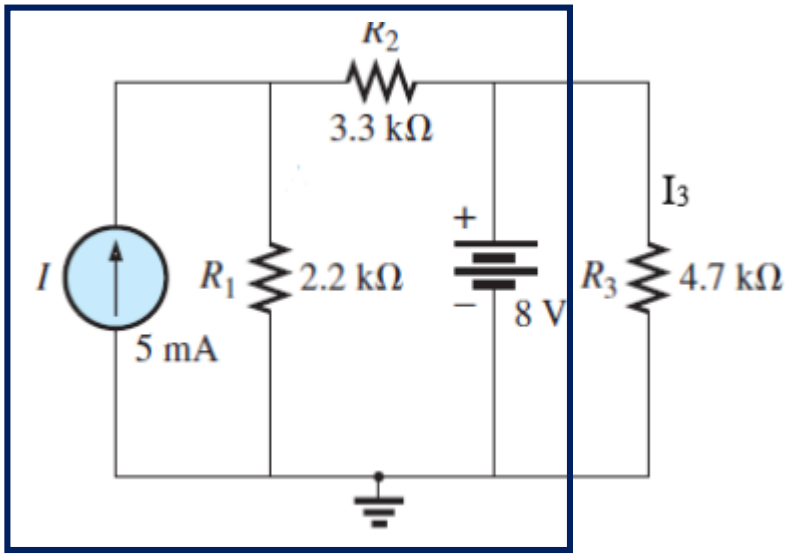
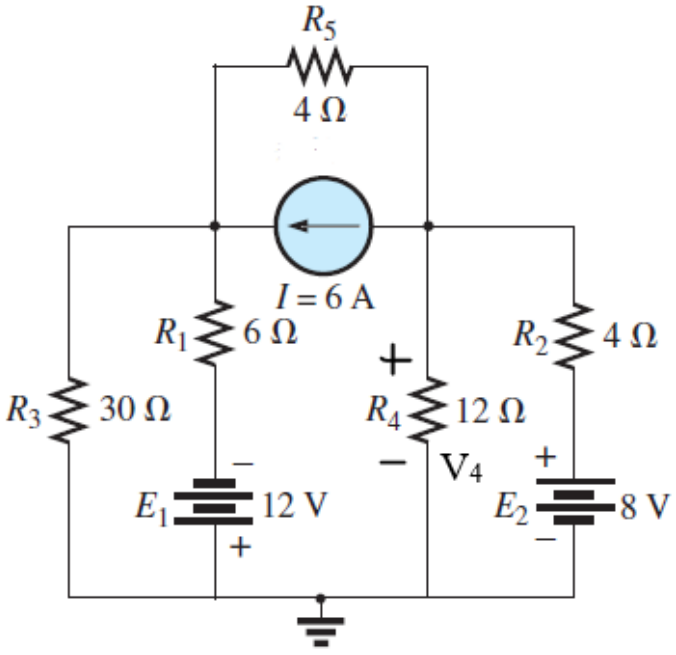
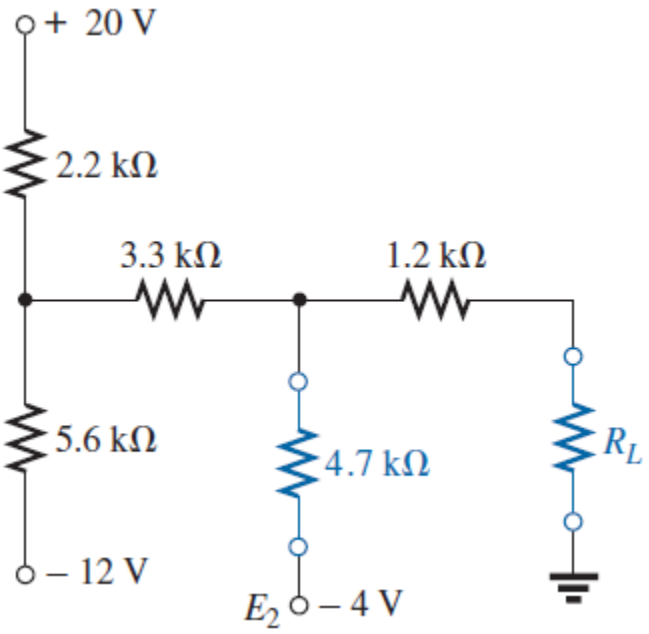
1. (a) Using superposition theorem, find the current through R_3 for the network below. Draw the circuits for each source (2 circuits), write all the formulas properly and also provide the current direction.
   (b) Apply thevenin's theorem for the network external to R_3. Draw the circuits required to find Eth and Rth. Finally draw the thevenin equivalent circuit and find the current through R_3. Compare the results with (a).



