23S-EC ENGR-3-LEC-1 Homework 2

SANJIT SARDA

TOTAL POINTS

100 / 100

QUESTION 1

Q1 100 pts

1.1 a **25 / 25**

✓ **- 0 pts** *Correct*

- 10 pts Partially incorrect

- 20 pts Mostly incorrect

- 25 pts Incorrect

1.2 b **25 / 25**

✓ **- 0 pts** *Correct*
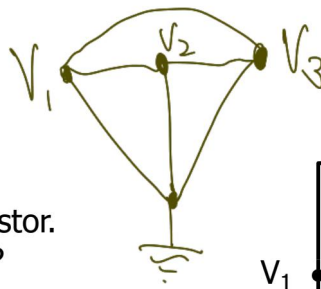
- 10 pts partially incorrect

- 25 pts Incorrect

1.3 c **25 / 25**

✓ **- 0 pts** *Correct*

- 10 pts Partially Incorrect
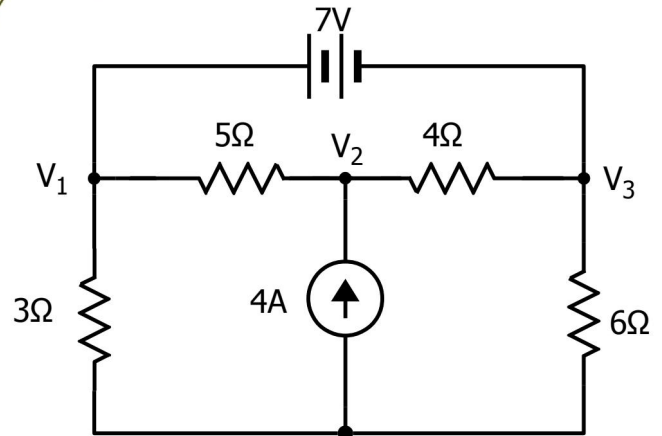
- 20 pts Mostly Incorrect

- 25 pts Incorrect

1.4 d **25 / 25**

✓ **- 0 pts** *Correct*

- 10 pts Partially Incorrect
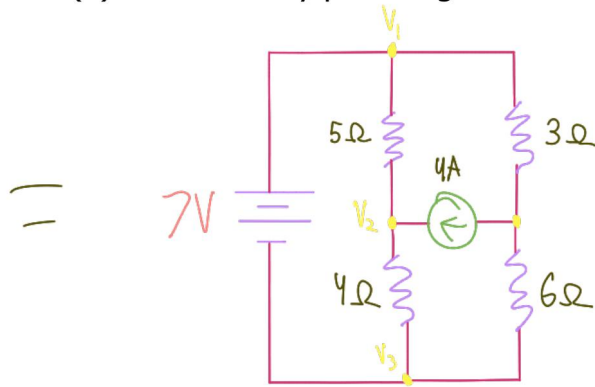
- 25 pts Incorrect

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EE3 Spring 2023
Homework Problem 2

(a) Find the current through the 6Ω resistor.
(b) Is the 6Ω current moving toward V_3?
(c) Find the current through the battery.
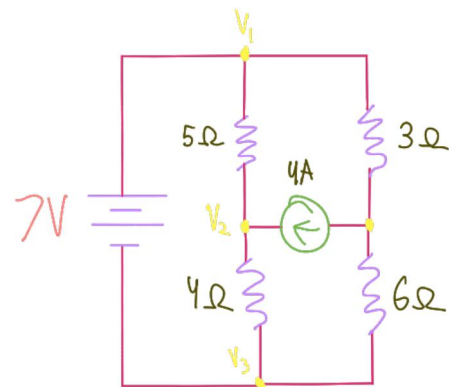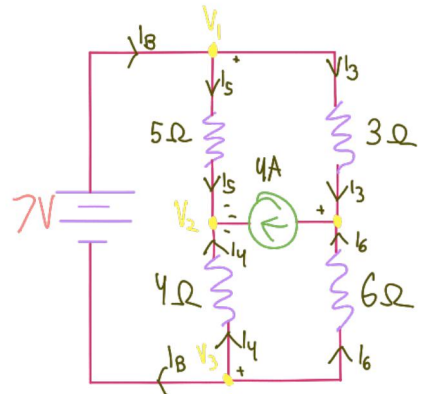(d) Is the battery providing or absorbing power?

