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Homework 3

ENGR 201

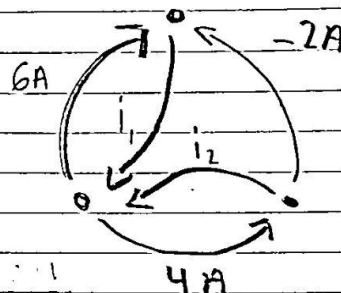
3.1) KCL

$$a) 6A - 2A = i_1 \Rightarrow$$

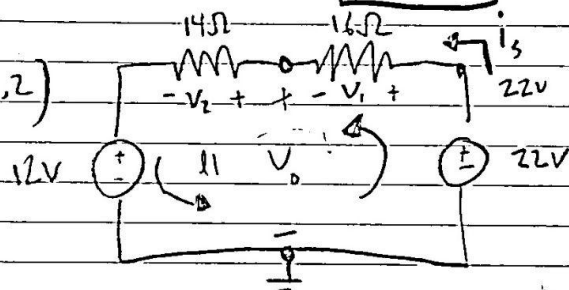
$$i_2 = 4A \checkmark$$

$$b) i_1 + i_2 = 6A \Rightarrow 2A + 4A = 6A$$

$$c) 4A = i_2 - 2A \Rightarrow i_2 = 2A \checkmark$$



3.2)



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KVL:

$$1) 0 = 22V - 16i_3 - 14i_3 - 12V$$

$$\downarrow$$

$$0 = 10V - 30i_3$$

$$30i_3 = 10V$$

$$i_3 = .33A$$

$$V_1 = .33A \cdot 16\Omega$$

$$V_2 = .33A \cdot 14\Omega$$

$$V_1 = 5.33V$$

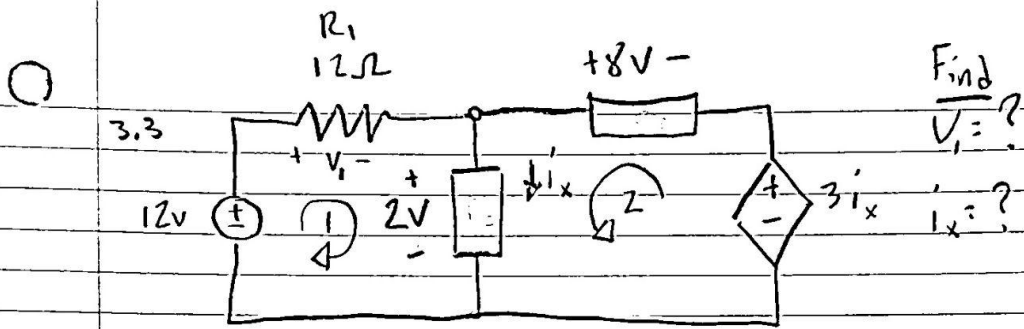
$$V_2 = 4.67V$$

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$$22V - V_1 = 16.67 \text{ at } +$$

$$-V_2 - 12V = -16.67 \text{ at } -$$

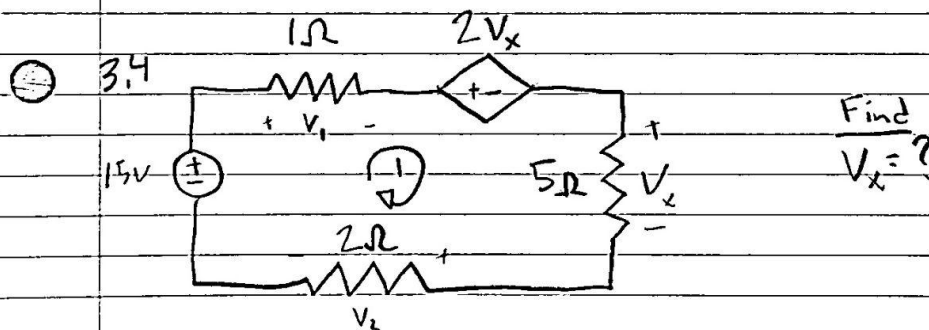
$$V_0 = 16.67V$$



KVL:

$$1) 0 = 12V - V_1 - 2V \Rightarrow V_1 = 10V$$

$$2) 0 = 3i_x + 8V - 2V \Rightarrow -6V = 3i_x \Rightarrow i_x = -2A$$

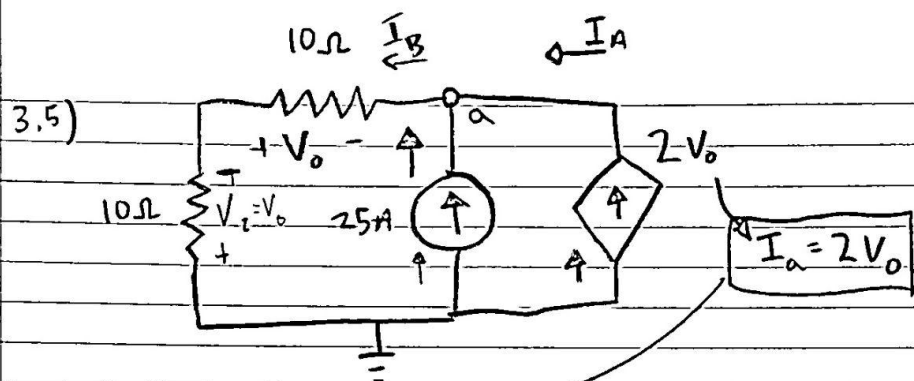


KVL:

$$0 = 15V - 1i_s - 2(5i_s) - 5i_s - 2i_s \Rightarrow 18i_s = 15V$$

$$V_x = i_s \cdot 5\Omega \Rightarrow V_x = 4.167V$$

$$i_s = \frac{15V}{18\Omega} = .833A$$



KCL)

$$a) \quad 25A + I_A = I_B \quad \text{---} \quad -V_o = 10\Omega I_B \quad \rightarrow \quad I_B = -\frac{V_o}{10\Omega}$$

$$\left(25\frac{V}{\Omega} + \frac{1\Omega \cdot V_o}{1\Omega} = \frac{-V_o}{10\Omega} \right) 1\Omega$$

$$25V + 2V_o = -\frac{1}{10}V_o$$

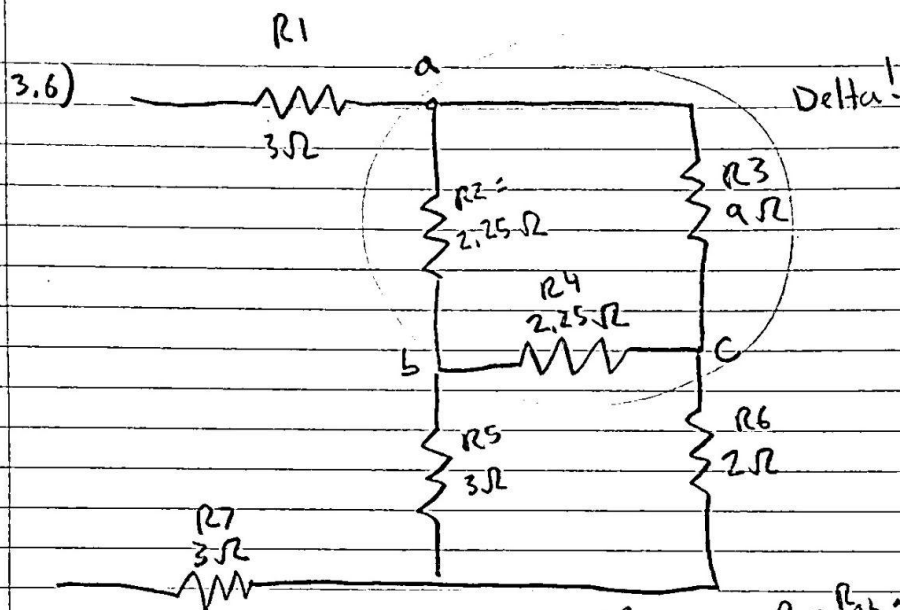
$$25V = -\frac{21}{10}V_o \quad \rightarrow \quad V_o = -\frac{250}{21}V$$

