

## EE4086 Quiz 1

July 22, 1998

Professor Leach

Name \_\_\_\_\_

**Instructions.** Print your name in the space above and on all quiz work sheets. Place a box around all answers. Write the word “over” if you continue your work on another page.

1. For the circuit in Figure P1, solve for  $v_O$  and put it into the form  $v_O = A(v_1 - v_2)$ , where you must give the equation for  $A$ . Hints: If you use superposition, solve for  $v_A$  as a function of  $v_1$  and  $v_2$  and solve for  $v_O$  as a function of  $v_1$ ,  $v_2$ , and  $v_A$ . If you write node equations, do not write equations at the  $v_A$  and  $v_O$  nodes.
2. For the circuit in Figure P2,
  - (a) solve for the transfer function for  $V_o/V_i$  and put it into standard time constant form, i.e. each pole and zero term is of the form  $(1 + \tau s)$ .
  - (b) sketch and label the Bode plot for  $|V_o/V_i|$ . Hint: As a check of your work, you can calculate the low-frequency gain and the high-frequency gain by assuming states for the capacitor.
3. For the circuit in Figure P3,
  - (a) plot the transfer characteristics for  $v_O$  versus  $v_I$ . Hint: There are only 2 realizable combinations of on-off states for the 2 diodes. Solve for  $v_O$  versus  $v_I$  for each state, plot the 2 curves, and then decide which curve is the correct one on each side of the intersection.
  - (b) sketch  $v_O(t)$  for  $v_I(t) = 10 \sin \omega t$ .

Figure P1.

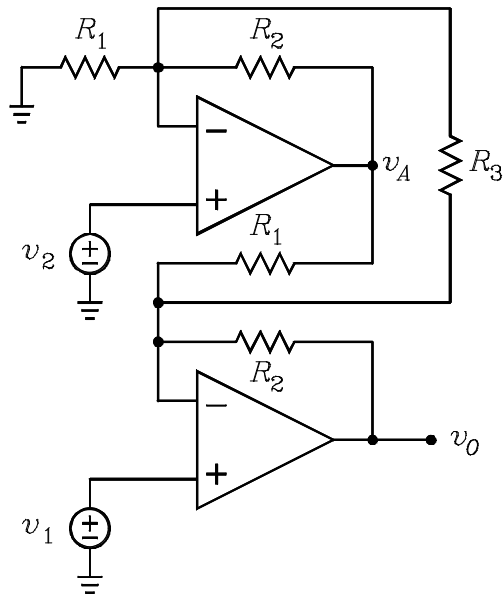


Figure P2.

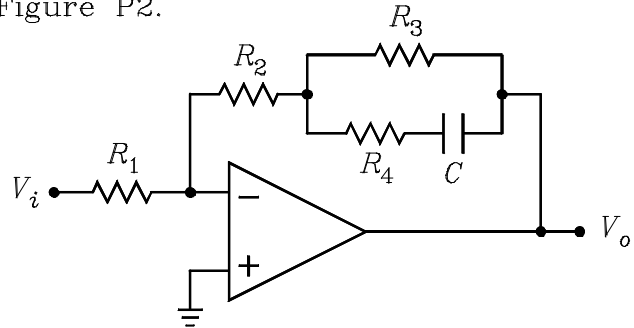


Figure P3.