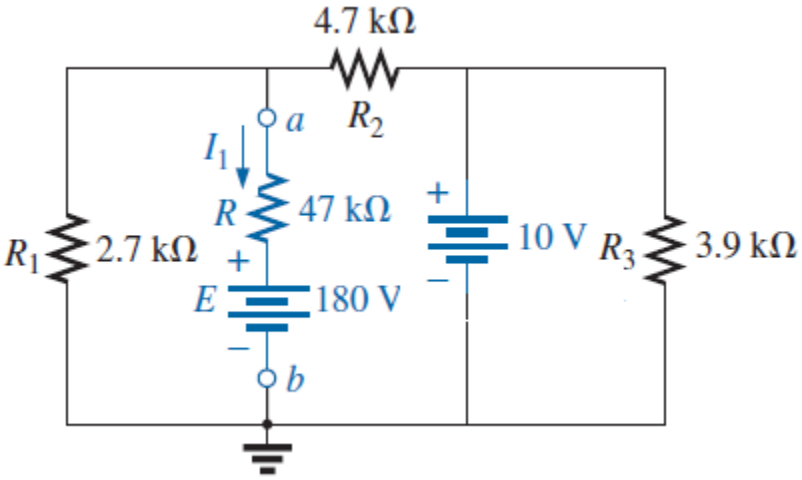
2. Using superposition theorem, find the voltage across R_4 for this network with all necessary steps, formula and diagram.



3. Apply thevenin's theorem for the network external to R_L with all necessary steps and formula. Draw the circuits required to find Eth and Rth. Finally draw the thevenin equivalent circuit and find the current through R_L if R_L= 10 kilo ohm.

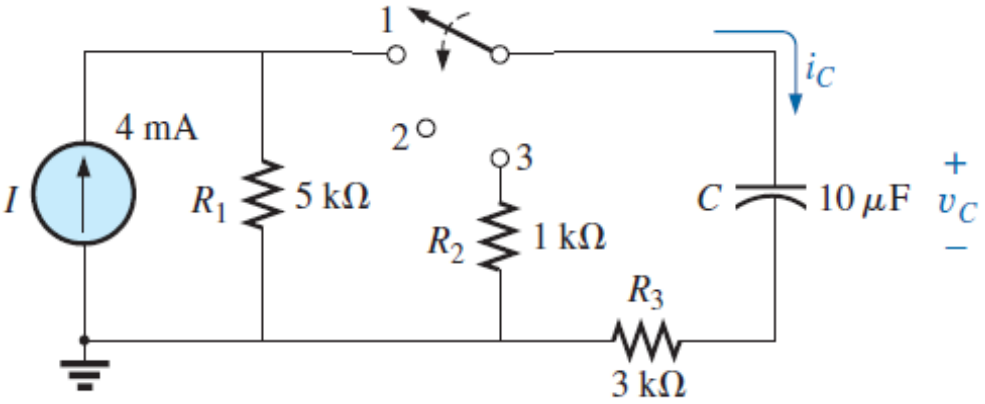


4. a) Find the Thévenin equivalent circuit for the portions of the networks external to points *a* and *b*. Show all necessary steps, formula and diagram. Also find the current I_1 flowing through this portion a and b (or flowing through R=47 kilo ohm resistor).
   b) Find the Norton's equivalent circuit for the portions of the networks external to the points *a* and *b* with all necessary steps, formula and diagram.



5. a. Find the mathematical expressions for the transient behavior of the voltage v_C and the current i_C if the capacitor was initially uncharged and the switch is thrown into position 1 at t = 0 s.
   b. Find the mathematical expressions for the voltage v_C and the current i_C if the switch is moved to position 2 at $t = 8\tau$.
   c. Find the mathematical expressions for the voltage v_C and the current if the switch is thrown into position 3 at $t = 12\tau$.
   d. Plot the waveforms obtained in parts (a)–(c)

   Demonstrate all necessary steps, formulas and calculations properly.



6. Find currents I_1 and I_2 and voltages V_1 and V_2 for the network below. Also determine the charge stored by the capacitor C_2 and energy stored by the inductor L_1.