Power absorbed by the dependent source can be found using $p = Vi$

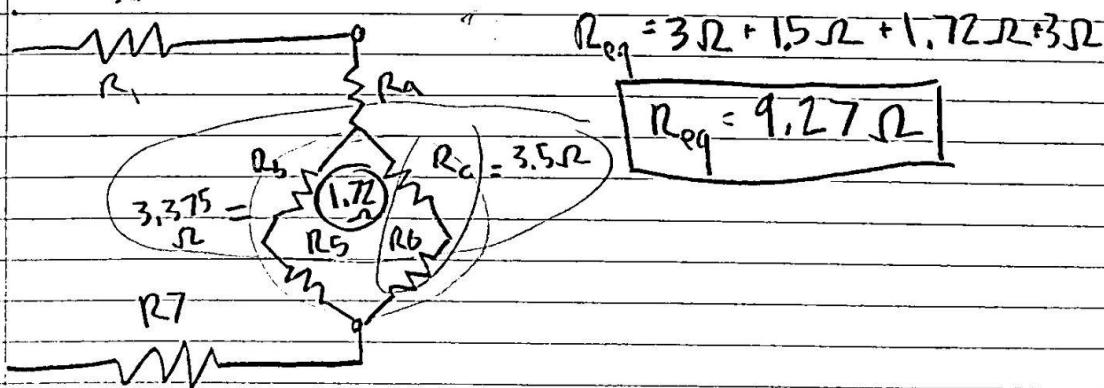
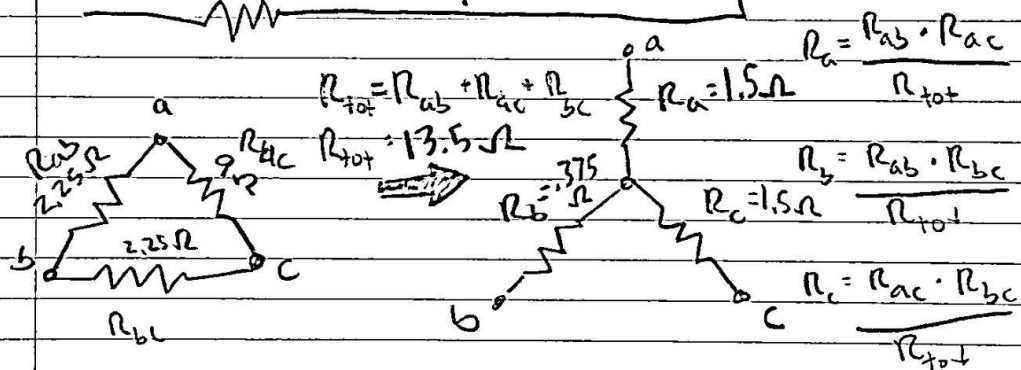
$$P = V_i I_A \quad \rightarrow \quad P = 2V_o \cdot 2V_o \quad \text{---} \quad V_2 = V_o \quad \therefore V_{tot} = 2V_o$$

$$P = 4V_o^2 \quad \rightarrow \quad P = 566.89 W$$

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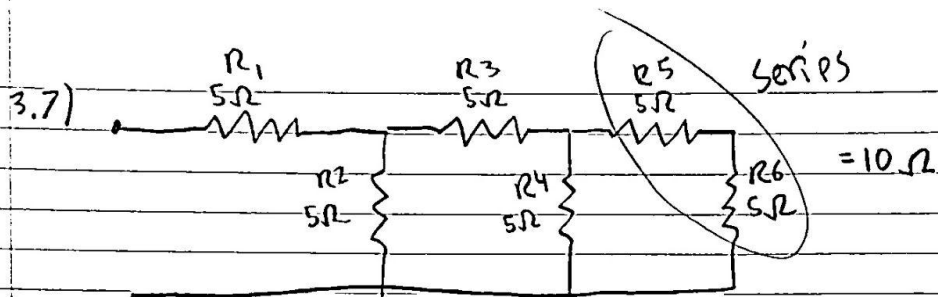


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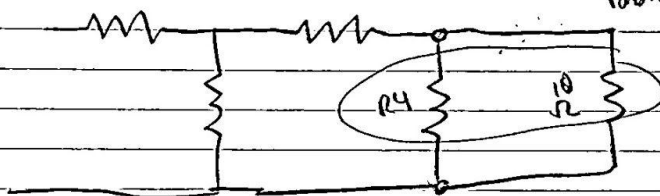


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3.7)

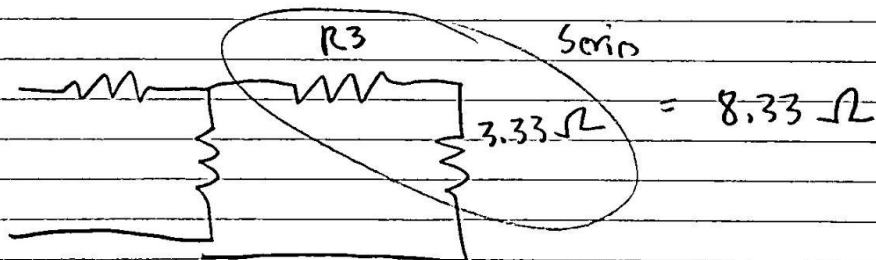


Parallel

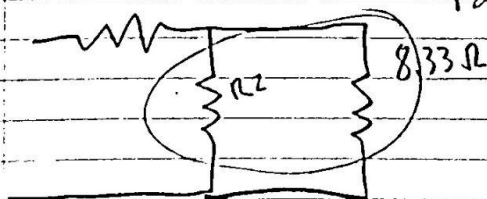


$$\frac{5 \cdot 10}{15} = 3.33 \Omega$$

Series

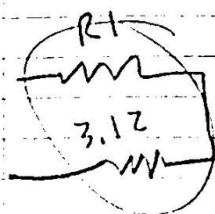


Parallel



$$\frac{5 \cdot 8.33}{13.33} = 3.12 \Omega$$

Series



$$R_{eq} = 8.12 \Omega$$

