University ☺f P☺rtland
Sch☺☺l ☺f Engineering

EE 261-Electrical Circuits-3 cr. hrs.
Fall 2013

Midterm Exam # 2

(Wednesday, October 30, 2013)
(Closed Book Exam, Two Formula Sheets Allowed)
(Total Time: 55 minutes)

Name:_____☺

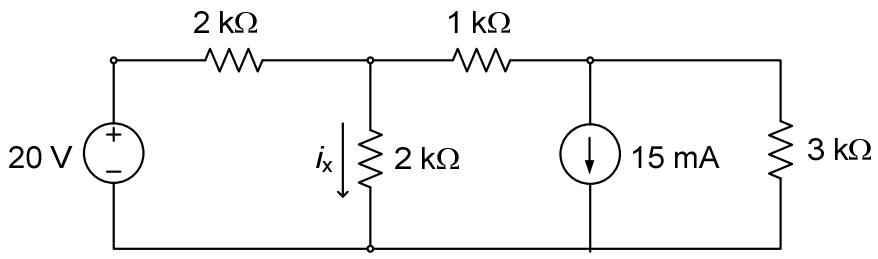
Signature:_____☺

"An honest mind possesses a kingdom."
Lucius Annaeus Seneca (4B.C.–65A.D.)

"Honest people are the true winners of the universe."
Anonymous

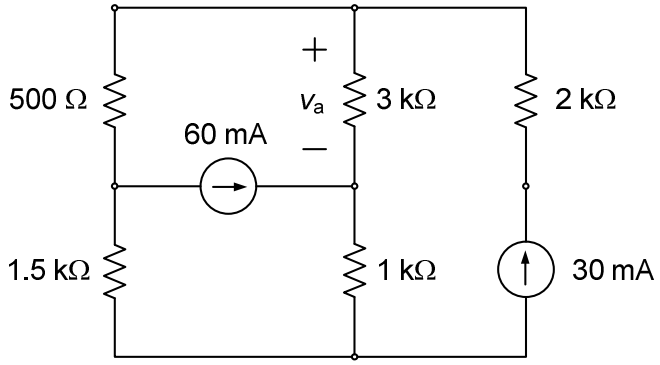
NOTE: You are expected to do Problems #1 to #4 in class. Problem #5 is take-home, due beginning of the class time on Monday, November 4, 2013.

1. (20 points) For the electric circuit shown, find the current i_x. Please show your work step by step.

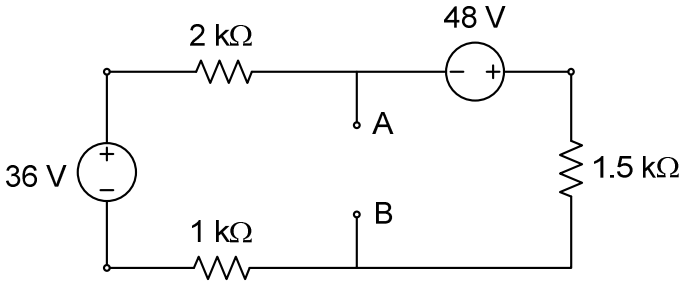


Problem	Score
#1	
#2	
#3	
#4	
#5	
Total	

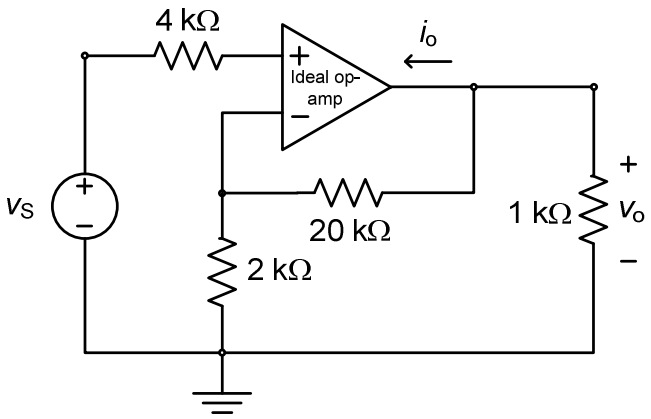
2. (20 Points) In the electric circuit shown, determine the value of the voltage v_a across the 3 kΩ resistor. (Again, please show your work clearly and provide brief justifications for the steps you take. Provide units.)



3. (20 Points) Consider the electric circuit shown. Determine the value of the external load resistor R_L to be connected between A-B terminals so that it receives maximum power from this circuit. What is the maximum power delivered to the load resistor chosen? Please provide your work step by step with justifications. <u>Don't forget to calculate the power value!</u>



4. (20 Points) For the op-amp circuit shown, determine the values of voltage v_o and current i_o for two cases: (a) v_s = ½ V; (b) v_s = 2 V. Show your work step by step and provide justifications. Also provide the correct unit for each answer.



5. (Take-home; Total: 20 points) For the op-amp circuit shown:

(a) (10 points) Find a general simplified expression for the output voltage v_o in terms of the two input voltages, v_1 and v_2. Show your work step by step. What does this circuit do?

(b) (10 points) Design this circuit so that $v_o = 6v_2 - 20v_1$. Note that design means you determine the values of the four resistors to achieve this input-output relationship. Use only kΩ resistors.