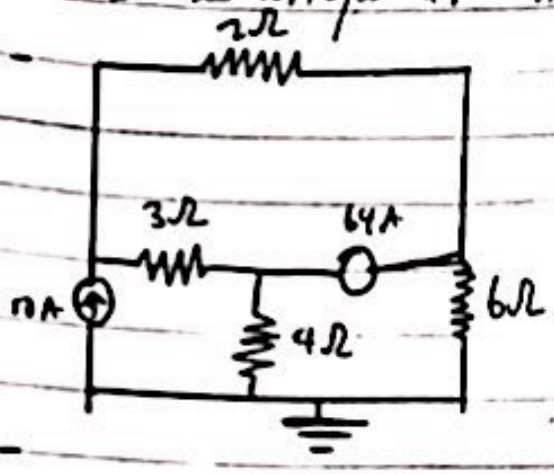
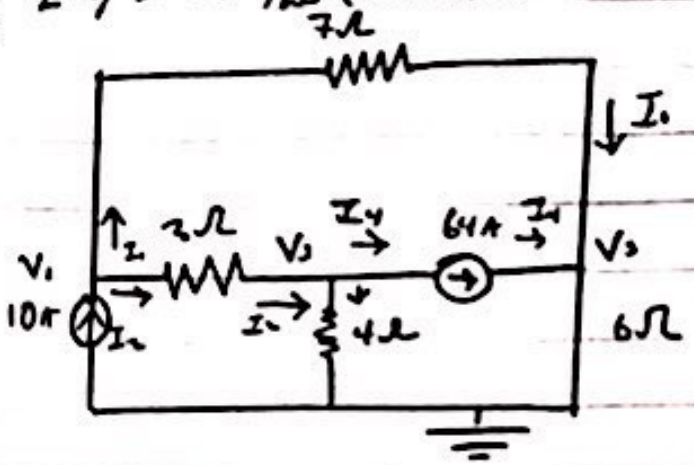
1) Find the voltages at node 1, 2 & 3 in the circuit below.





At node 1, KCL:

$$10 - I_1 + I_2 \rightarrow 10 = \frac{V_1 - V_2}{2} + \frac{V_1 - V_3}{3}$$

$$\rightarrow 60 = 3(V_1 - V_3) + 2(V_1 - V_2)$$

$$60 = 3V_1 - 3V_3 + 2V_1 - 2V_2$$

$$60 = 5V_1 - 2V_2 - 3V_3 \quad \ldots\ldots (1)$$

At node 2, KCL:

$$I_2 = I_3 + 64$$

$$64 = I_2 - I_3$$

$$64 = \frac{V_1 - V_2}{3} - \frac{V_2 - 0}{4}$$

$$768 = 4(V_1 - V_2) - 3[V_2 - 0]$$

$$768 = 4V_1 - 4V_2 - 3V_2$$

$$768 = 4V_1 - 7V_2 \quad \ldots\ldots (11)$$

At Node 3 KCL

$$64 + I_1 = I_5$$