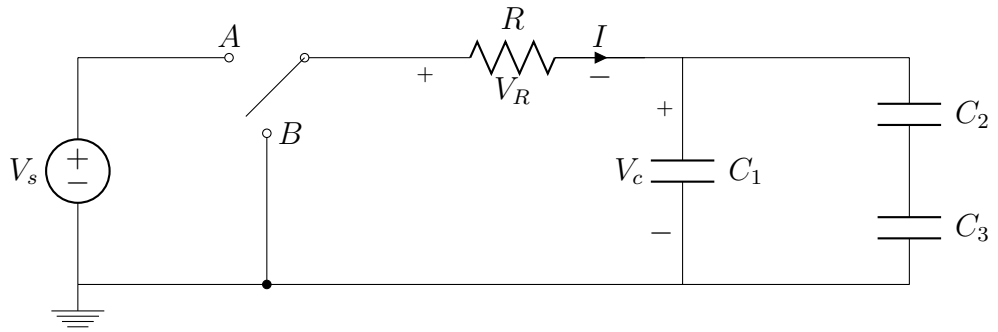
2. (10 points) Given the circuit below



(a) What is the current in this circuit? (make sure you mark its direction on the circuit).

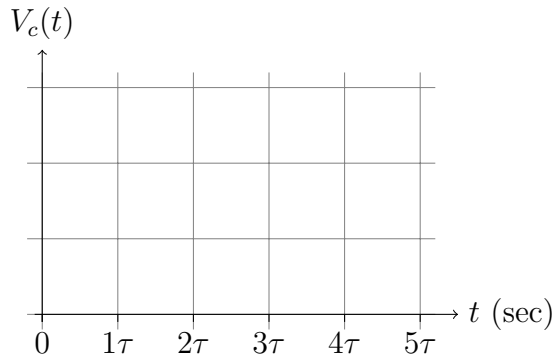
(b) Compute the power dissipated by each resistor then perform a power balance.

3. (25 points) Given the schematic below and assuming the switch was in position B for a long time.



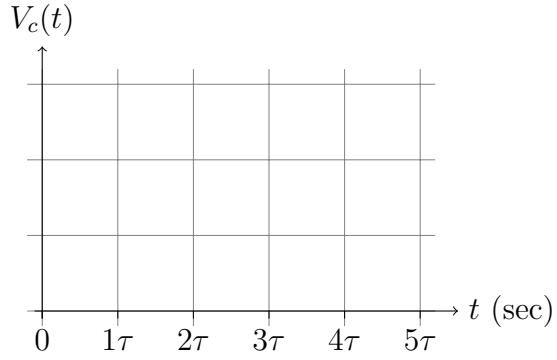
(a) Given $R = 25\text{k}\Omega$, $C_1 = 5\mu\text{F}$ and $C_2 = C_3 = 10\mu\text{F}$ what is the time constant τ of the circuit.

(b) Describe and sketch what happens to V_c when the switch is turned to position A at time $t = 0$. Write down the equation the describes that behavior.



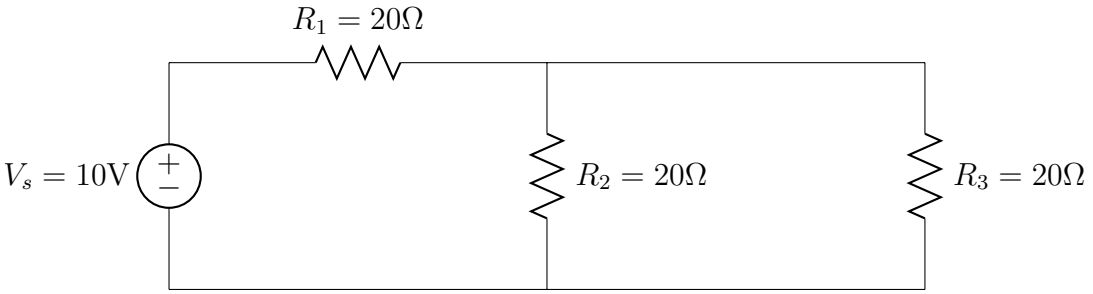
(Problem 3 continue)

(c) Describe and sketch what happens to V_c when the switch is turned back to position B after it has been in position A for a long time and we reset the time to $t = 0$. Write down the equation that describes that behavior.



(d) Given the situation in part (c) and assuming $V_s = 1\text{V}$, compute t_{10} and at t_{90} corresponding to 10% and 90% of V_s, respectively.

4. (20 points) Given the circuit below (**You must put the labels and directions on the schematic.**)



(a) Label, compute and indicate the direction or polarity of:

1. I_s supplied by the voltage source.
2. V_1 across the resistor R_1.
3. I_2 through the resistor R_2 and the voltage V_2 across it.
4. I_3 through the resistor R_3 and the voltage V_3 across it.

(b) Compute the power balance of the circuit and show conservation of energy