$$@V_2, \quad 4 + \frac{V_1 - V_2}{5} + \frac{V_3 - V_2}{4} = 0$$

$$V_1 = V_3 + 7$$

$$\frac{V_1}{3} + \frac{V_3}{6} = 4$$

Analysis

Solving for V_1, V_2, V_3:

$$80 + 4V_1 + 5V_3 - 9V_2 = 0 \qquad V_1 = \frac{31}{3}\,V \quad \boxed{10.33}$$

$$V_1 = V_3 + 7 \qquad V_2 = \frac{46}{3}\,V \quad \boxed{15.33}$$

$$2V_1 + V_3 - 24 = 0 \qquad V_3 = \frac{10}{3}\,V \quad \boxed{3.33}$$

$$@ \; I_6 = \frac{V_3}{6} = \frac{5}{9} = 0.556A$$

(b) It is moving against V_3.

$$© \; I_B = I_5 + I_3 = \frac{V_1 - V_2}{5} + \frac{V_1}{3} = \frac{31-46}{15} + \frac{31}{9} = \frac{22}{9} = 2.44A$$

(d) The current is flowing from the positive terminal, which means that the battery is delivering power.

1.1 a **25 / 25**
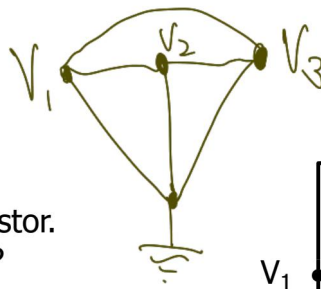
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EE3 Spring 2023
Homework Problem 2

V_1 V_2 V_3

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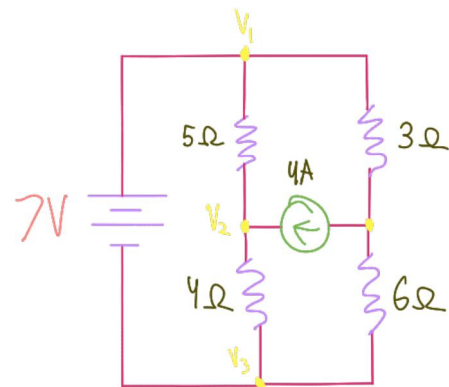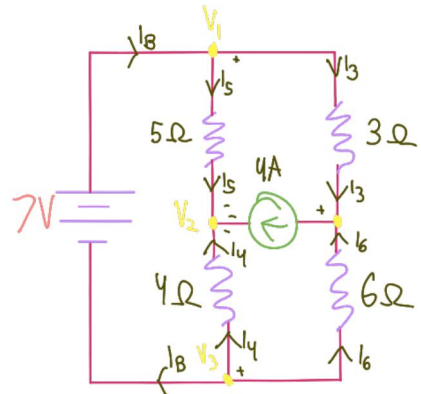(d) Is the battery providing or absorbing power?

7V

5Ω V_2 4Ω

V_1 V_3

3Ω 4A 6Ω

5Ω 3Ω

V_1

7V 4A

V_2

4Ω 6Ω

V_3

Analysis

Solving for V_1, V_2, V_3:

@V_2, $4 + \frac{V_1-V_2}{5} + \frac{V_3-V_2}{4} = 0$ | $80 + 4V_1 + 5V_3 - 9V_2 = 0$ $V_1 = \frac{31}{3}$ V **10.33**

$V_1 = V_3 + 7$ | $V_1 = V_3 + 7$ $V_2 = \frac{46}{3}$ V **15.33**

$\frac{V_1}{3} + \frac{V_3}{6} = 4$ | $2V_1 + V_3 - 24 = 0$ $V_3 = \frac{10}{3}$ V **3.33**

I_8 V_1 V_3
V_5
5Ω 4A 3Ω
V_5 V_{13}
V_2 I_4 I_6
4Ω 6Ω
I_8 V_3 I_6
7V

@ $I_6 = \frac{V_3}{6} = \frac{5}{9} = 0.556A$

ⓑ It is moving against V_3.

ⓒ $I_B = I_5 + I_3 = \frac{V_1-V_2}{5} + \frac{V_1}{3} = \frac{31-46}{15} + \frac{31}{9} = \frac{22}{9} = 2.44A$

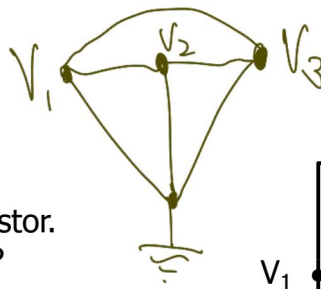ⓓ The current is flowing from the positive terminal, which means that the battery is delivering power.

