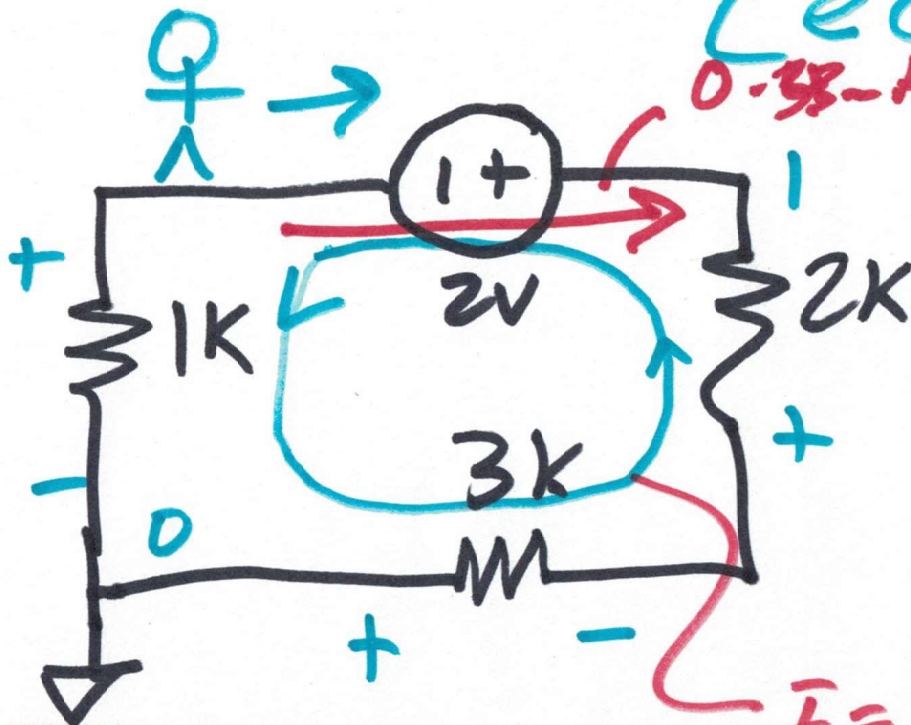


EE 220

Circuits 1

Sept. 9, 2020

Lecture 5



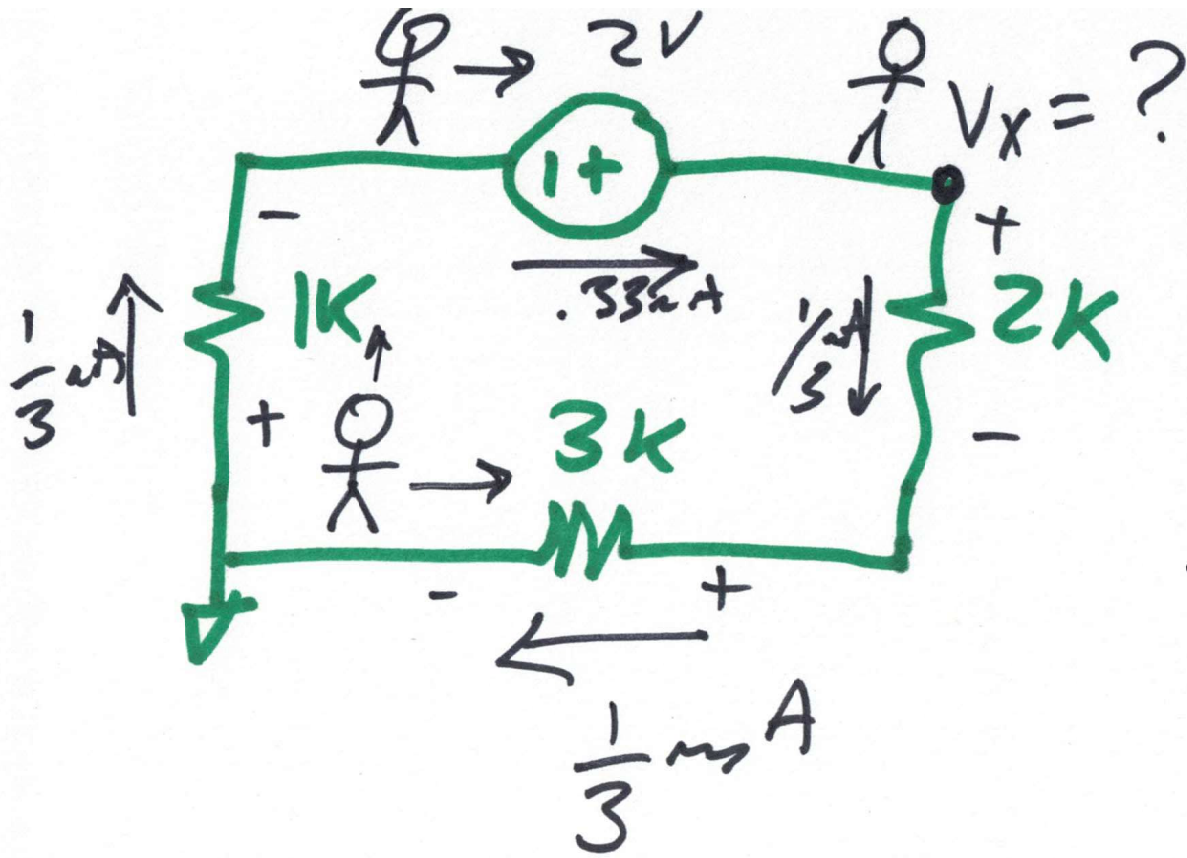
$$2V + 2K \cdot I + 3K \cdot I$$

$$+ 1K \cdot I = 0$$

$$2V = -6K \cdot I$$

$$I = \frac{-2}{6} \cdot \frac{1}{K} = \underline{\underline{0.33mA}}$$

$$I = -0.33mA$$



