ECE 3 HW 3

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With V_4 as the reference node we have

$$V_2 = 16V$$

And from KCL, the following equations for V_1 and V_3

$$\frac{16 - V_1}{5} + \frac{V_3 - V_1}{7} = 1$$

$$0.5 = \frac{V_3 - V_1}{7} + \frac{V_3}{6}$$

Solving these we get

$$V_1 = 8.778V$$

$$V_3 = 5.667V$$

We have that the current flowing into V_4 is

$$1 + \frac{V_3}{6} = \boxed{1.945A}$$

From KCL this must be the magnitude of the current flowing across the battery, from V_4 to V_2

Now with V_2 as the reference node we have

If V_2 is the ground node, then we must have that $V_4 = -16V$, and we will from KCL have the following equations for V_1 and V_3

$$\frac{-V_1}{5} + \frac{V_3 - V_1}{7} = 1$$

$$0.5 = \frac{V_3 - V_1}{7} + \frac{V_3 + 16}{6}$$

Solving these equations we get

$$V_1 = -7.222V$$

$$V_3 = -10.333V$$

We have that the current flowing into V_4 is

$$1 + \frac{V_3 + 16}{6} = \boxed{1.945A}$$

From KCL this must be the magnitude of the current flowing across the battery, from V_4 to V_2