

Last Name: _____

Lecture Section: _____

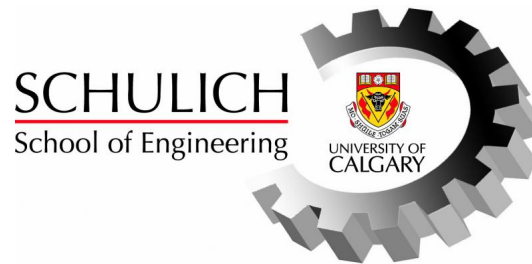
First Name: _____

L01 - Pouyan (Yani) Jazayeri

L02 - Norm Bartley

L03 - Denis Onen

L04 - Mike Potter



ENGG 225 - Fundamentals of Electrical Circuits and Machines

Midterm Examination

Wednesday, February 28, 2018

Time: 7:00 - 8:30 PM

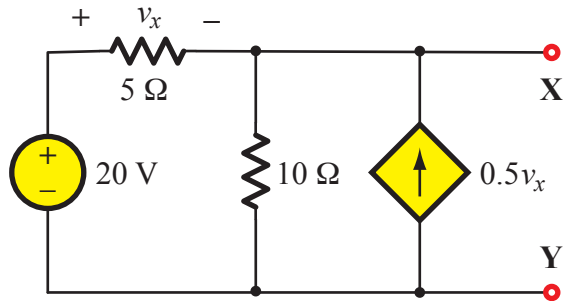
Instructions:

- Time allowed is 90 minutes.
 - The examination is closed-book.
 - Only calculators sanctioned by the Schulich School of Engineering (Casio FX-260, Casio FX-300MS, or TI-30XIIS) are permitted in the examination.
 - The maximum number of marks is 45, 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: _____

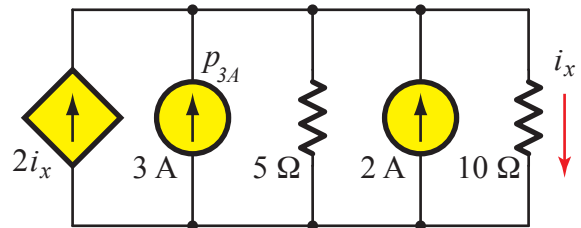
1. [15 marks.] Parts (a)-(e) below each have an identical weighting of three marks. Please answer the questions in the boxes provided.

- (a) [3] In the circuit at right, calculate the short-circuit current i_{sc} between terminals **X** and **Y**. Assume the direction is from **X** to **Y**.



Answer: $i_{sc} =$

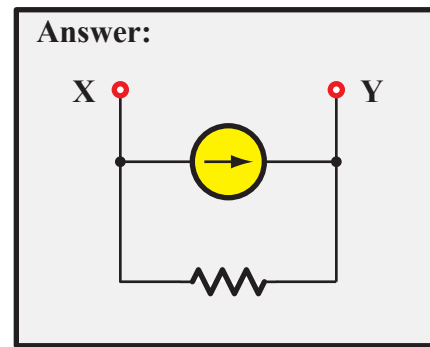
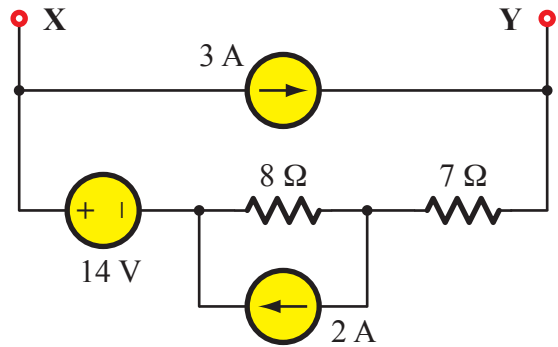
- (b) [3] In the circuit at right, give the absolute value of the power p_{3A} in the 3 A current source, and indicate whether it is delivered or absorbed.



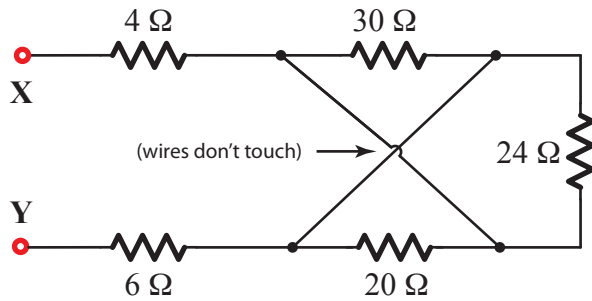
Answer: $|p_{3A}| =$

Circle One: *delivered* / *absorbed*

- (c) [3] Simplify the circuit shown at right to a single current source and parallel resistor between terminals **X** and **Y**. Appropriately assign values to the current source and the resistor in the box below.

