

Name: _____

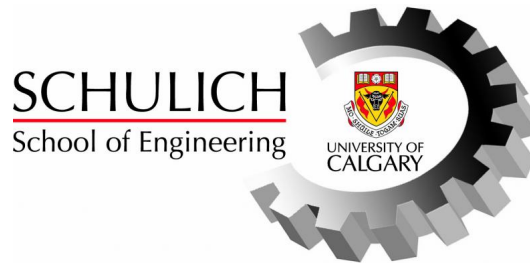
Lecture Section: _____

L01 - *Billy Wu*

L02 - *Norm Bartley*

L03 - *Pouyan (Yani) Jazayeri*

L04 - *Anis Haque*



ENGG 225 - Fundamentals of Electrical Circuits and Machines
Midterm Examination

Friday, February 28, 2014

Time: 7:00 - 8:30 PM

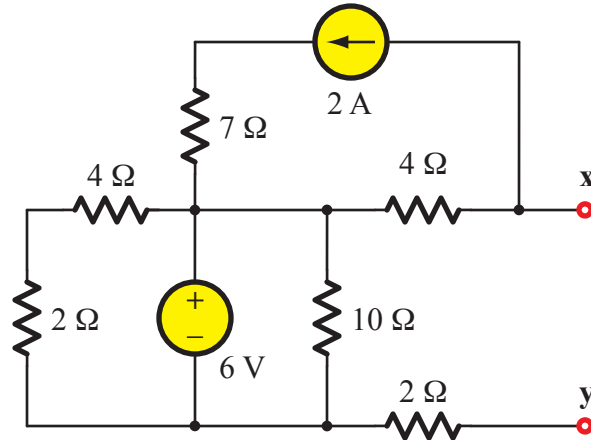
Instructions:

- 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 40, 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.
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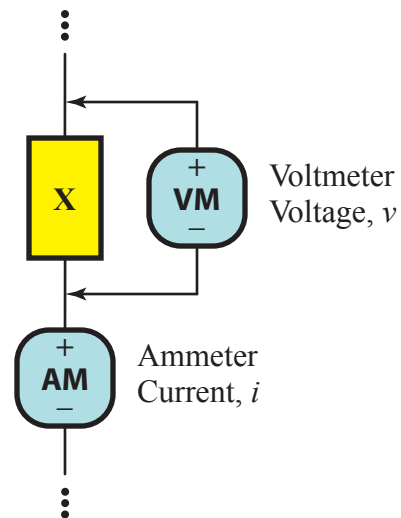
1. [15 marks.] Parts (a)-(e) below each have an identical weighting of three marks. Please answer the questions in the boxes provided.

- (a) [3] For the circuit given at right, calculate the voltage v_{xy} .



Answer: $v_{xy} =$

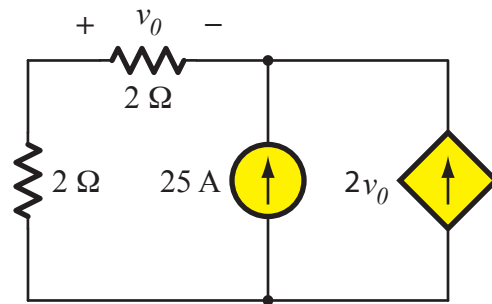
- (b) [3] Consider a circuit element **X** shown at right, which is part of a larger circuit. As shown, a voltmeter and an ammeter are connected to it. Suppose that the voltmeter indicates $v = 5$ V, and the ammeter indicates $i = -1$ A. Determine the power p_x in circuit element **X**, and whether it is absorbing or delivering power.



Answer: $p_x =$

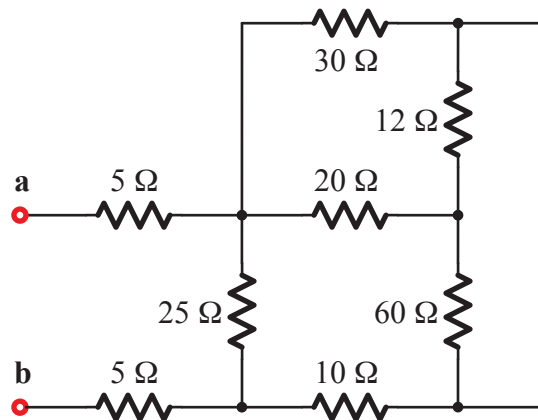
(Question 1, continued ...)

- (c) [3] In the circuit at right, determine the power in the dependent source, and whether it is absorbing or delivering power.



Answer: $p_{2v_0} =$

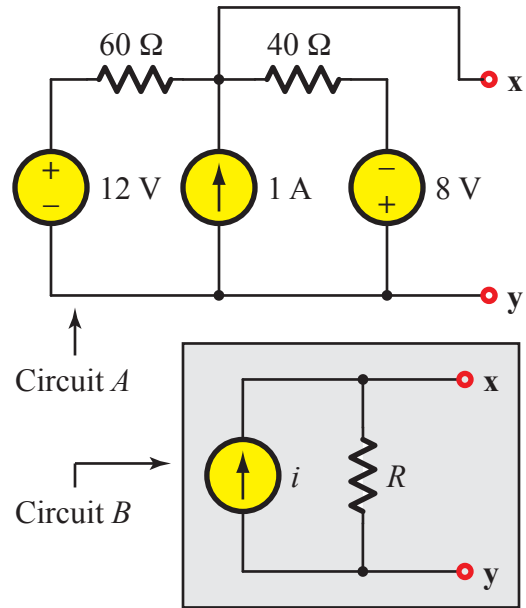
- (d) [3] In the circuit at right, determine the equivalent resistance R_{eq} as seen at the terminals **a** and **b**.



