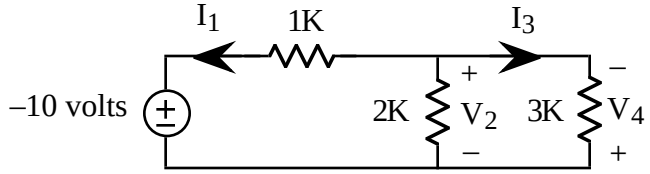
PROBLEMS YOU SHOULD BE ABLE TO DO BEFORE YOU TAKE ECE 207

FALL 1995 **A.P. FELZER**

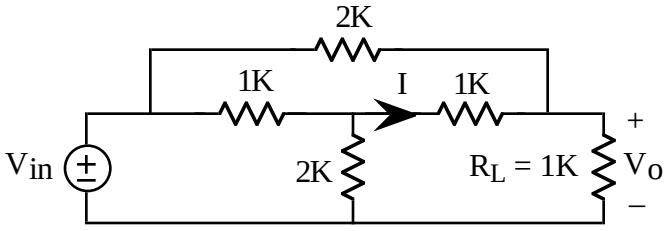
1. Sketch each of the following functions for $t \geq 0$
   a. $x(t) = 1 - e^{-t}$
   b. $x(t) = 2 - e^{-t}$
   c. $x(t) = 2 \cos 10t$
   d. $x(t) = 2 \cos (10t - \pi/4)$
   e. $x(t) = 1 + 2 \cos (10t - \pi/4)$

2. Given the following circuit



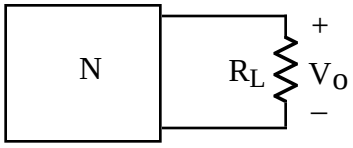
   a. Find I_1, V_2, I_3 and V_4
   b. Explain how the choice of reference directions affects
      (i) What's going on inside the circuit
      (ii) The values of the voltages and currents

3. Given the following circuit



   a. Write and put in matrix the node equations
   b. Solve your equations in part (a) for the node voltages and then use the results to calculate I for V_{in} = 5 volts
   c. Find the power being supplied by the source V_{in} and the power being received by the load R_L if V_{in} = 5 volts
   d. Find R_{eq} as seen by the source V_{in}
   e. Find the transfer function $G = V_o/V_{in}$. Then make use of your result to find V_o if V_{in} = 5 volts. Make sure you get the same result as in part (b)
   f. Find and draw the Thevenin Equivalent as seen by R_L if V_{in} = 5 volts
   g. Make use of your Thevenin Equivalent circuit in part (f) to find V_o. Make sure you get the same results as in parts (b) and (e)
   h. Make use of SPICE to check your result for V_o

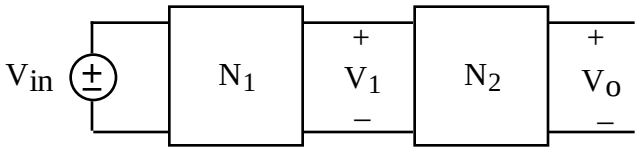
4. Given the following circuit



with open circuit voltage $V_{OC} = -10$ volts

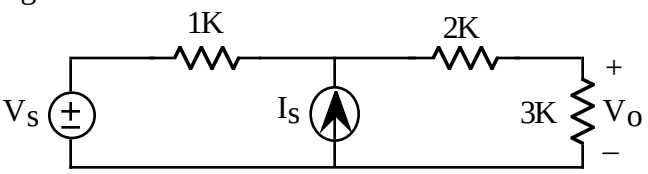
a. Sketch V_O as a function of R_L. Describe your curve. Then explain why it looks the way it does
b. Sketch V_O as a function of R_{TH} of N if $R_L = 1K$. Describe your curve. Then explain why it looks the way it does

5. Under what circumstances does the overall voltage gain $G = V_O/V_{in}$ of the following cascade circuit



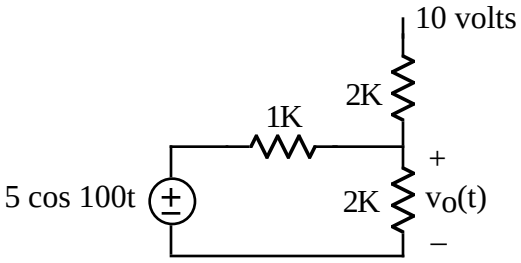
equal the product of the open circuit voltage gains of the individual sections. Explain why

6. Given the following circuit



make use of superposition to find V_O as a function of V_S and I_S

7. Given the following circuit



a. Find and sketch $v_O(t)$
b. Use SPICE to obtain a plot of $v_O(t)$