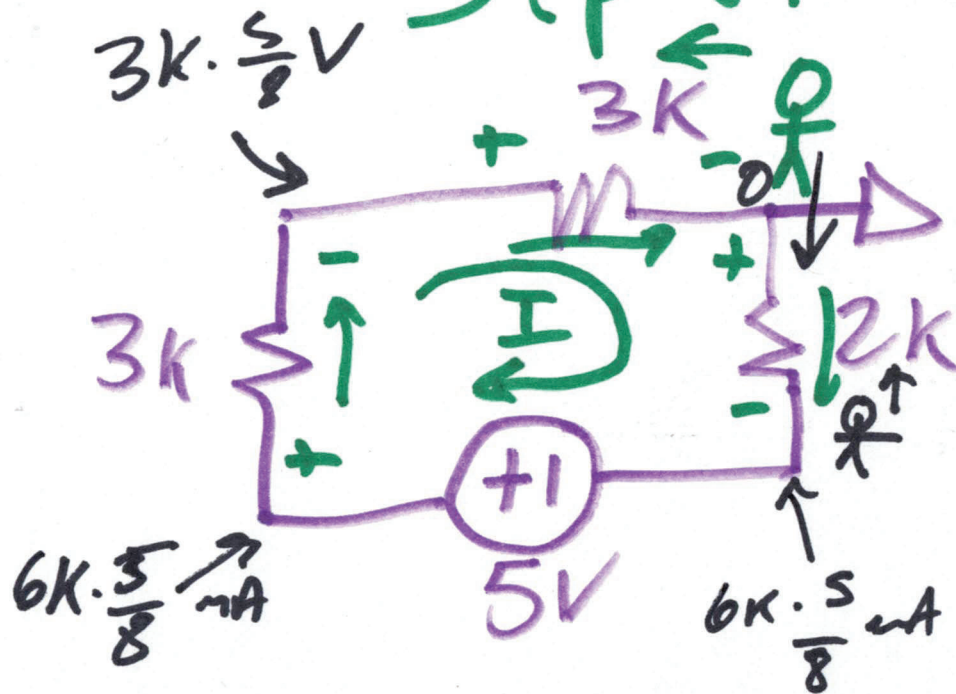


EE 220 - Circuits 1

Study Session

Sept.