$$-\frac{1}{3} \text{ mA} \cdot 1\text{k} + 2\text{V} = V_x$$

$$-\frac{1}{3} \text{ V} + 2\text{V} = V_x$$

$$V_x = 1\frac{2}{3} \text{ V}$$

$$\frac{1}{3} \text{ mA} \cdot 3\text{k} + \frac{1}{3} \text{ mA} \cdot 2\text{k} = V_x$$

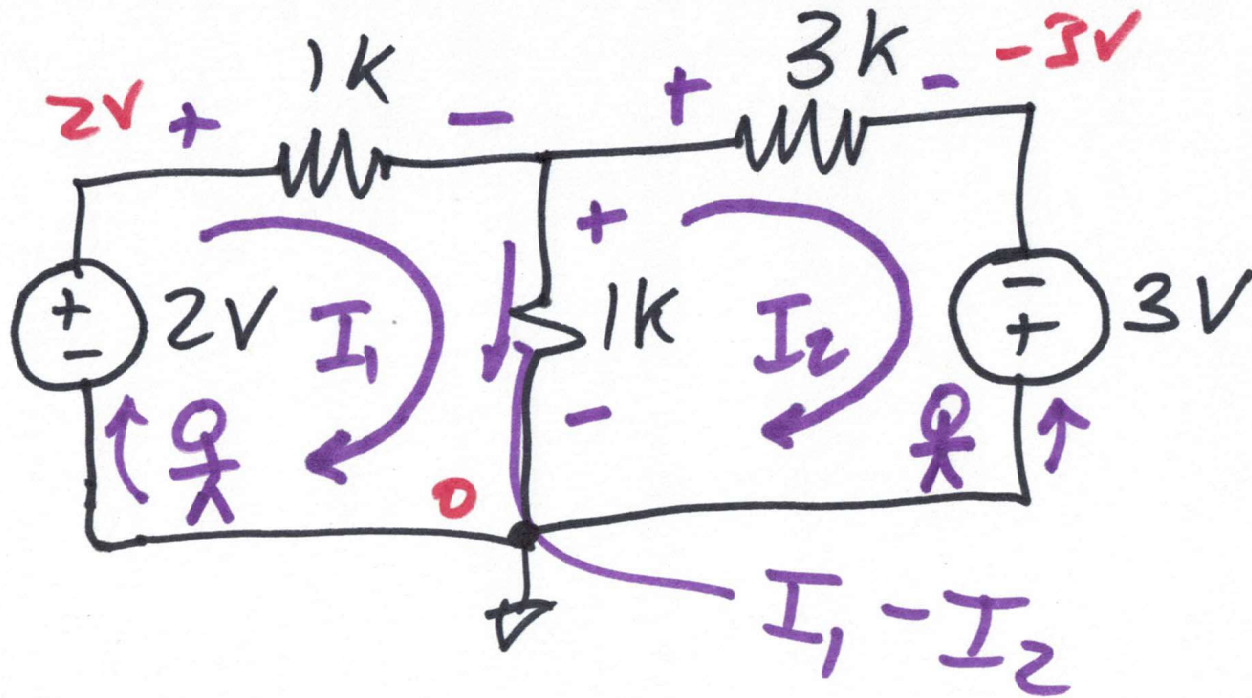
$$1\text{V} + \frac{2}{3}\text{V} = V_x$$