V_1
5Ω 3Ω
4A
7V V_2
4Ω 6Ω
V_3

1.2 b **25 / 25**

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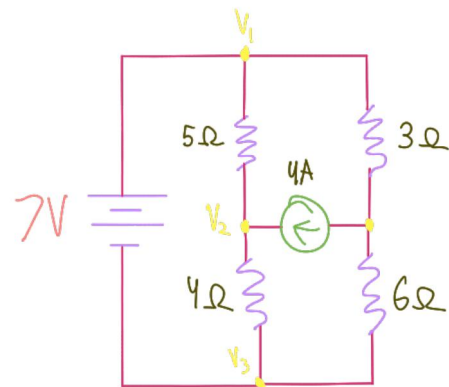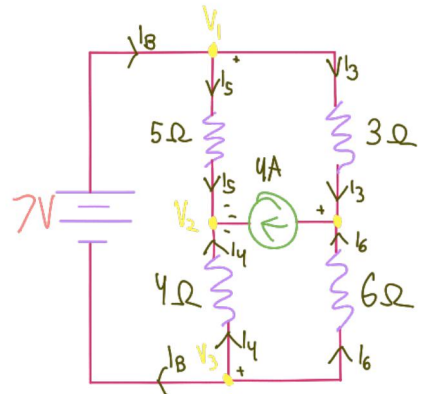(d) Is the battery providing or absorbing power?
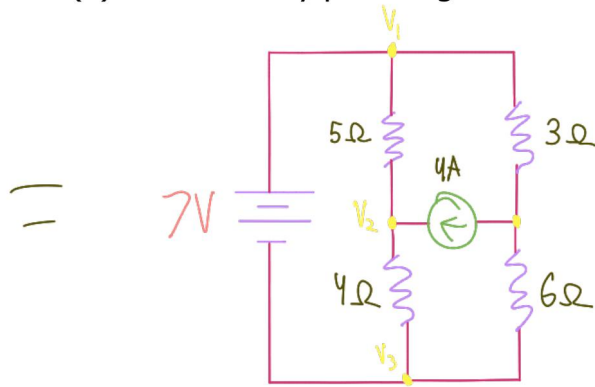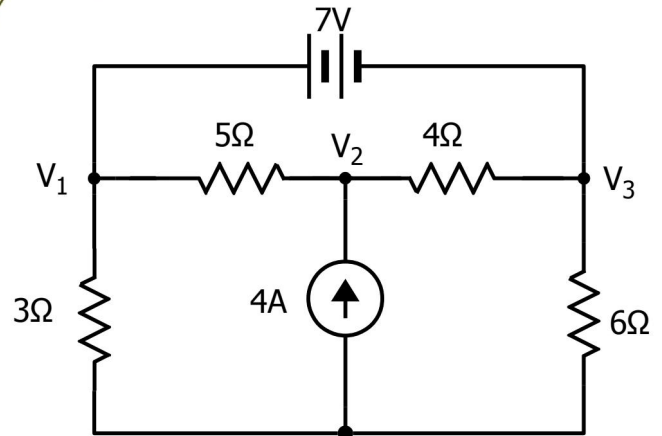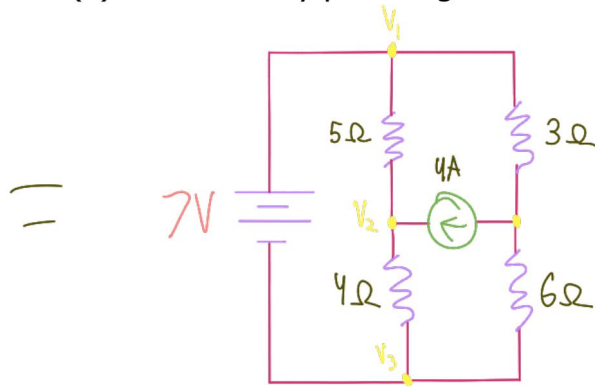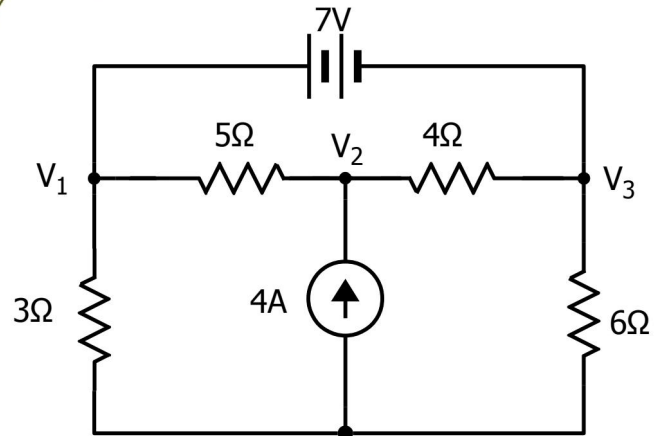
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$V_1 = \frac{31}{3}$ V   10.33

