First Name: _____

Last Name: _____

There are 3 problems.
The first two problems are worth 13 points each.
The last problem is worth 14 points.

| Problem	Possible	Score
1	13	
2	13	
3	14	
Total	40	

This quiz is **CLOSED BOOK** and **NO CALCULATORS ALLOWED.**

You may use one page of notes, 8.5 by 11 inches, both sides, handwritten by yourself.

For full credit, you need to show your work for all problems.

Problem 1: Find the step responses $V_c(t)$ and $V_o(t)$ for the following op amp circuit. You may assume the amplifier is an ideal infinite-gain op amp. u(t) denotes the unit step function.

$V_s\,u(t)$ + −

+

−

V_0

R_2

C

+ −

V_c

R_1
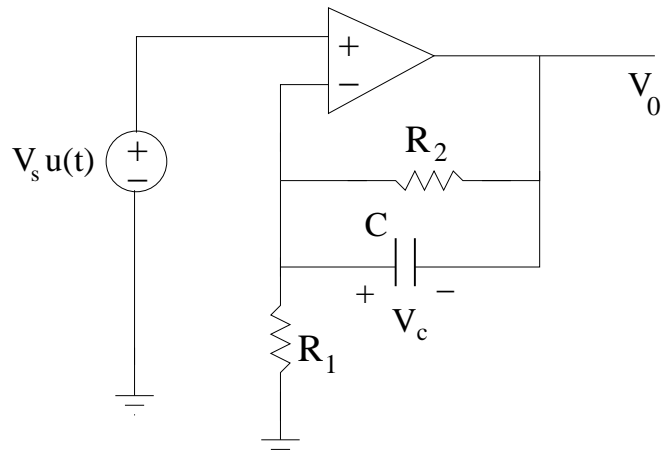
Problem 2: For the circuit shown below, suppose that the input V_s has value 12 V for $t < 0$ and value 0 for $t \geq 0$. Write a differential equation for v(t), the voltage across the capacitor. Solve the differential equation to obtain the natural response v(t).
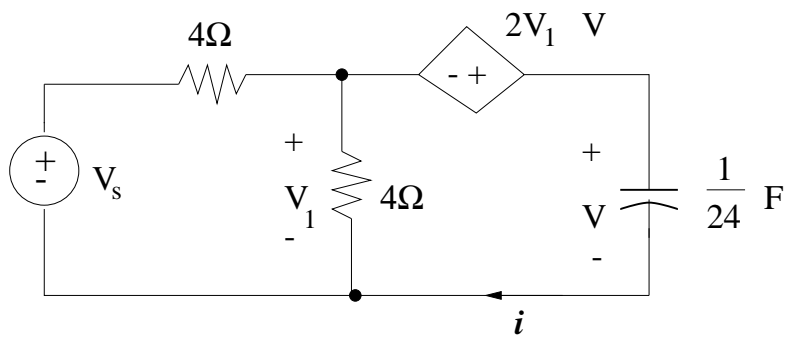
Problem 3: In this circuit, the switch is closed for a long time, and then opens at time t=0. (a) Find the indicated voltage v(t) for all time. (b) Consider the current i_c that flows through the capacitor, and consider the current i_R that flows in the resistor in parallel with the capacitor. Is either of these currents (or both, or neither) continuous at time t=0 (i.e., have NO jump discontinuity at time t=0)? Explain how you know. (c) For what times $t_{ss} > 0$ would one typically consider that this circuit is in steady state?