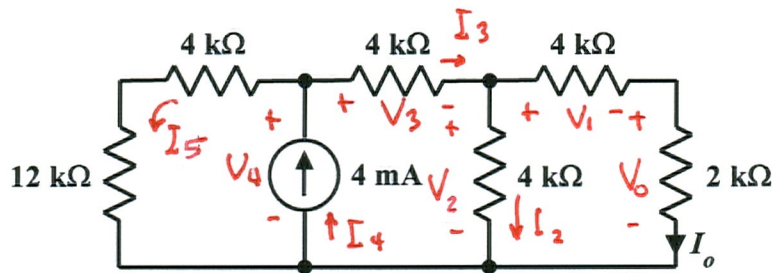


Homework Problem #035

Determine the value of I_o using linearity/proportionality and the initial assumption that $I_o = 1 \text{ mA}$.



Assume $I_o = 1 \text{ mA}$

Then $V_o = (2 \text{ k}\Omega) I_o = 2 \text{ V}$

$$V_1 = (4 \text{ k}\Omega) I_o = 4 \text{ V}$$

$$V_2 = V_1 + V_o = 6 \text{ V}$$

$$I_2 = \frac{V_2}{4 \text{ k}\Omega} = \frac{3}{2} \text{ mA}$$

$$I_3 = I_2 + I_o = \frac{5}{2} \text{ mA}$$

$$V_3 = (4 \text{ k}\Omega) I_3 = 10 \text{ V}$$

$$V_4 = V_3 + V_2 = 16 \text{ V}$$

$$I_5 = \frac{V_4}{16 \text{ k}\Omega} = 1 \text{ mA}$$

$$I_4 = I_3 + I_5 = \frac{7}{2} \text{ mA}$$

$$\therefore \frac{I_o}{4 \text{ mA}} = \frac{1 \text{ mA}}{\frac{7}{2} \text{ mA}} \Rightarrow I_o = \frac{8}{7} \text{ mA} \approx 1.143 \text{ mA}$$