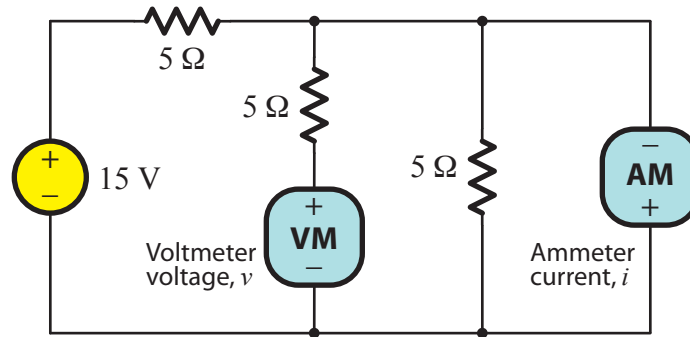


- (d) [3] In the circuit at right, find the total equivalent resistance R_{xy} between the terminals **x** and **y**.



Answer: $R_{xy} =$

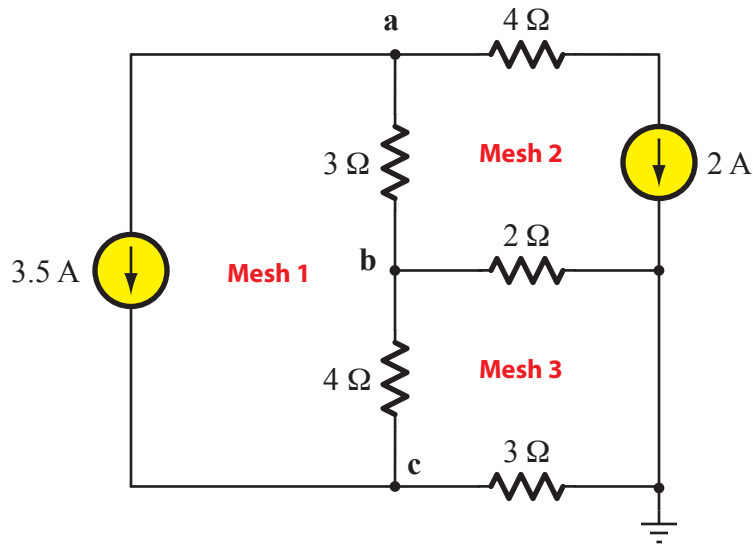
- (e) [3] In the circuit at right, assume that the voltmeter and ammeter are ideal. Give the voltmeter's reading v , and the ammeter's reading i .



Answer: $v =$

Answer: $i =$

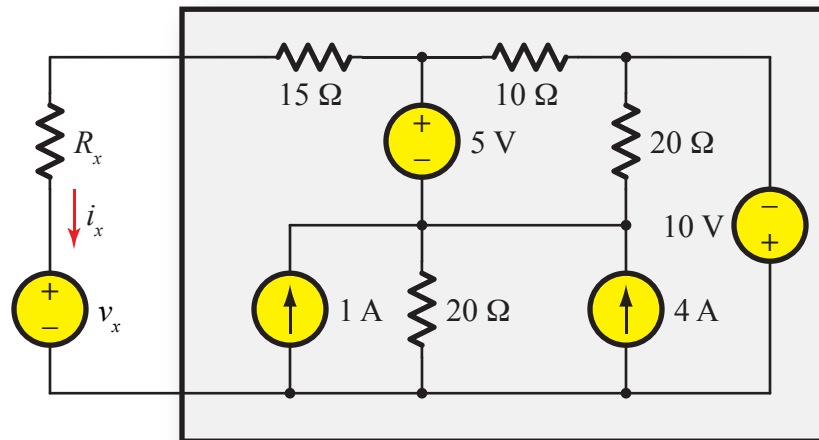
2. [16 marks.] Consider the circuit below.



- (a) [6] Write (but do not solve) the node-voltage equations for nodes **a**, **b**, and **c** using only the node voltages v_a , v_b , v_c as variables. No need to simplify.
- (b) [4] Write (but do not solve) the mesh-current equations for meshes 1, 2, and 3 using only the mesh currents i_1 , i_2 , i_3 as variables.
- (c) [6] Using the set of equations for your choice of either part (a) or part (b), solve for the node voltages v_a , v_b , v_c .

(Question 2, additional workspace ...)

3. [14 marks.] Consider the circuit below.



Find i_x for the R_x and v_x values in the table below. (*Hint: Use a Thévenin equivalent for the part of the circuit shown in the box.*)

v_x (V)	R_x (Ω)	i_x (A)
5	10	
10	30	
0	0	

(Question 3, additional workspace ...)

(Please do not write in this space.)

#1 (15)	#2 (16)	#3 (14)	Total (45)