EE10 Practice Midterm 2

Department of Electrical Engineering, UCLA

Winter 2012

Instructor: Prof. Gupta

1. Exam is closed book. Calculator and one double sided cheat-sheet is allowed.
2. Cross out *everything* that you don't want me to see. Points will be deducted for everything wrong!
3. Do NOT use Laplace Transforms to solve any problems.

Name:

Student ID:

Student on Left:

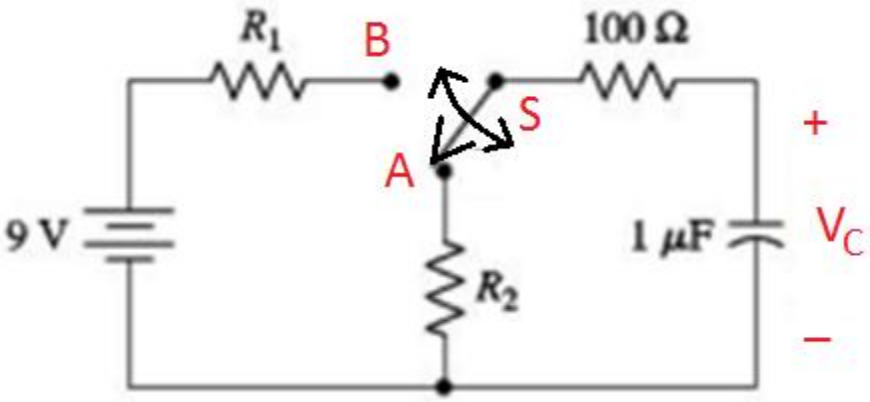
Student on Right:

Student in Front:

Problem	Maximum Score	Your Score
1	10	
2	6	
3	8	
4	6	
Total	30	

Question 1 (10 points)

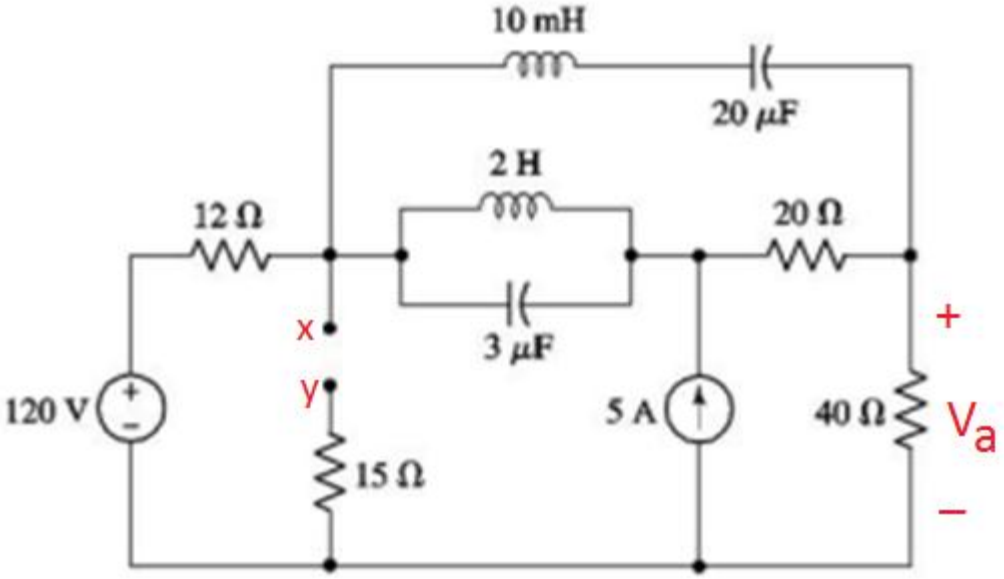
The switch S in the circuit below has been at position A for a long time. At *t = 0s* S is switched from A to B. Again at *t = 1ms* S is switched back to A from B. Find values of resistances R_1 and R_2 such that $V_C(1ms) = 8V$ and $V_C\ (2ms) = 1V$.



R_1 =
R_2 =

Question 2 (6 points)

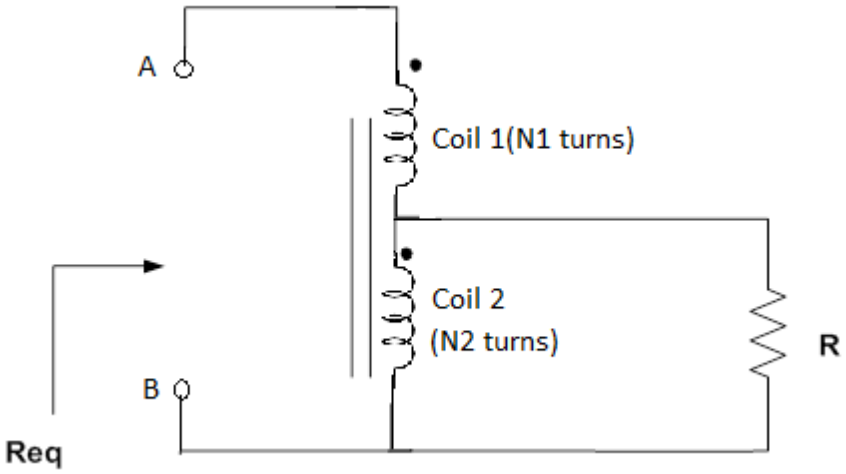
It is known that there is a capacitor connected between nodes *x* and *y* in the circuit shown below. Also it is known that the connections were made a long time ago, i.e. the circuit is at rest. Given this information, compute the value of voltage *Va* which is marked in the circuit below.



Va =

Question 3 (8 points)

In the circuit below, coils 1 and 2 form an ideal transformer. Coil 1 has N1 turns and coil 2 has N2 turns. Find the equivalent resistance R_{eq} as seen between terminals A and B.



Question 4 (6 points)

You found a rather strange piece of circuitry which has three exposed terminals – ***X, Y*** *and* ***Z.*** It is known that there is exactly one resistor (R), one inductor (L), and one capacitor (C) in the circuit but you don't know how they are connected.

Equivalent resistances were measured for each terminal pair (XY, YZ and XZ) by applying a 1V DC source between respective terminals and the following observations made:

R_{eq} between X and Y = infinity

R_{eq} between Y and Z = infinity

R_{eq} between X and Z = 10 ohms

Draw <u>all possible</u> connections of the three elements (R, L and C) with ***X***, ***Y***, ***Z*** clearly labeled which would satisfy the above conditions and observations. Explain your solution. (No points given without explanations.)