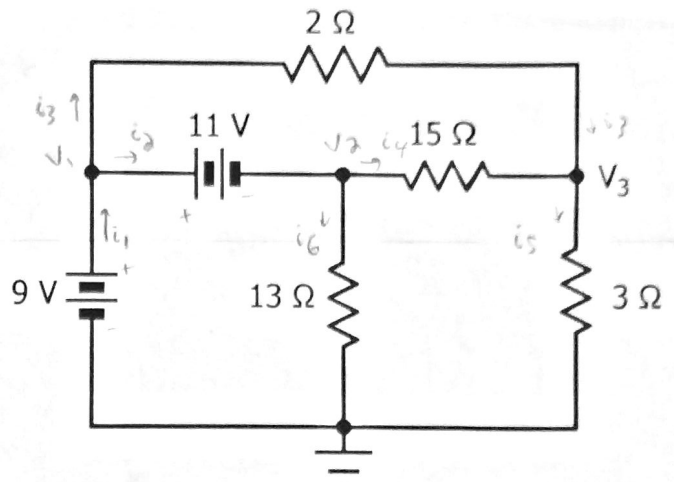


EE3 Spring 2019
Quiz 2

- a. Write (do not solve) the KCL equation for Node 3 (the top of the 3 Ω resistor). You MUST use the numerical battery voltages in the equation. The only non-numeric symbol allowed in the equation is V_3 . NOTE THE BATTERY ORIENTATIONS!
- b. What is the direction of the current through the 13 Ω resistor (remember, we are talking conventional current here)?



$$a) \quad i_4 + i_3 = i_5$$

$$i_1 = i_2 + i_3$$

$$i_2 = i_3 + i_6$$

$$i_5 = \frac{V_3 - 0}{3} = i_4 + i_3 = \frac{V_1 - V_3}{2} + \frac{V_2 - V_3}{15}$$

where $V_1 = 9$, $V_2 = 9 - 11 = -2$

So:

$$\frac{V_3}{3} = \frac{9 - V_3}{2} + \frac{(-2) - V_3}{15}$$

or $\frac{V_3}{3} = \frac{9 - V_3}{2} - \left[\frac{2 + V_3}{15} \right]$

b) Assuming downward:

$$9 - 11 - i_6(13) = 0 \rightarrow -2 - i_6(13) = 0 \rightarrow i_6 = -\frac{2}{13}$$

i_6 obviously has to be going upward for KVL to be satisfied.

So the current through the 13 Ω resistor is going upwards, or away from the designated "ground" icon.