26, 2020



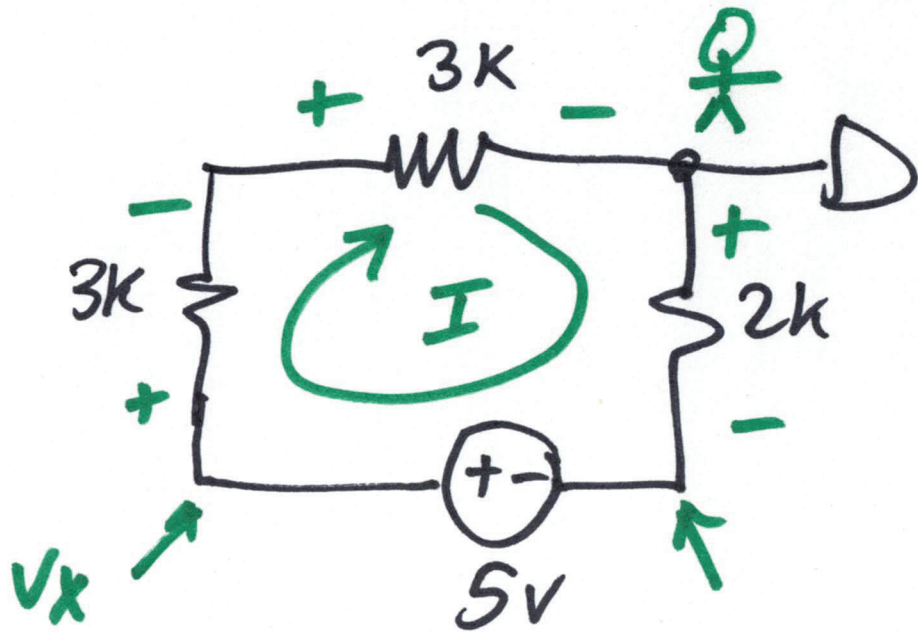
$$+3k \cdot I + 3k \cdot I$$

$$-5 + 2k \cdot I = 0$$

$$8k \cdot I = 5$$

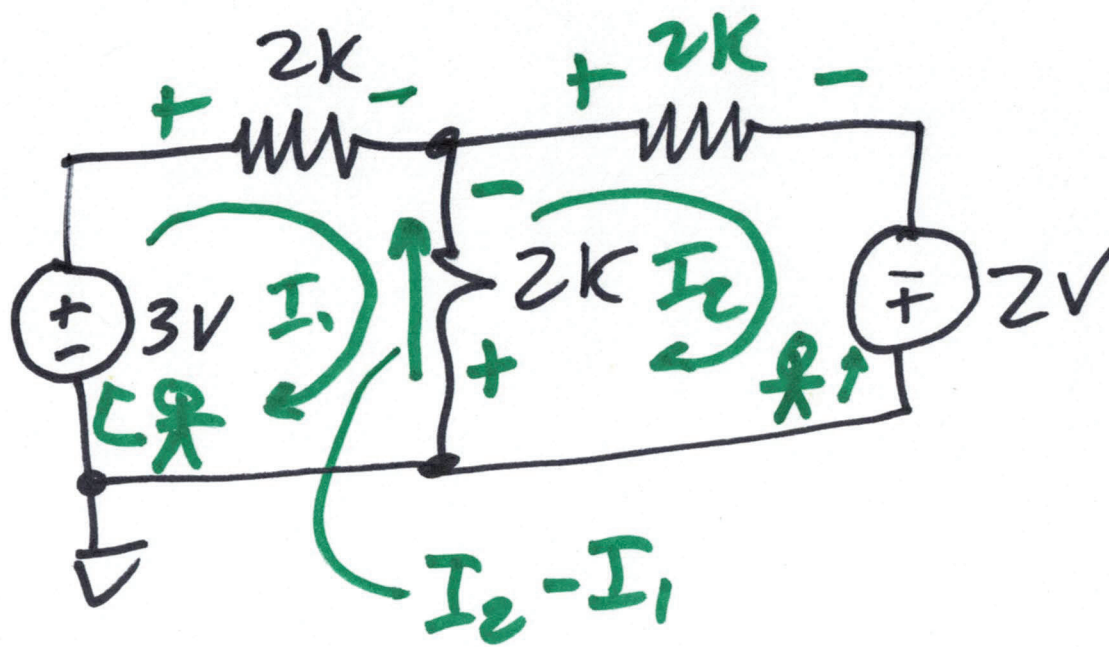
$$I = \frac{5}{8} mA$$

$$-2k \cdot \frac{5}{8} \mu A$$



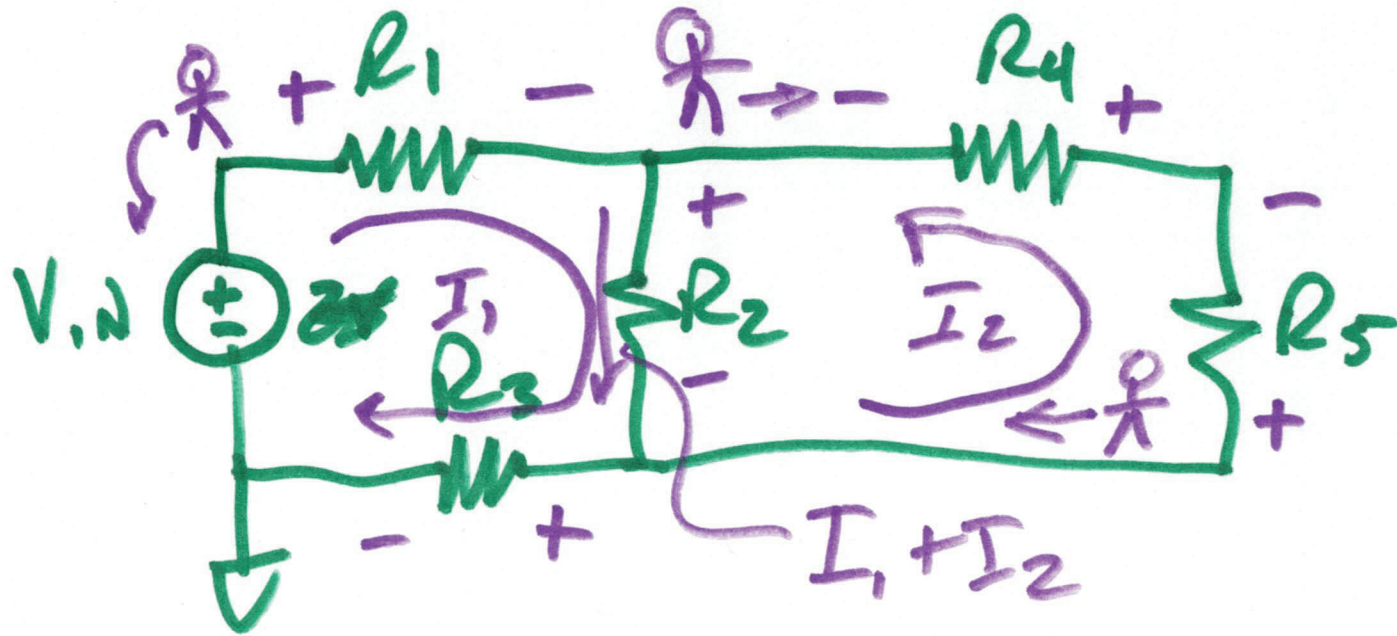