Answer: $R_{eq} =$

(Question 1, continued ...)

- (e) [3] Shown at right are two circuits. Circuit *B* is equivalent to Circuit *A* as seen at the terminals **x** and **y**. Using only source transformations, transform Circuit *A* to circuit *B* to obtain the values of *i* and *R* in Circuit *B*.

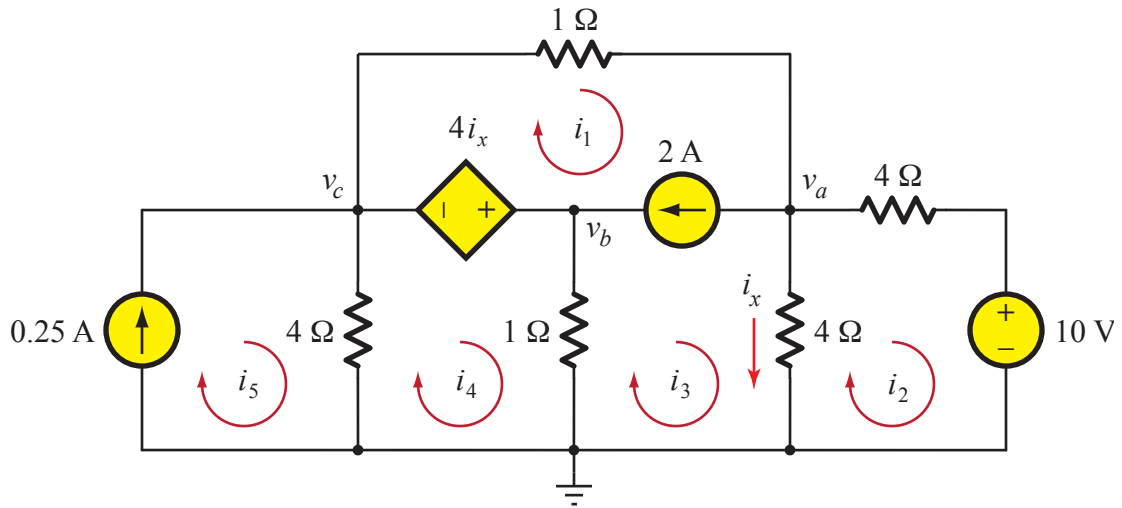


Answer: $i =$

Answer: $R =$

2. [13 marks.] Consider the circuit below.

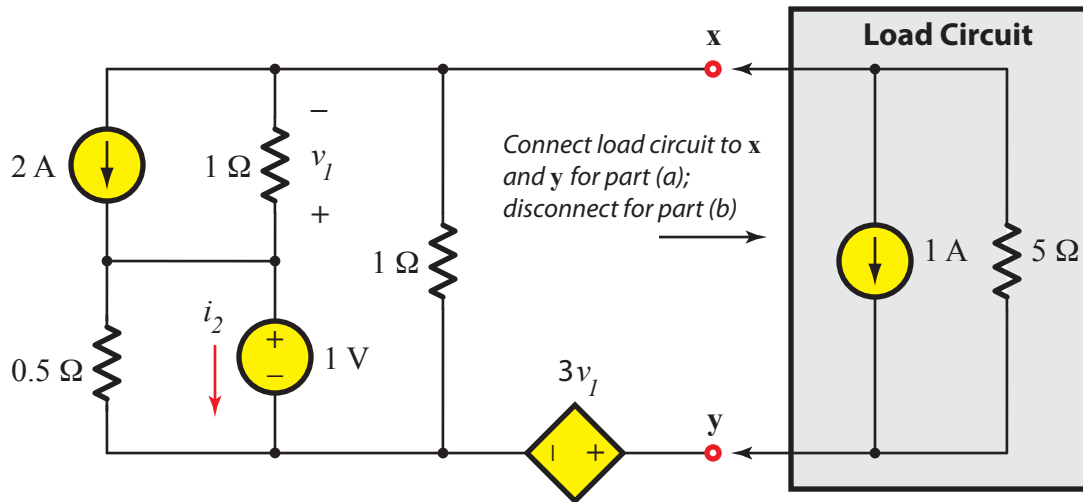
- (a) [7] Use the node-voltage method to find the node voltages v_a , v_b , and v_c .
 (b) [6] Use whatever method you wish to find the mesh currents i_1 , i_2 , i_3 , i_4 , and i_5 .



(Question 2, additional workspace ...)

3. [12 marks.] Consider the circuit below, with and without the “load circuit” (i.e., the 1 A current source and 5 Ω resistor) connected to terminals **x** and **y**.

- (a) [4] First assume that the load circuit is attached. Suppose that it is known that the load’s 1 A current source is *delivering* 5 W of power. Using this information and whatever method you wish, determine v_1 and i_2 .
- (b) [8] Now disconnect (and disregard) the load circuit. Determine the Thévenin equivalent circuit as seen to the left of the terminals **x** and **y**.



(Question 3, additional workspace ...)

(Please do not write in this space.)

#1 (15)	#2 (13)	#3 (12)	Total (40)