

# INSTRUCTIONS:



Begin the test when you are verbally instructed. You have **40 minutes** to complete the exam.

Write your name on every page. Sign and write your NetID on the cover page.

This is a closed book, closed notes quiz. An equation sheet is provided. A calculator is allowed.

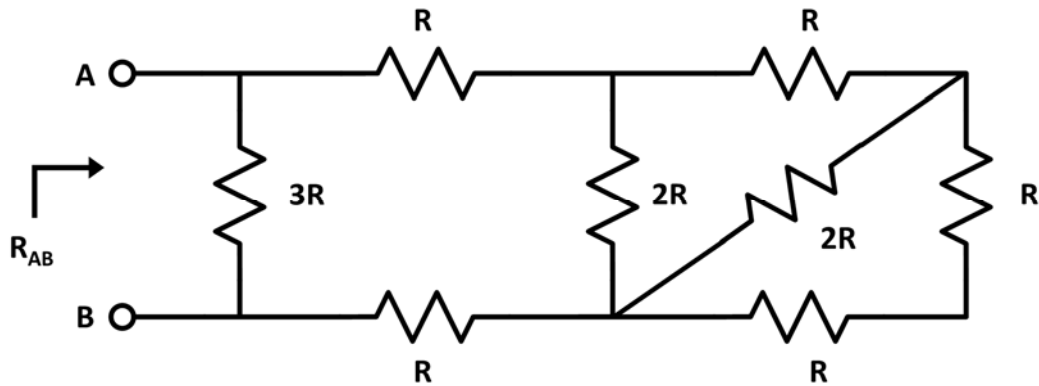
No credit will be given for each problem if you do not show the complete work, even if the answer is correct. Numerical answers must be followed by units wherever units exist.

Re-grading policy: You must turn in your paper to your instructor for re-grading within 7 days following the day in which the exam papers are returned to the class. Attach a sheet specifying which problem(s) is to be looked at, and for what reasons. Do not write or make changes on the exam pages.

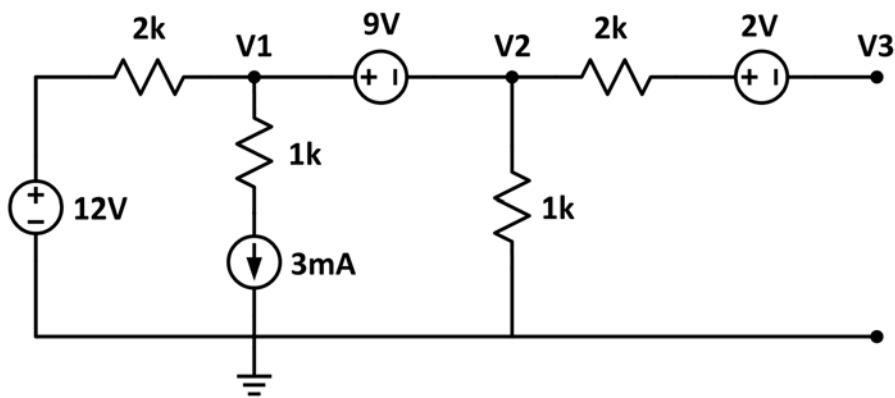
By signing below, as the student named above, I agree that I will observe the Student Code of the University of Illinois.

Signature: \_\_\_\_\_

NetID: \_\_\_\_\_

**Problem 1 (4 points)**Find  $R_{AB}$  between the terminals A-B in the circuit below.

$$R_{AB} = (((((R+R) \parallel 2R) + R) \parallel 2R) + R + R) \parallel 2R = 1.5R$$