$$V_x = 1\frac{2}{3} \text{ V}$$

2)

KVL  
KCL

# Mesh Analysis



$$2V - 1k \cdot I_1 - 1k(I_1 - I_2) = 0 \rightarrow 2 = 2kI_1 + 1kI_2 = 0$$

$$-3V + 3k \cdot I_2 - 1k(I_1 - I_2) = 0$$

$$2kI_1 = 2 + 1kI_2$$

$$I_1 = 1mA + \frac{1}{2}I_2$$

5)

$$I_1 = 1 \mu A + \frac{1}{2} I_2$$

$$3 = 4kI_2 - 1kI_1$$

$$\begin{aligned} 3 &= 4kI_2 - 1k\left(1 \mu A + \frac{1}{2} I_2\right) \\ &= 4kI_2 - 1V - 500 I_2 \end{aligned}$$

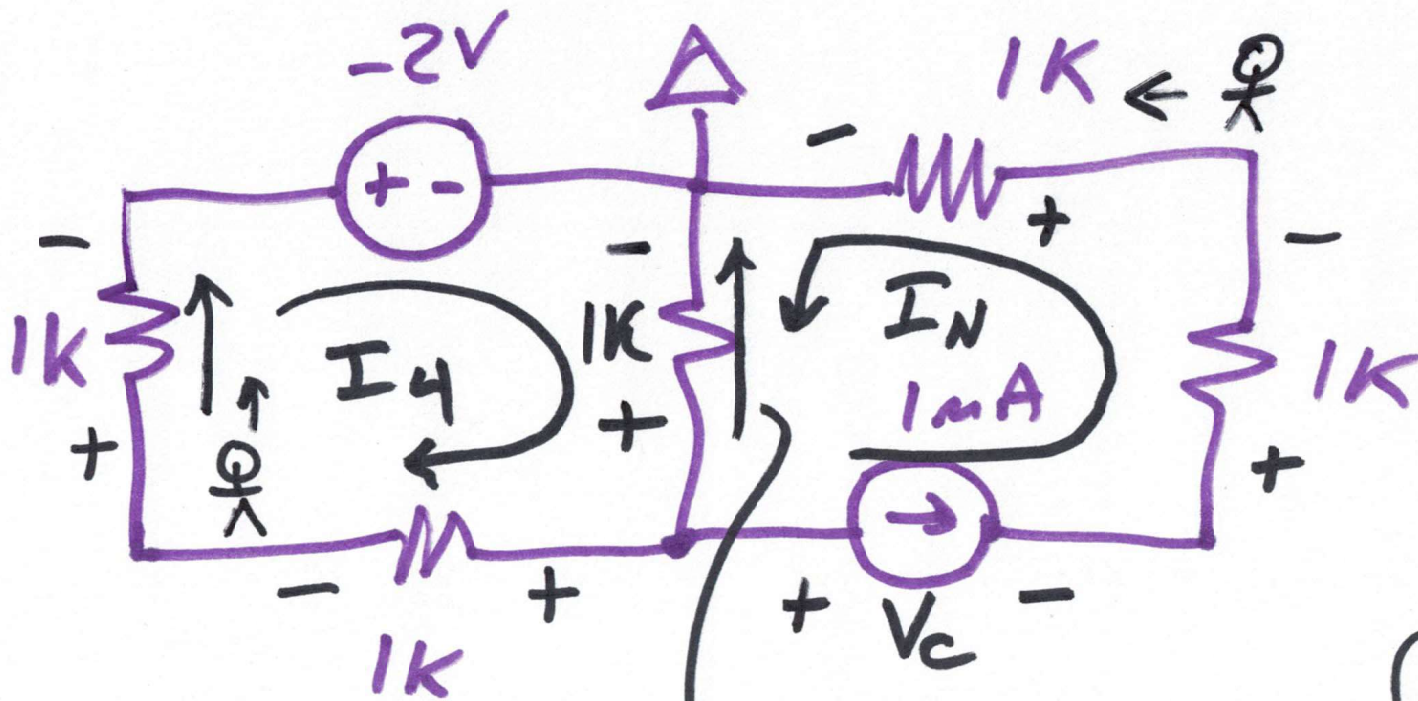
$$3 = 3.5kI_2 - 1 \quad \approx$$

$$\begin{aligned} I_1 &= 1 \mu A + \frac{1}{2} \cdot \frac{8}{7} \mu A \\ 1 \mu A + \frac{4}{7} &= 1.48 \mu A \quad I_2 = \frac{4}{3.5k} = \frac{8.500}{7.500} \cdot 10^{-3} A \\ &= \frac{\frac{1}{2} \cdot 8}{1.7} \cdot 10^{-3} A \end{aligned}$$

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$$= \frac{8}{7} \mu A$$

4)