$$2k \cdot I + 5 = V_x$$

$$V_x = 3kI + 3kI = 6kI$$



$$3 - 2kI_1 + 2k(I_2 - I_1) = 0$$

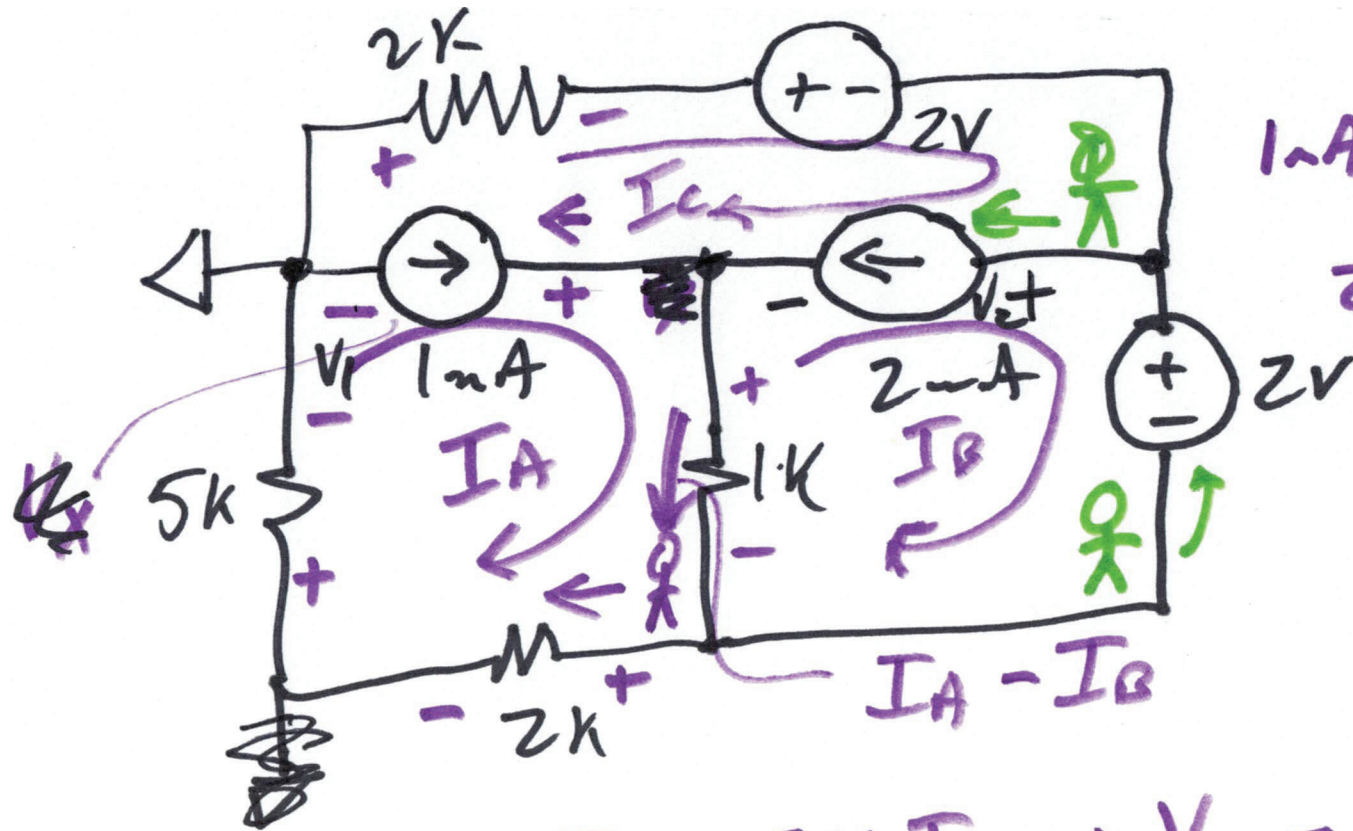
$$-2 + 2kI_2 + 2k(I_2 - I_1) = 0$$



$$-V_{1,N} + R_3 I_1 + R_2 (I_1 + I_2) + R_1 I_1 = 0$$

$$+R_2 (I_1 + I_2) + R_4 I_2 + R_5 I_2 = 0$$

4)



