Example : Linearity : Use of
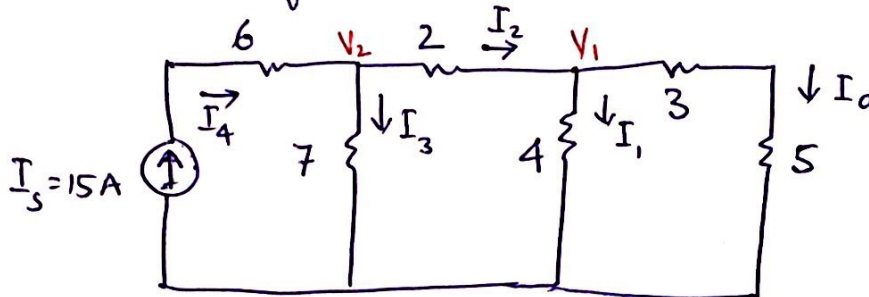
Assume $I_0 = 1A$ and use linearity to find the actual value of I_0 in the circuit.

Solution:

$$\text{If } I_0 = 1 A \quad \text{then} \quad V_1 = 8 V$$

$$V_1 = 8 V \quad \text{So} \quad I_1 = 2 A$$

(we can assume $I_0 = 2A$ and get the same result)

$$\text{then } I_2 = I_1 + I_0 = 2 + 1 = 3 A$$

$$\text{and } V_2 = 2 I_2 + V_1$$

Note : $\}$ calculation of V_2.

$$V_2 = 2 \times 3 + 8 = 14 V$$

$$\text{So} \quad I_3 = \frac{V_2}{7} = 2 A$$

$$\text{And} \quad I_4 = I_2 + I_3 = 3 + 2 = 5 A$$

$$\text{So } I_s = I_4 = 5 A \quad \text{yields} \quad I_0 = 1A$$

Hence $I_s = 3 \times 5 = 15$ then using linearity

$$I_0 = 1 \times 3$$

$$\text{So} \quad I_0 = 3 A$$