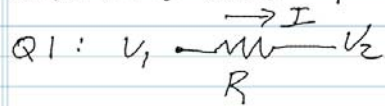


AME 3623 Quiz #1 1/17/13



Assume:

$$V_1 = 5V$$

$$I = 10 \text{ mA}$$

$$R = 100 \Omega$$

What is V_2 ?

Ohm's Law: $V_1 - V_2 = IR$

$$V_2 = V_1 - IR$$

$$= 5 - .01 \times 100$$

$$= 4V$$

Q2 same circuit

Assume:

$$V_1 = 5V$$

$$I = 25 \text{ mA}$$

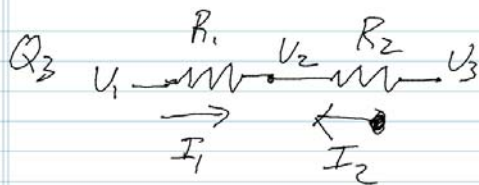
$$V_2 = 0V$$

What is R ?

Ohm's Law: $V_1 - V_2 = IR$

$$R = \frac{V_1 - V_2}{I} = \frac{5 - 0}{.025}$$

$$= 200 \Omega$$



Assume that

$$V_1 = 6V$$

$$V_2 = 2V$$

$$R_1 = 200\Omega$$

What is I_1 ?

$$V_1 - V_2 = I_1 R_1$$

$$I_1 = \frac{6-2}{200} = 20mA$$

Assume further that:

$$V_3 = 1V$$

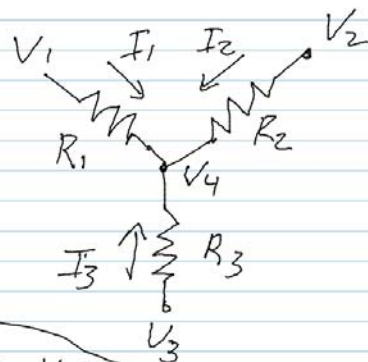
What is R_2 ?

$$I_2 = -I_1$$

$$V_3 - V_2 = I_2 R_2$$

$$R_2 = \frac{V_3 - V_2}{I_2} = \frac{1-2}{-0.02} = 50\Omega$$

Q4



Assume:

$$V_1 = 0V$$

$$V_2 = 7V$$

$$V_3 = 2V$$

$$R_1 = 100\Omega$$

$$R_2 = 200\Omega$$

$$R_3 = 250\Omega$$

What is V_4 ?

Ohm's Law:

$$V_i - V_4 = I_i R_i \quad i \in \{1, 2, 3\}$$

$$\sum I_i = 0 \rightarrow$$

$$I_1 + I_2 + I_3 = 0$$

$$\frac{V_1 - V_4}{R_1} + \frac{V_2 - V_4}{R_2} + \frac{V_3 - V_4}{R_3} = 0 \quad \leftarrow V_4 \text{ is only unknown!}$$

$$\frac{0 - V_4}{100} + \frac{7 - V_4}{200} + \frac{2 - V_4}{250} = 0$$

$$-10V_4 + 35 - 5V_4 + 8 - 4V_4 = 0$$

$$19V_4 = 43$$

$$V_4 = \frac{43}{19} V$$

Note: no matter what $V_1, V_2, V_3, R_1, R_2, R_3$ are:

$$\min(V_1, V_2, V_3) \leq V_4 \leq \max(V_1, V_2, V_3)$$

