Course: ECE 53a
Quiz #2
Instructor: Pamela Cosman
Date: 2/11/09

First Name: _____

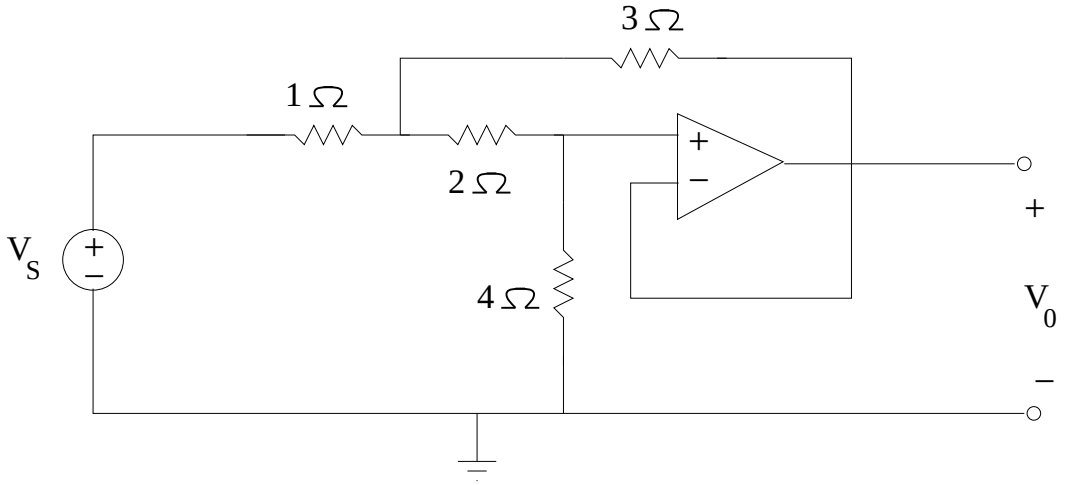
Last Name: _____

There are 4 problems.
Each problem is worth 10 points.

Problem	Possible	Score
1	10	
2	10	
3	10	
4	10	
Total	40	

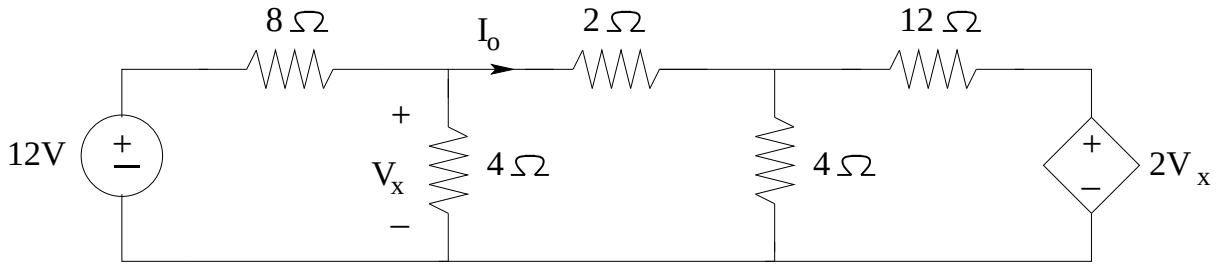
On this quiz you may use one page of notes (8.5 by 11 inches, both sides of the page).
No other notes or books allowed. No calculators.
You need to show your work for all problems.

Problem 1: In the following circuit, find the output voltage V_o in terms of the source voltage V_s. Assume that the op amp shown is an ideal (infinite gain) operational amplifier.



Problem 2: (a) Given a box of 10-kΩ resistors and an ideal (infinite gain) op-amp, show how to design a circuit that would have an output voltage that equals one third of the input voltage, regardless of the load that might be attached to the output terminals. (b) Suppose it turns out now that the amplifier which you thought could be treated as having infinite gain actually has a gain of only 100. With the circuit configured as you have it in part (a), what is the relation between the input and output voltages?

Problem 3: Find the current I_o through the 2Ω resistor using Thevenin's theorem. That is, find the Thevenin equivalent for the circuit without the 2Ω resistor present, across the terminals where the 2Ω resistor is connected. Draw the Thevenin equivalent circuit. Attach a 2Ω resistor to the Thevenin equivalent and compute the current through it using that simple circuit.



Problem 4: For this circuit, suppose that $V_c(t)$ is described by the function given below right. That is, $V_c(t) = 0$ for $t \leq 0$, $V_c(t) = t$ for $0 < t \leq 1$, and $V_c(t) = 1$ for $t > 1$.
Find expressions for the following 5 things: (a) $i(t)$, (b) $i_R(t)$, (c) $V_R(t)$, (d) $V_s(t)$, and (e) $V_o(t)$. Your final expressions should be functions of t but you should not have any variables such as $V_c(t)$ in your final expressions. (You do not need to sketch any of them).