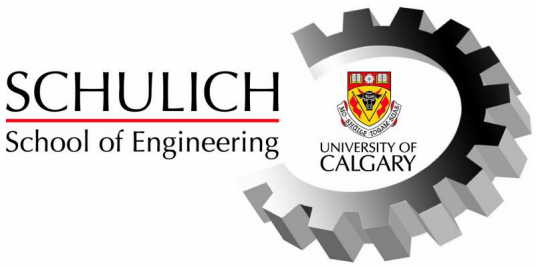
Name: _____

Lecture Section: _____

L01, L02 - *Norm Bartley*
L03 - *Hamid Zareipour*
L04 - *Pouyan (Yani) Jazayeri*
L05 - *Anis Haque*
L06 - *Anders Nygren*



ENGG 225 - Fundamentals of Electrical Circuits and Machines

Midterm Examination

Wednesday, March 2, 2011
Time: 6:30 - 8:00 PM

Instructions:

- Time allowed is 90 minutes.
- The examination is closed-book.
- Only calculators sanctioned by the Schulich School of Engineering are permitted in the examination.
- The maximum number of marks is 50, as indicated; please attempt all questions. The midterm examination counts 25% toward the final grade.
- Please use a pen or heavy pencil to ensure legibility.
- Please answer questions in the spaces provided; if space is insufficient, please use the back of the pages.
- Please show your work; where appropriate, marks will be awarded for proper and well-reasoned explanations.

UCID: _____

1. Consider the circuit in Fig. 1.

   (a) Choose an appropriate reference node, and find all of the indicated node voltages using the node-voltage method. **[6 marks.]**

   (b) Using your answers to part (a), find the power in each of the voltage sources, indicating whether it is absorbed or supplied. **[5 marks.]**

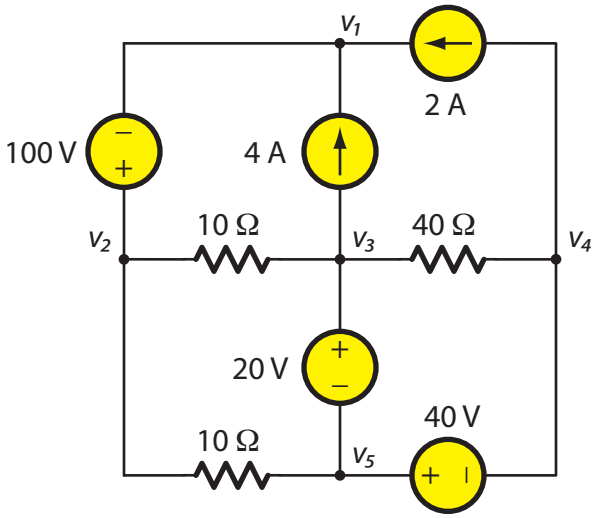


Fig. 1. Determine the node voltages; find power in all the voltage sources.

[11 marks total.]

(Question 2, additional workspace ...)

2. Consider the circuit in Fig. 2.

   (a) Determine the four mesh currents using the mesh-current method.

   [8 marks.]

   (b) Using your answers to part (a), determine the node voltages v_1, v_2, v_3.

   [4 marks.]

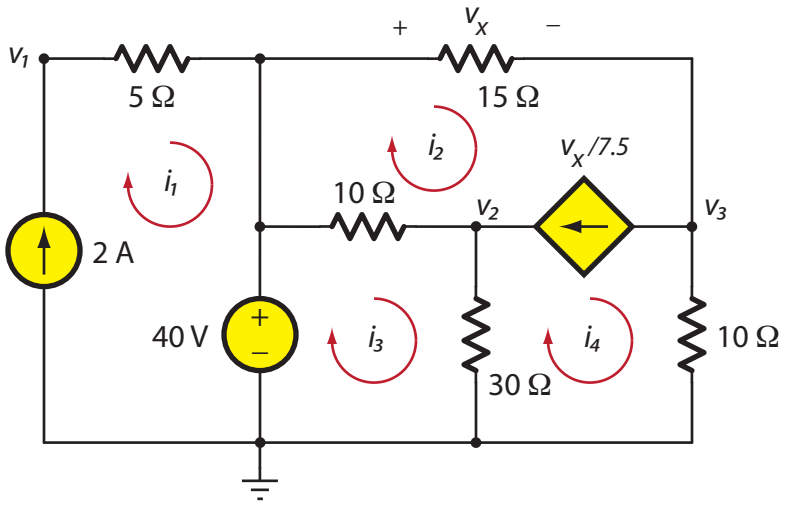


Fig. 2. Find mesh currents, node voltages v_1, v_2, v_3.