$$1mA = I_A - I_C$$

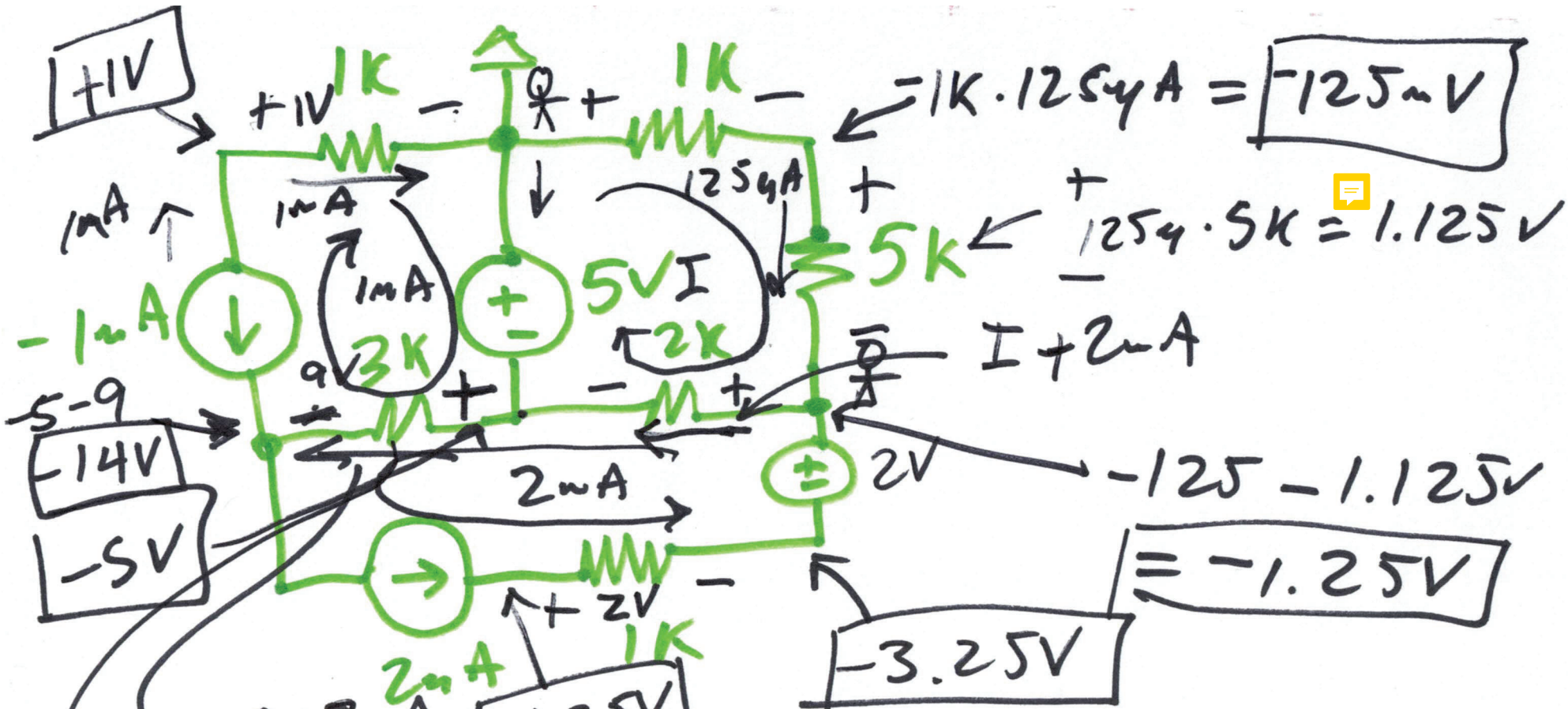
$$2mA = I_C - I_B$$

$$-2k I_A - 5k I_A + V_1 - 1k (I_A - I_B) = 0$$

$$+2 - V_2 - 1k (I_A - I_B) = 0$$

$$-V_2 - V_1 - 2k I_C - 2 = 0$$

5)



