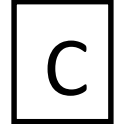


INSTRUCTIONS:



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

Write your name and netid on first page.

This is a closed book, closed notes quiz. **An equation sheet is provided at the end of the quiz.** 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.**

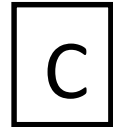
Re-grading policy: You must request a regrade within 5 days following the day in which the exams are returned to the class. You must clearly state the reason you are requesting a regrade.

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

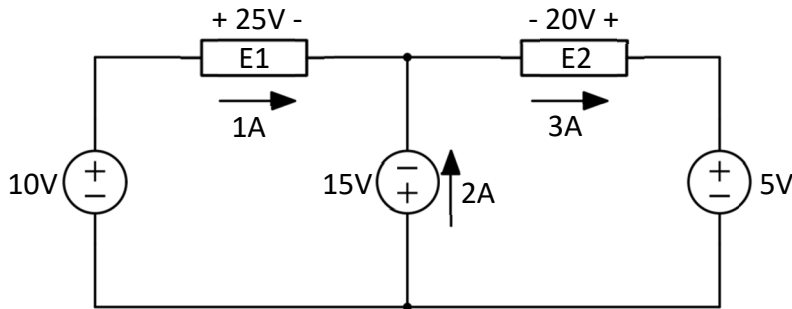
Signature: _____

UIN: _____

Problem 1 (6 points)



In the circuit shown below, find the power consumed or supplied by each element.



Element	Power
E1	25w
E2	-60w
15V	30w

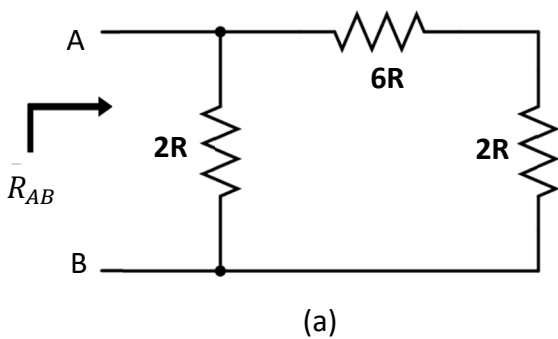
$$P_{E1} = 25 \times 1 = 25w$$

$$P_{E2} = -20 \times 3 = -60w$$

$$P_{15v} = 15 \times 2 = 30w$$

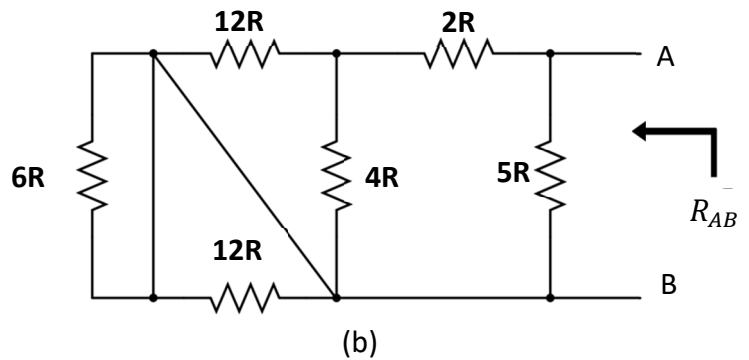
Problem 2 (6 points)

Find equivalent resistance in the circuit shown below.



$$(2R+6R) \parallel 2R = 1.6R$$

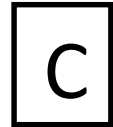
$R_{AB} = 1.6R$



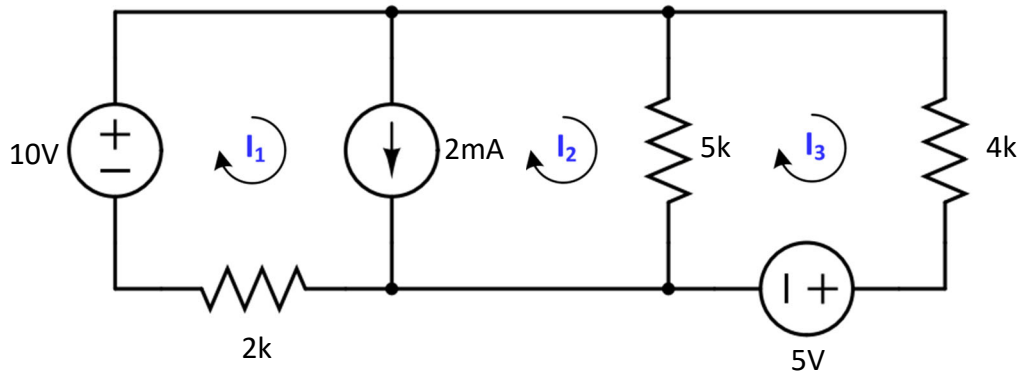
left 6R and bottom 12R short out

$$(12R \parallel 4R+2R) \parallel 5R = 2.5R$$

$R_{AB} = 2.5R$

**Problem 3 (6 points)**

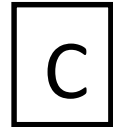
Use **loop analysis** method to write a system of **at most three** equations you could use to find loop currents in the circuit below (DO NOT SOLVE).