[12 marks total.]

(Question 1, additional workspace ...)

3. Consider the circuit shown in Fig. 3.

   (a) Determine the Thévenin equivalent circuit to the left of the terminals **x** and **y**. **[12 marks.]**

   (b) Predict v_{xy} when a resistor R and current source i are placed between the terminals **x** and **y** as shown, where $R = 10\ \Omega$ and $i = 2$ A. **[2 marks.]**

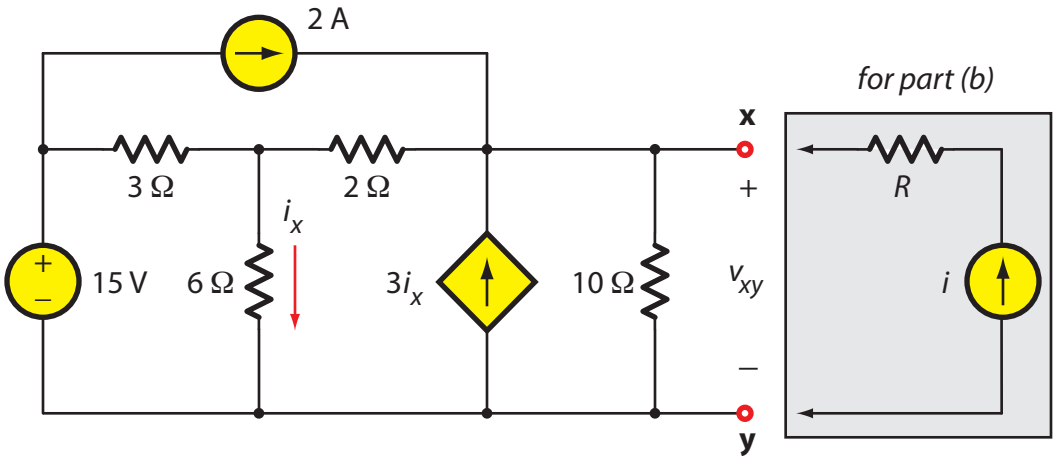


Fig. 3. Determine Thévenin equivalent circuit; find v_{xy} for $R = 10\ \Omega$, $i = 2$ A.

[14 marks total.]

(Question 3, additional workspace ...)

4. For the circuit given in Fig. 4, find i_x using the principle of superposition.

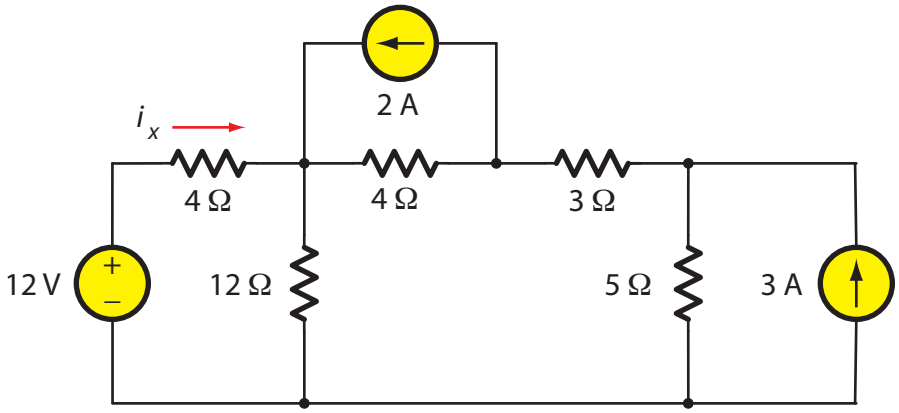


Fig. 4. Find i_x by superposition.

[13 marks.]

(Question 4, additional workspace ...)

(Please do not write in this space.)

#1 *(11)*	**#2** *(12)*	**#3** *(14)*	**#4** *(13)*	**Total** *(50)*