Instructions:

i. Answers to this Problem Set is due on May 14 (TH sections) or 15 (WF sections). Submit at the start of the meeting.
ii. Use only black or blue non-erasable ink.
iii. Write your name, student number, section and teacher's name at the upper right hand corner of every page of your answer sheets. Staple sheets together.
iv. Do not use the reverse side of your answer sheets for your solutions. Anything written at the back will be considered scratchwork.
v. No calculator is allowed.
vi. Answer each problem completely. Answers in fractional form must be in simplest form. **Place your final answer in a box.**

Part I.

1. For the given circuit in Fig.1, calculate the maximum power to the variable resistance R according to the maximum power transfer condition.
    a. Use source transformation to calculate either the Norton current source or the Thevenin voltage source.
    b. Use other network analysis technique to calculate either the Norton current source or the Thevenin voltage source.
2. For the given circuit in Fig.2, calculate the maximum power to the load R_L according to the maximum power transfer condition.
    a. Use superposition to calculate either the Norton current source or the Thevenin voltage source.
    b. Use other network analysis technique to calculate either the Norton current source or the Thevenin voltage source.
3. For the given circuit in Fig. 3, calculate the following:
    a. I_0 using Norton equivalent
    b. V_0 using Thevenin equivalent
4. For the circuit in Fig. 4, determine the coefficients for the following equation:

$$V_O = aV_1 + bV_2 + cV_3$$

5. For the circuit in Fig. 5, calculate the node voltages: Va, Vb, Vc, Vd, Ve, Vf and Vg.

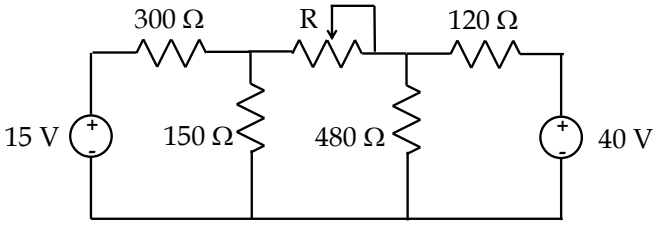


Fig.1

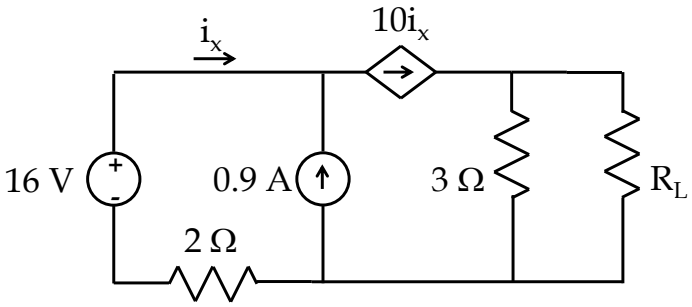


Fig.2

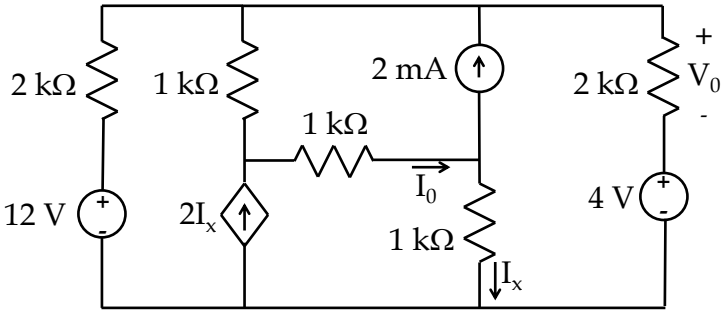


Fig.3

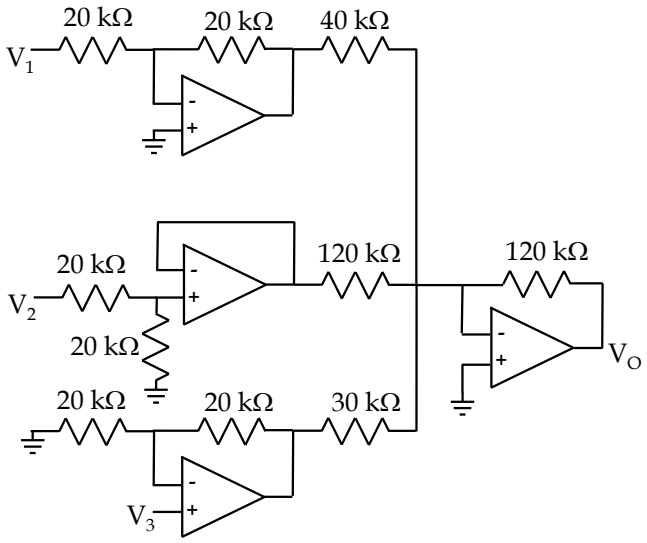


Fig.4

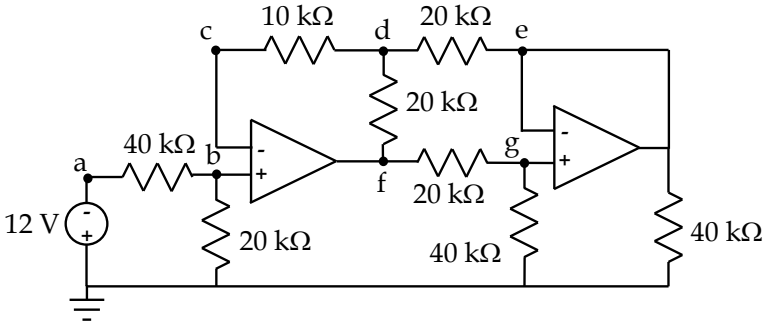
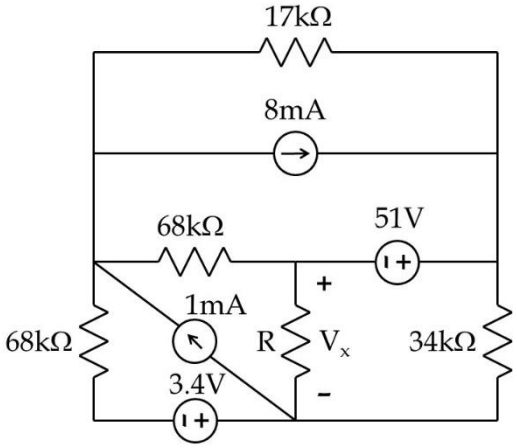


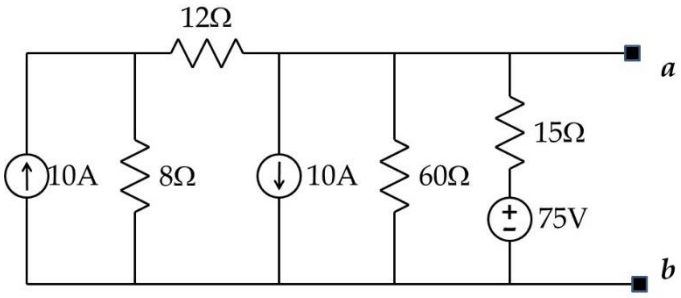
Fig.5

Part II.

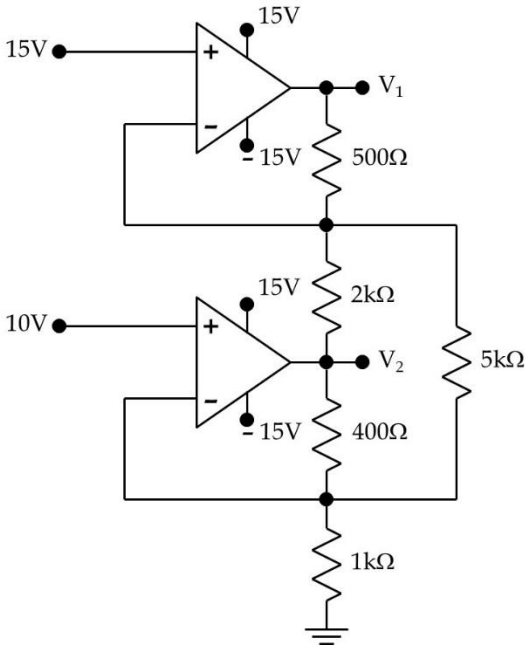
1. In the given circuit, a voltmeter is used to measure the voltage Vx. The measured voltage is 2V. Assume that the voltmeter has a resistance of 96kΩ.
   a. What is the value of the unknown resistance?
   b. What is the percentage of error in the voltage measurement?



2. For the given circuit, find the Thevenin and Norton equivalents across terminals ***a*** and ***b***.



3. The two op amps in the circuit are ideal.
   a. Calculate V_1 and V_2.
   b. Determine in which region the two op amps operate.



4. Using the least number of op amps, design a circuit with an output $V_o = 0.5V_1 - 2V_2$.