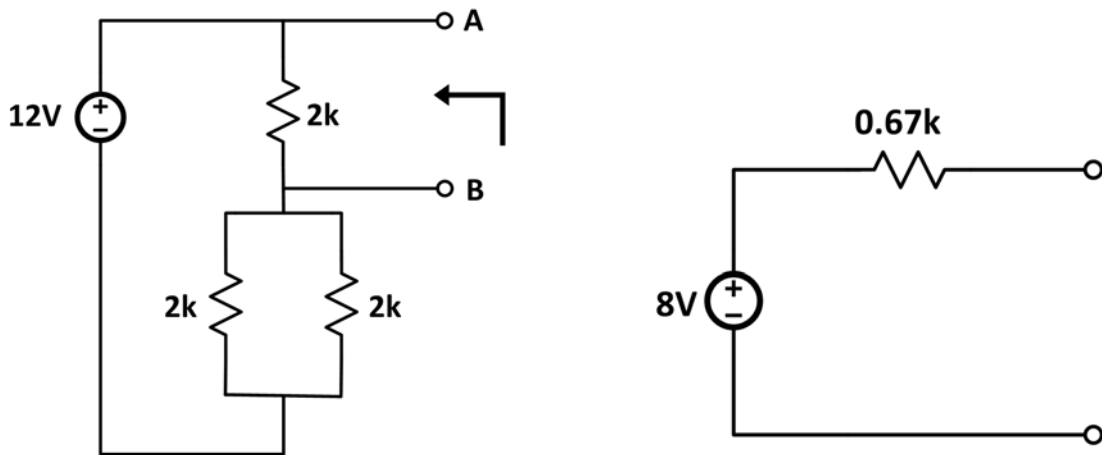
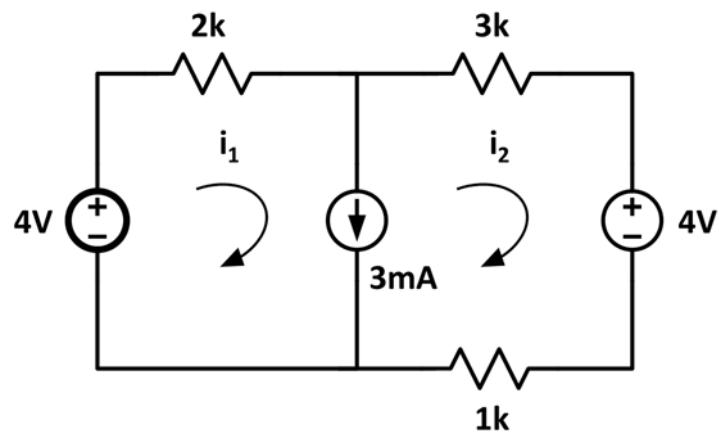
**Problem 2 (6 points)**Use **node analysis** to write series of equations which could be used to solve voltages  $V_1$ ,  $V_2$  and  $V_3$  in the circuit shown below. DO NOT SOLVE THE EQUATIONS.

$$\frac{V_1 - 12}{2} + 3 + \frac{V_1 - 9}{1} = 0$$

$$V_1 - 9 = V_2$$

$$V_2 - 2 = V_3$$

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**Problem 3 (4 points)**Draw the **Thevenin equivalent circuit** of the circuit shown below.**Problem 4 (6 points)**Use **loop analysis** to find currents  $i_1$  and  $i_2$ .

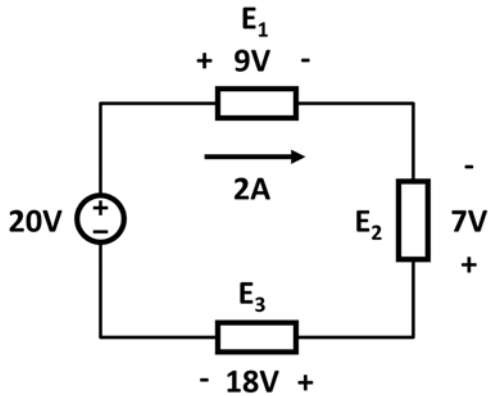
$$-4 + 2i_1 + (3 + 1)i_2 + 4 = 0$$

$$i_1 - i_2 = 3$$

$$i_1 = 2 \text{ mA} , i_2 = -1 \text{ mA}$$

**Problem 5 (6 points)**

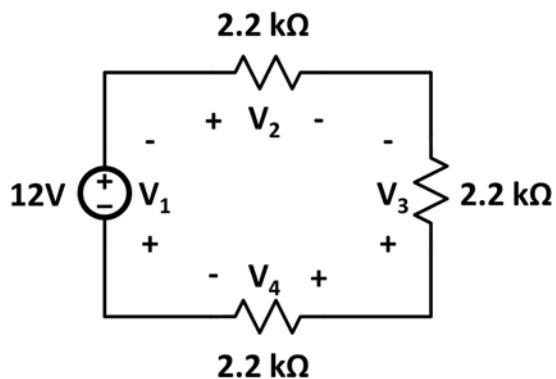
In the circuit shown below, find the power consumed or supplied by each element  $E_1$ ,  $E_2$ , and  $E_3$ .



Element	Power
$E_1$	18 W
$E_2$	-14 W
$E_3$	36 W

**Problem 6 (6 points)**

In the circuit shown below, find voltages  $V_2$ ,  $V_3$ , and  $V_4$ .



Element	Voltage
$V_2$	4 V
$V_3$	-4 V
$V_4$	4 V

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## Grades:

Problem	
1	/8
2	/6
3	/6
4	/8
5	/6
6	/6
Total	/40