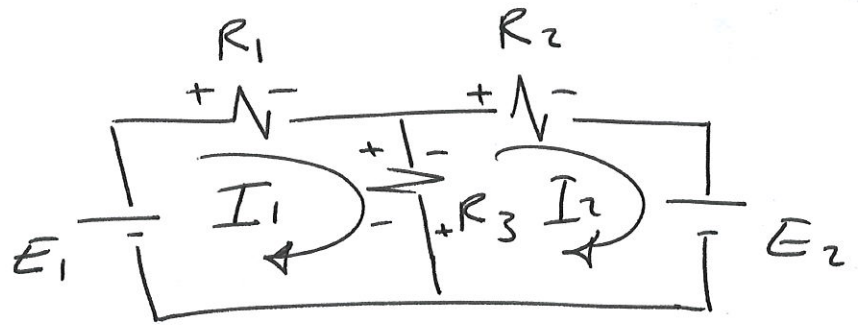


Mesh analysis



Loop ①:

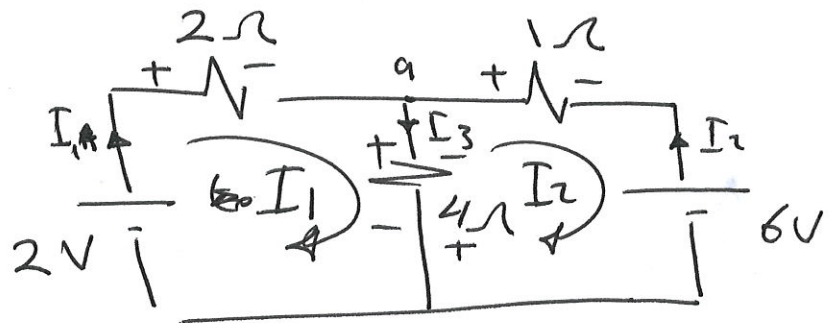
$$E_1 - I_1 R_1 - (I_1 - I_2) R_3 = 0 \quad \text{--- ①}$$

Loop ②:

$$-E_2 - (I_2 - I_1) R_3 - I_2 R_2 = 0 \quad \text{--- ②}$$

Ex Using mesh analysis to find I_1, I_2 & I_3 ?

Sol



Loop ①

$$2 - 2I_1 - 4(I_1 - I_2) = 0$$

$$2 - 6I_1 + 4I_2 = 0 \quad \text{--- ①}$$

Loop ②

$$-6 - 4(I_2 - I_1) - I_2 = 0$$

$$-6 - 5I_2 + 4I_1 = 0 \quad \text{--- ②}$$

② × 5 and ① × 4 and subtract

$$I_2 = \left(\frac{2 - 6I_1}{4} \right) \Rightarrow I_2 = \left(\frac{6I_1 - 2}{4} \right)$$