$$-1k \cdot 125\mu A = -125\mu V$$

$$+125\mu \cdot 5k = 1.125V$$

$$-125 - 1.125V$$

$$= -1.25V$$

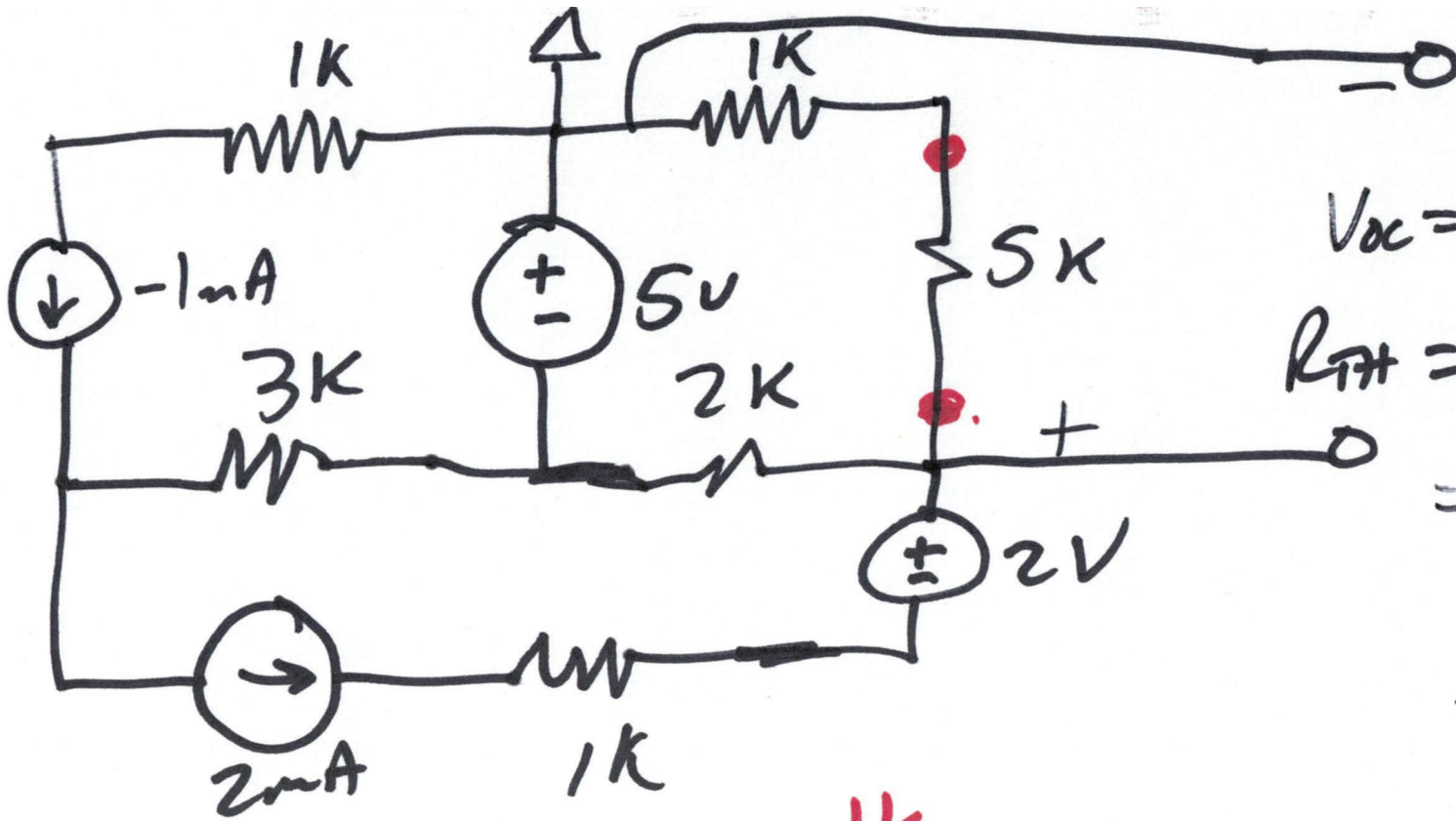
$$-3.25V$$

$$= 3\mu A - 5 + 2k(I + 2\mu A) + 5k \cdot I + 1k \cdot I = 0$$

$$3k \cdot 3\mu A = 9\mu V + 8k \cdot I = 0$$

$$I = \frac{1}{8} \mu A = 125\mu A$$

6)