$V_2 = \frac{46}{3}$ V   15.33

$V_3 = \frac{10}{3}$ V   3.33

ⓐ $I_6 = \frac{V_3}{6} = \frac{5}{9} = 0.556A$

ⓑ It is moving against V_3.

ⓒ $I_B = I_5 + I_3 = \frac{V_1 - V_2}{5} + \frac{V_1}{3} = \frac{31 - 46}{15} + \frac{31}{9} = \frac{22}{9} = 2.44A$

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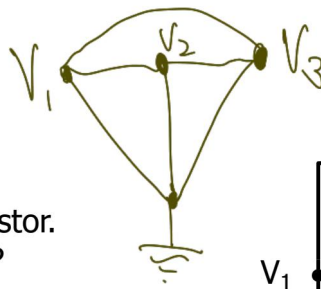
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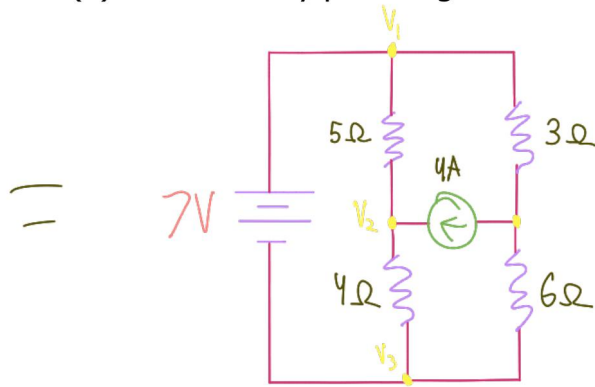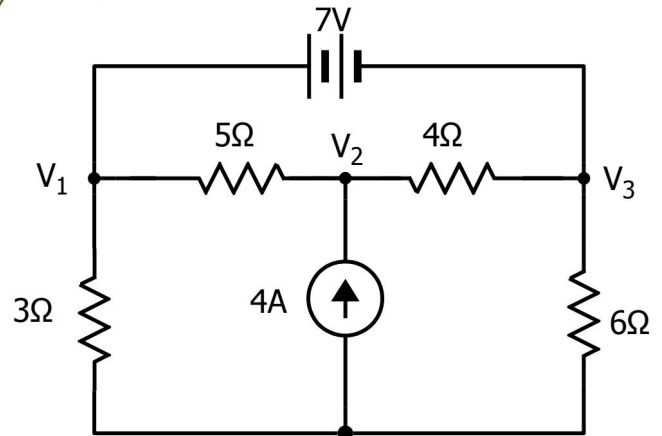✓ **- 0 pts** *Correct*

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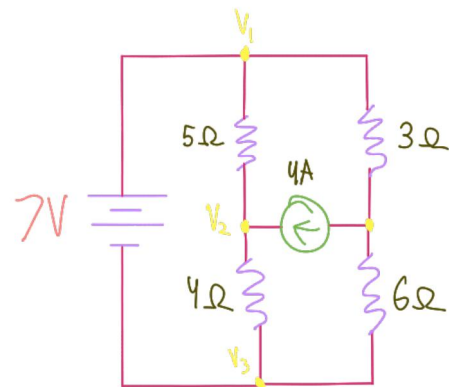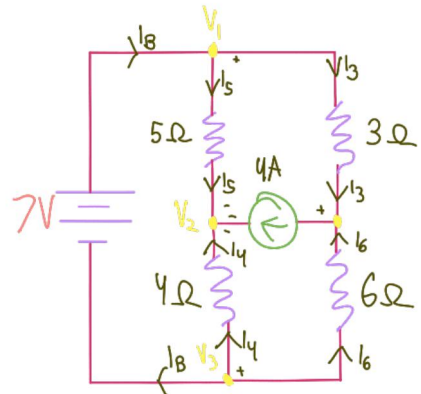(d) Is the battery providing or absorbing power?

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