$$-6 - 5 \left(\frac{6I_1 - 2}{4} \right) + 4I_1 = 0$$

$$-6 - \frac{30}{4} I_1 + \frac{10}{4} + 4I_1 = 0 \quad * 4$$

$$-24 - 30I_1 + 10 + 16I_1 = 0$$

$$\therefore I_1 = \underline{\underline{-1 \text{ A}}}$$

$$I_2 = \left(\frac{6 * (-1) - 2}{4} \right) = -2 \text{ A}$$

at node g

$$I_1 = I_2 + I_3$$

$$I_3 = I_1 - I_2 = -1 - (-2) = \underline{\underline{1 \text{ A}}}$$

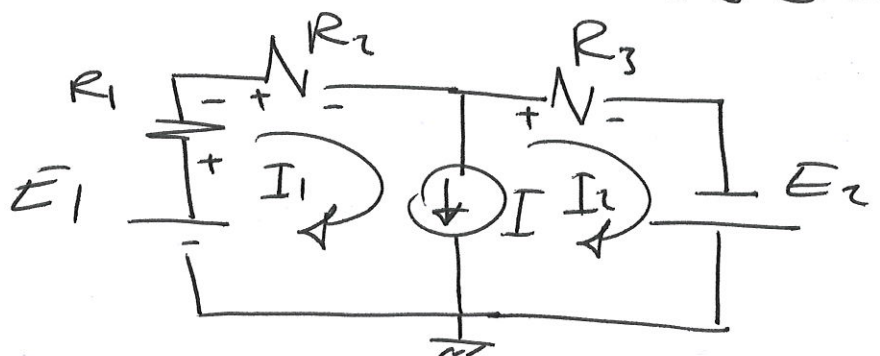


Supermesh Currents

~~Expanding mesh analysis to handle the current source in the network.~~

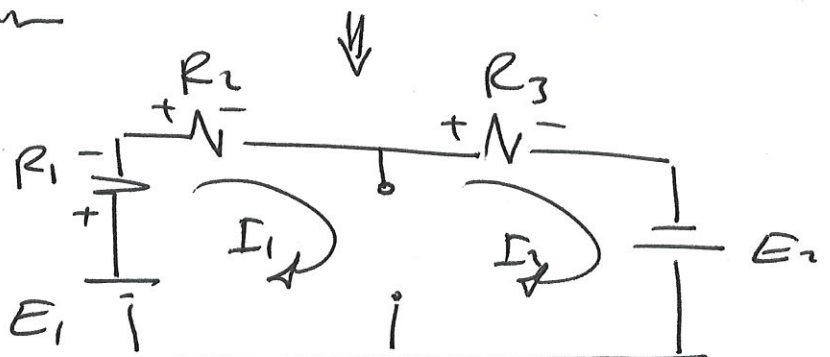
1) let loops

$$I_1 - I_2 = I \quad \text{--- (1)}$$

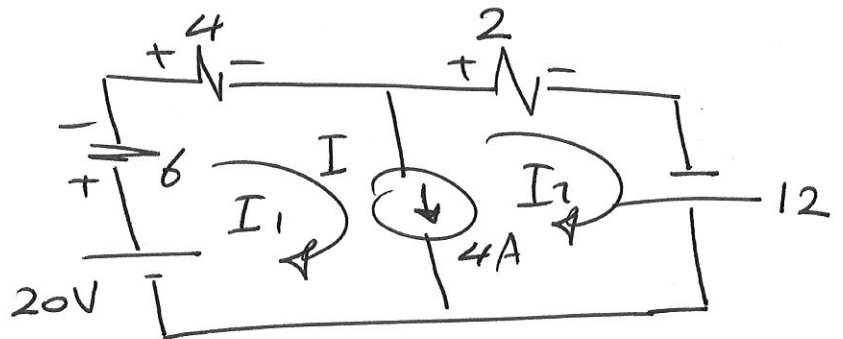


2) Remove current source

$$E_1 + I_1 R_1 - I_1 R_2 - I_2 R_3 + E_2 = 0$$

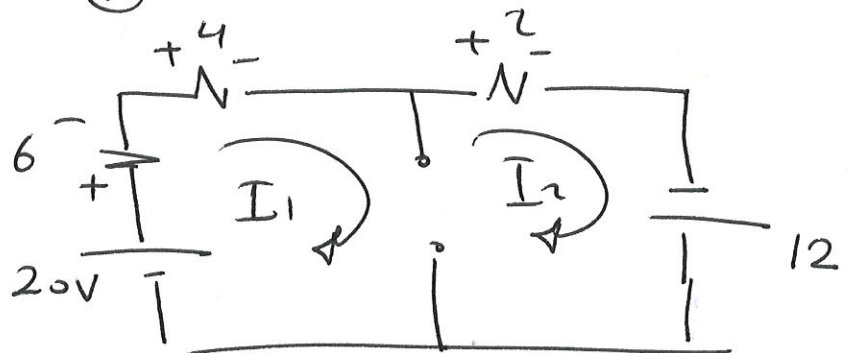


Ex Using mesh analysis, determine the currents of the network of Fig.



Sol

$$I_1 - I_2 = 4 \quad \text{--- (1)}$$



$$20 - 6I_1 - 4I_1 - 2I_2 + 12 = 0 \quad \text{--- (2)}$$

نوجد I_1 من (1) ونعوضه في (2)

$$I_1 = I_2 + 4$$

$$20 - 6(I_2 + 4) - 4(I_2 + 4) - 2I_2 + 12 = 0$$

$$20 - \underline{6I_2} - 24 - \underline{4I_2} - 16 - \underline{2I_2} + 12 = 0$$

$$-8 - 12I_2 = 0$$

$$I_2 = \boxed{-0.67}$$

$$I_1 = I_2 + 4 = \boxed{3.33}$$