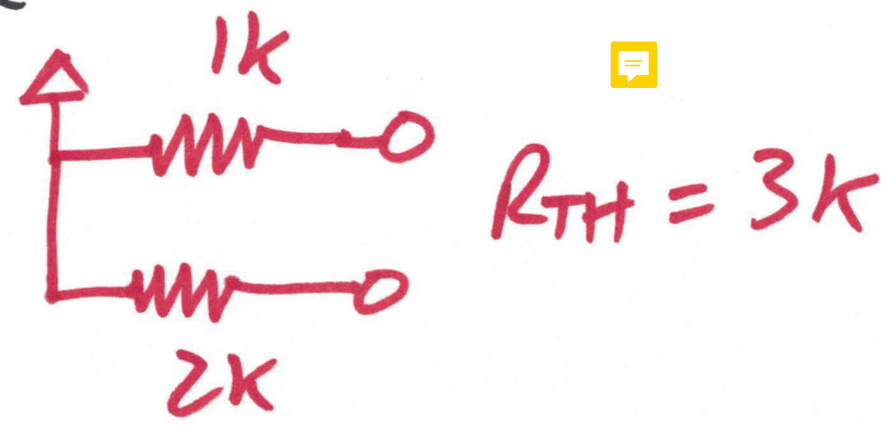


$$V_{oc} = V_{TH} = -1.25$$

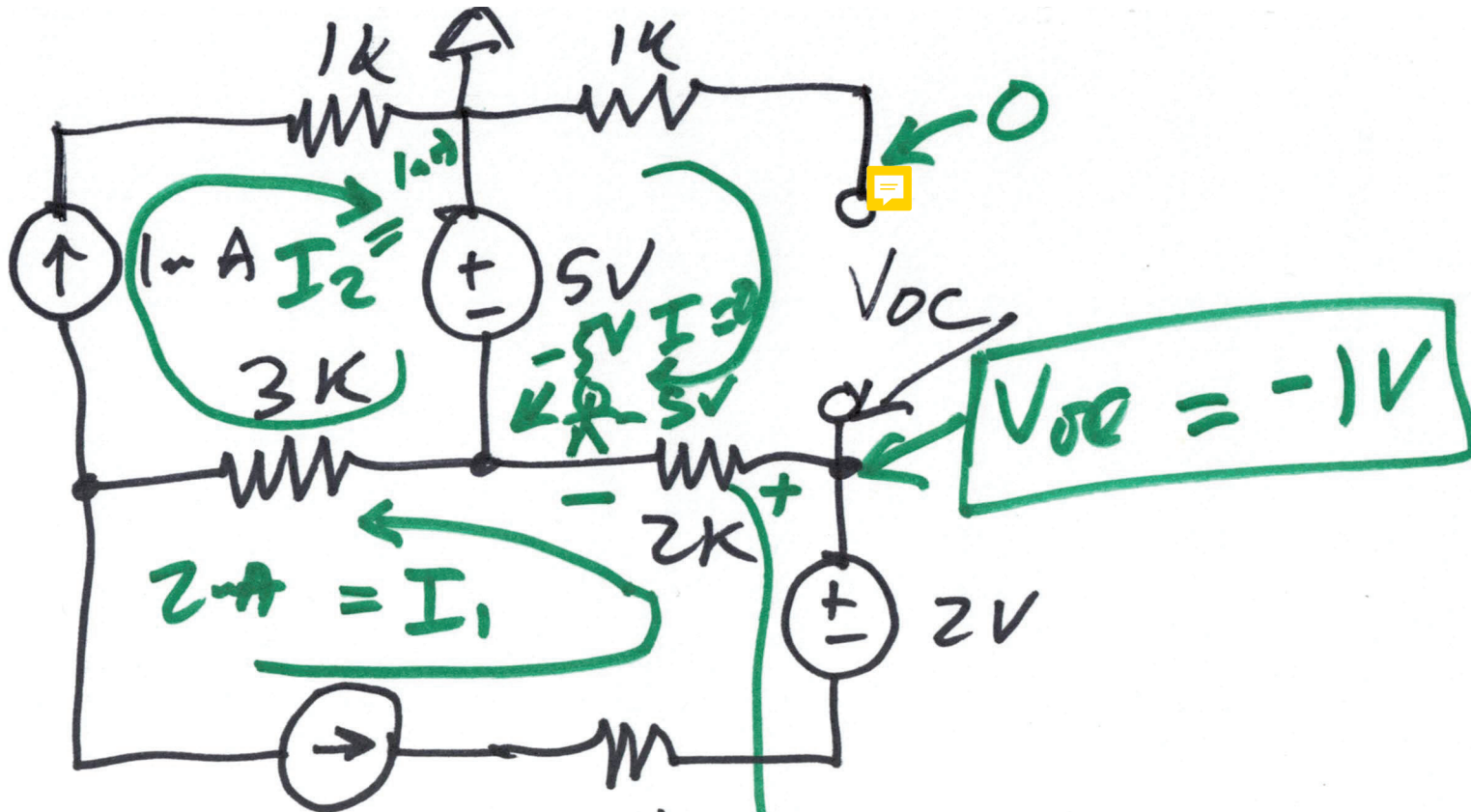
$$R_{TH} = 2k \parallel 8k$$

$$= \frac{12}{8} k$$

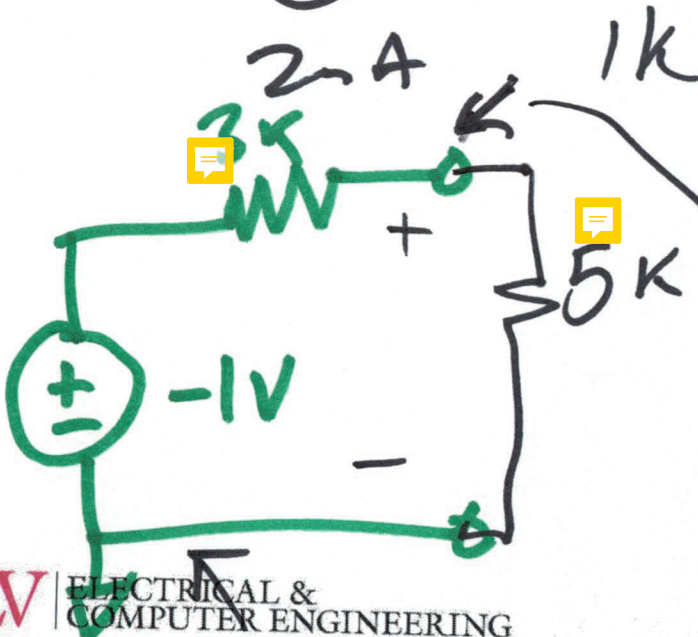
$$= \underline{\underline{1.5k}}$$



1)