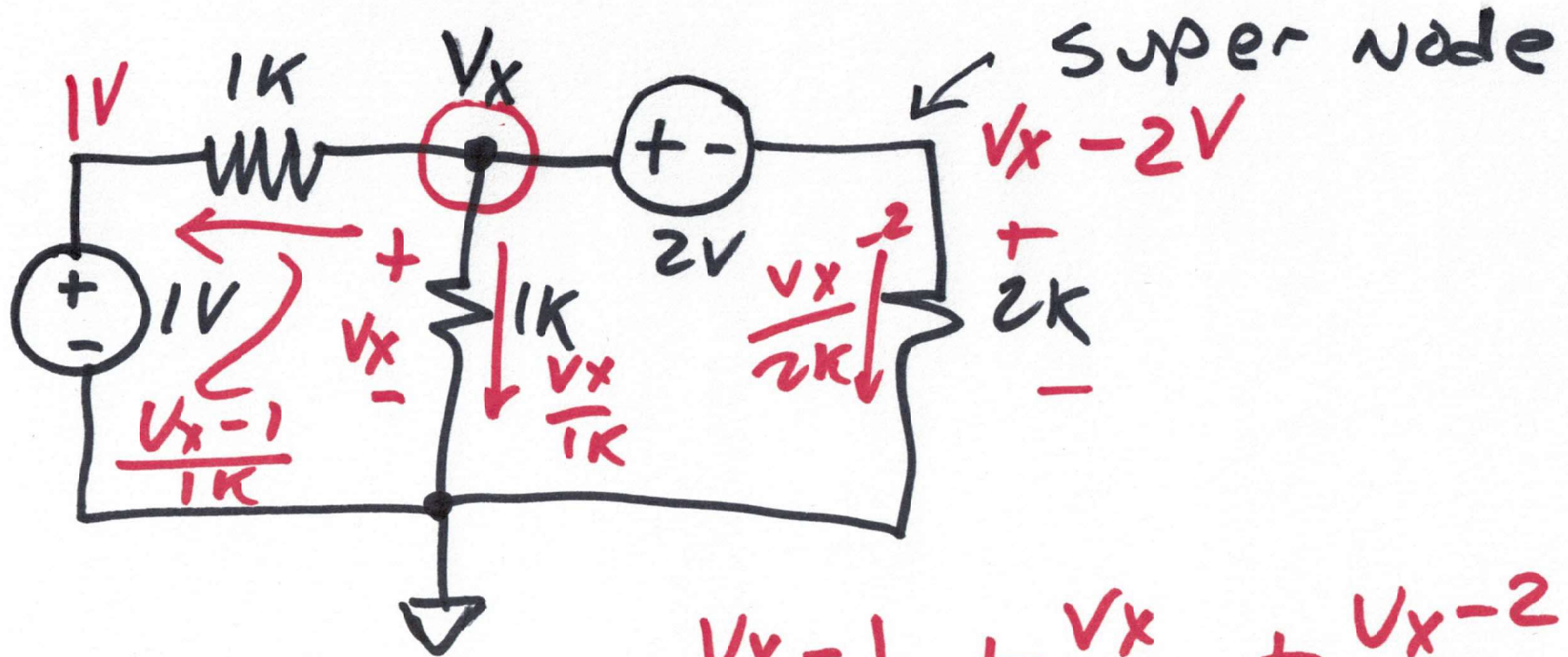
$$I_N = 1 \mu A$$

$$(-I_N - I_4)$$

$$-1K I_4 - (-2) + 1K (-I_N - I_4) - 1K \cdot I_4 = 0$$

$$-1K I_N + 1K (-I_N - I_4) - V_c - I_N \cdot 1K = 0$$

\*) 5

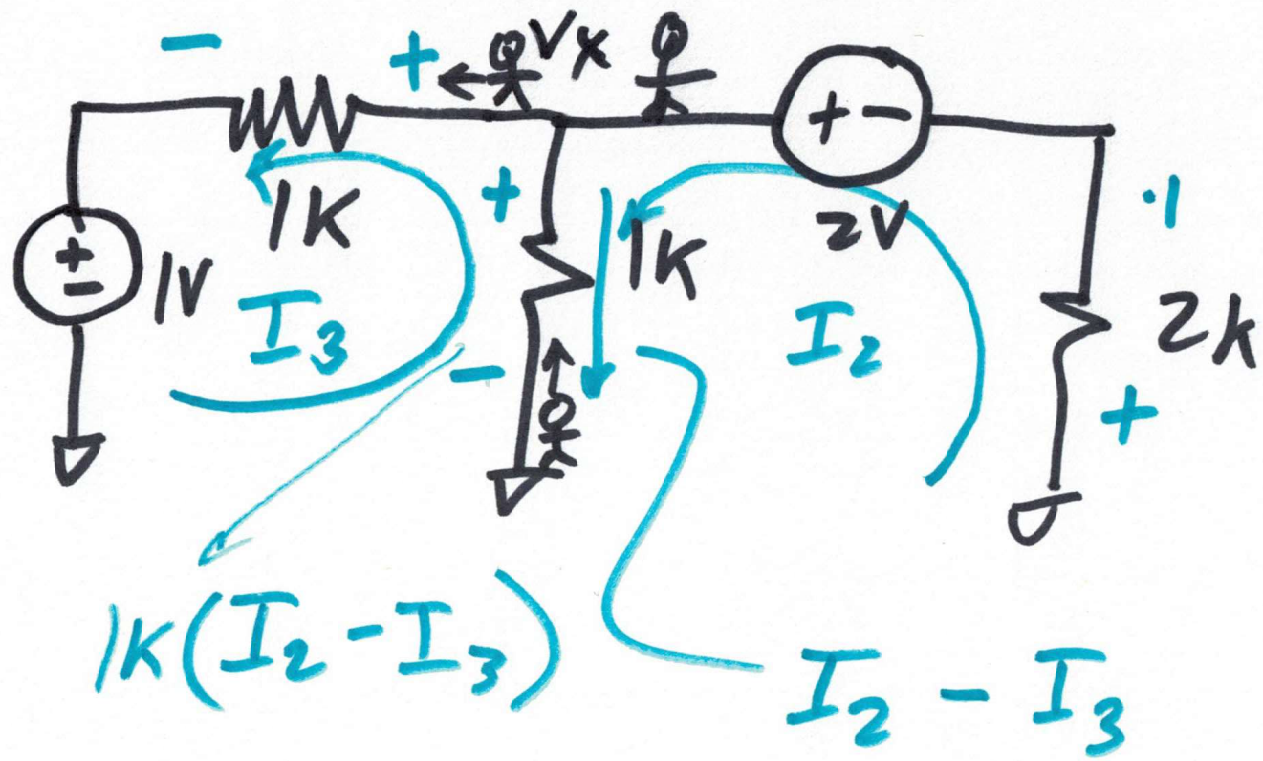


$$\frac{V_x - 1}{1k} + \frac{V_x}{1k} + \frac{V_x - 2}{2k} = 0$$

$$2V_x - 2 + 2V_x + V_x - 2 = 0$$

$$5V_x = 4$$

$$V_x = \frac{4}{5} = 0.8V$$



$$1k(I_2 - I_3) - 1k(I_3) - 1V = 0$$

$$1k(I_2 - I_3) - 2V + 2k \cdot I_2 = 0$$