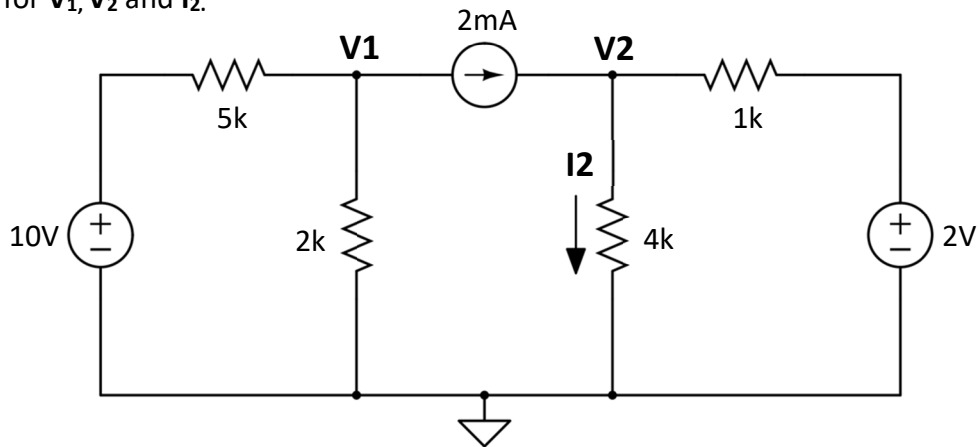
$$\text{superloop } I1, I2: -10 + 5I_2 + 2I_1 = 0$$

$$\text{loop } I3: 4I_3 + 5 + 5(I_3 - I_2) = 0$$

$$I_1 - I_2 = 2$$

Problem 4 (8 points)

- (a) Use node analysis and write **at most three** equations you would use to solve for V_1 , V_2 and I_2 .



$$\text{node } V1: \frac{V1 - 10}{5} + 2 + \frac{V1}{2} = 0$$

$$\text{node } V2: \frac{V2 - 2}{1} - 2 + \frac{V2}{4} = 0$$

$$\text{current } I2: I2 = \frac{V2}{4}$$

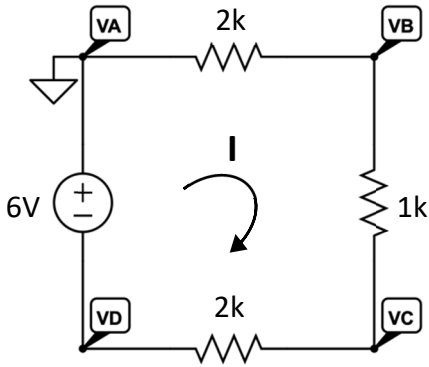
- (b) Solve equations you obtained in part (a).

V_1	0V
V_2	3.2V
I_2	0.8mA

Problem 5 (7 points)

C

In the circuit shown below, (a) Find the current I , voltage V_{AD} and V_A , (b) Find voltage V_B and V_C .

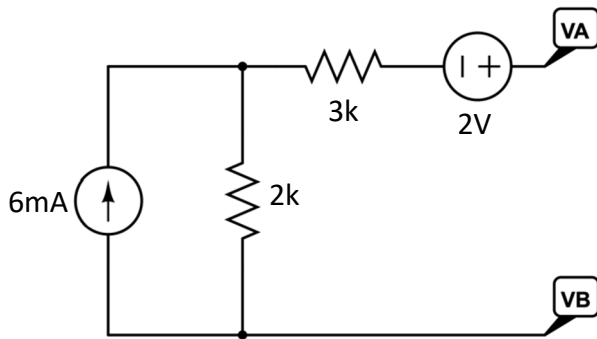


I	1.2mA
V_{AD}	6V
V_A	0V

V_B	-2.4V
V_C	-3.6V

$$V_B = V_A - V_{AB} = 0 - I \times 2k = -2.4V$$

$$V_C = V_B - V_{BC} = -2.4 - I \times 1k = -3.6V$$

Problem 6 (7 points)**C**Draw the **Thevenin equivalent circuit** between the terminals A-B in the circuit below.**Equivalent Circuit:**

$$R_{eq} = 3 + 2 = 5k$$

$$V_{th} = 6mA \times 2k + 2 = 14V$$