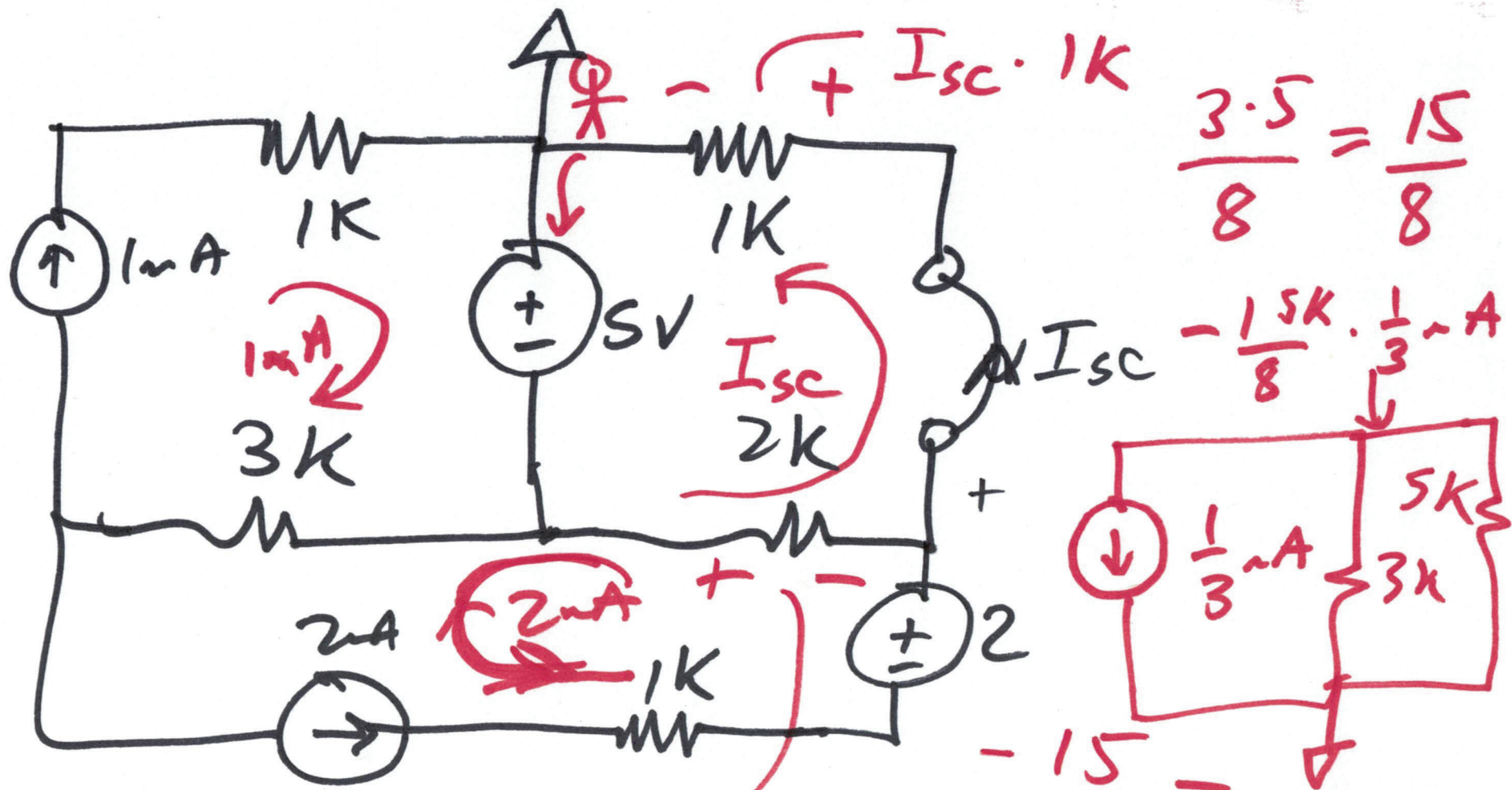
$$V_{oc} = -1V$$



$$2k \cdot 2A = 4V$$

$$-1 \cdot \frac{5}{5+3} = -\frac{5}{8} = -375mV$$

3)



$$-5 - 2\text{k}(I_{sc} - 2\text{mA})$$

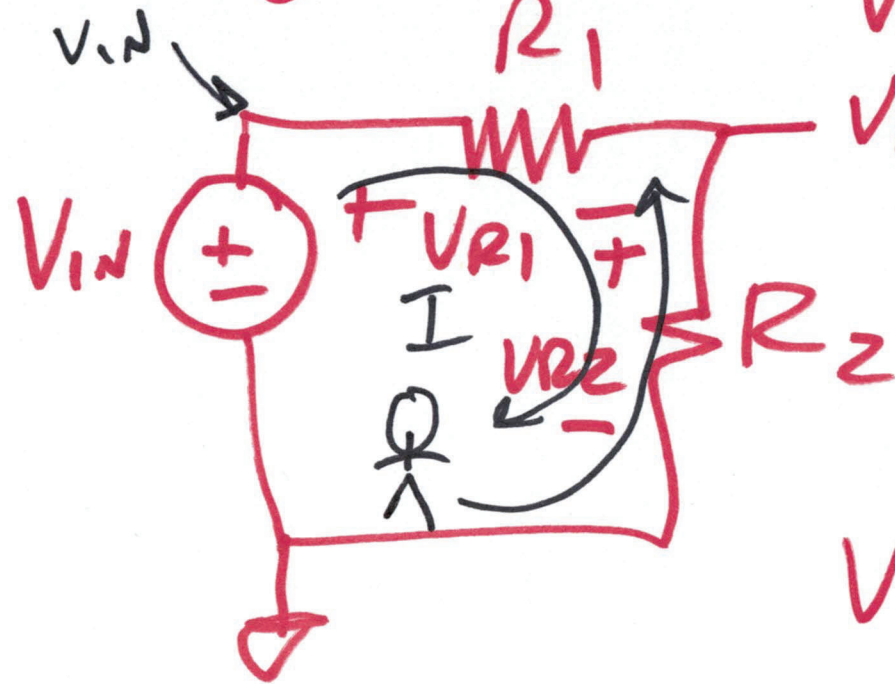
$$- I_{sc} \cdot 1\text{k} = 0$$

$$2\text{k}(I_{sc} - 2\text{mA})$$

$$-1 - 3\text{k} I_{sc} = 0$$

$$I_{sc} = -\frac{1}{3}\text{mA}$$

Voltage divider



$$V_{R1} = V_{in} \cdot \frac{R_1}{R_1 + R_2}$$

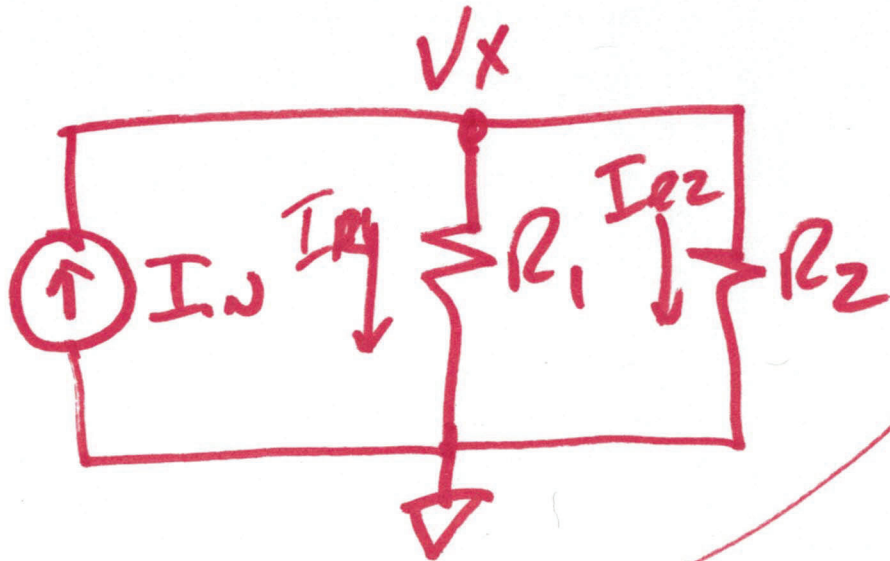
$$V_{R2} = V_{in} \cdot \frac{R_2}{R_1 + R_2}$$

$$V_{R1} = V_{in} - V_{R2}$$

$$+ I \cdot R_2$$

$$+ I \cdot R_2 + I \cdot R_1 = V_{in}$$

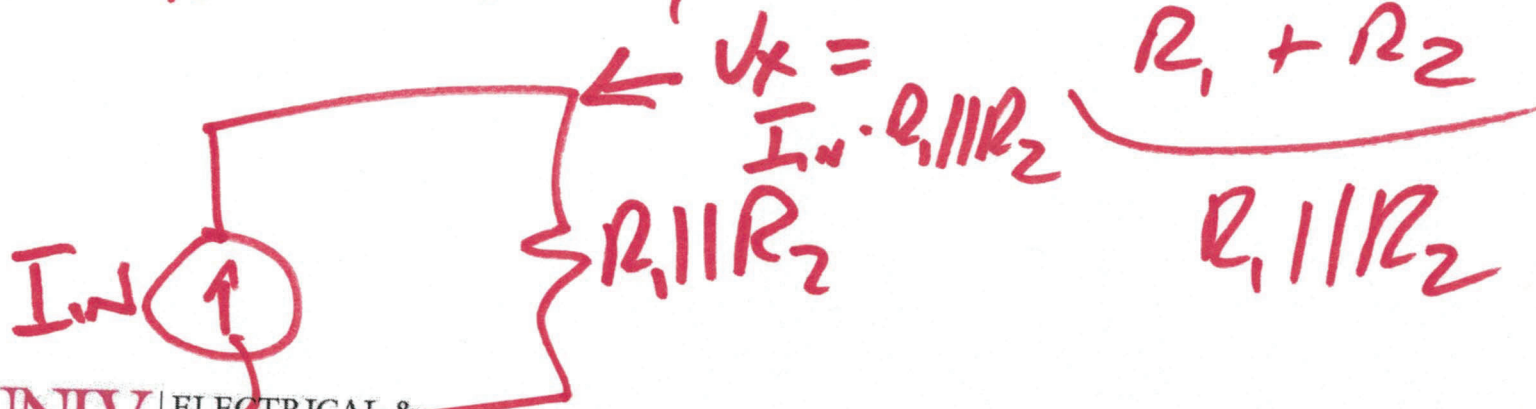
current divider



$$I_{R1} = I_N \cdot \frac{R_2}{R_1 + R_2}$$

$$I_{R2} = I_N \cdot \frac{R_1}{R_1 + R_2}$$

$$V_x = I_{R1} \cdot R_1 = I_N \cdot \frac{R_1 R_2}{R_1 + R_2}$$



$$V_x = I_N \cdot R_1 || R_2$$

$$R_1 || R_2$$

11)