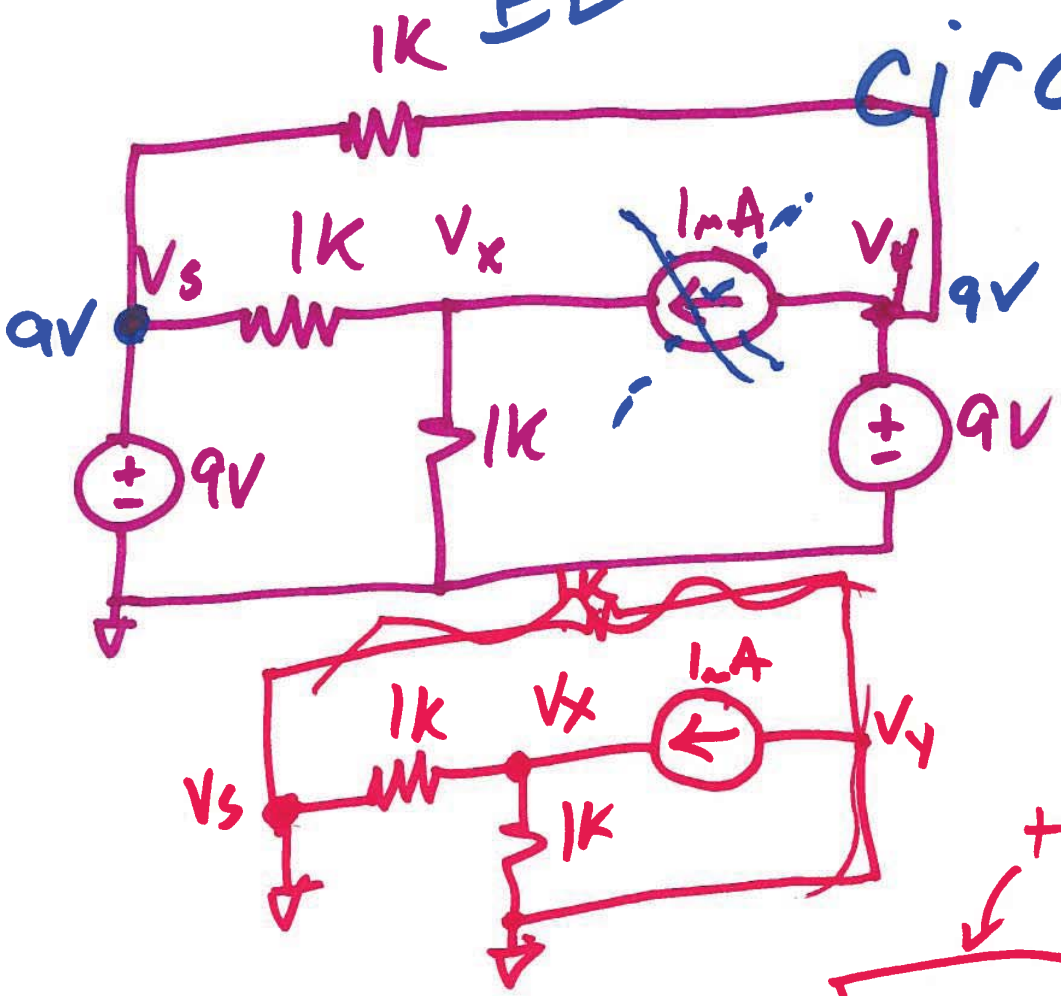
Study Session I final

EE 220 Circuits I



same 1mA

$V_x = 4.5V$

$V_y = 9V$

$V_s = 9V$

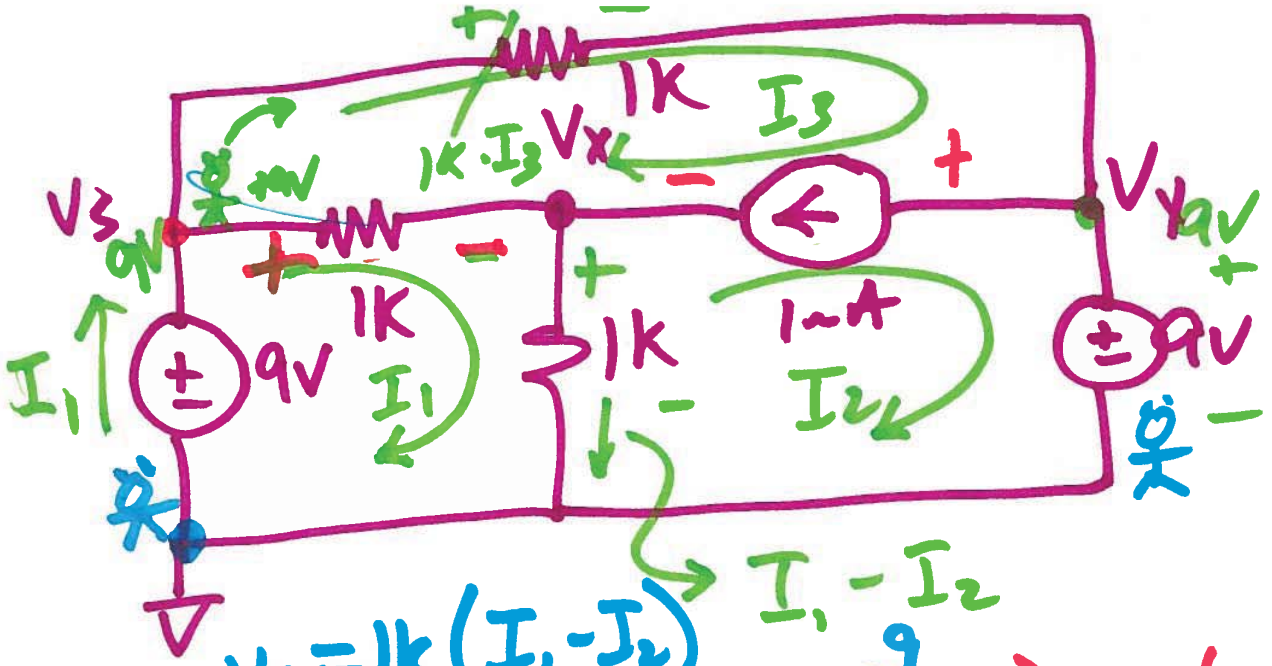
short 9V sources

$V_s = 0$

$V_y = 0$

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

+.5V



$I_3 - I_2 = 1mA$

$9 - 1K \cdot I_3 - 9 = 0$

$I_3 = 0$

$V_x = 1k(I_1 - I_2)$

$-I_3 \cdot 1k - (V_y - V_x) + (I_1 - I_3) \cdot 1k = 0$

$I_3 - I_2 = 1mA$

$9V - (I_1 - I_3) \cdot 1k - (I_1 - I_2) \cdot 1k = 0$

$-9V - (V_y - V_x) - (I_1 - I_3) \cdot 1k = 0$

$0 \quad (-I_1 + I_3) \cdot 1k + \quad 0$

$9 - V_x = 0$

$$I_3 - I_2 = 1\sim A$$

$$-I_3 \cdot 1k - (9 - V_X) + (I_1 - I_3) \cdot 1k = 0$$

$1k(I_1 - I_2)$

$$-I_1 \cdot 1k + I_3 \cdot 1k + 9 - V_X = 0$$

$1k(I_1 - I_2)$

$$I_3 - I_2 = 1m\,A$$

$$-I_3 \cdot 1k - 9 + 1k \cdot I_1 - 1kI_2 + 1k \cdot I_1 - 1kI_3 = 0$$

$$-I_1 \cdot 1k + I_3 \cdot 1k + 9 - 1k \cdot I_1 + 1kI_2 = 0$$

$I_3 - I_2 = 1mA$, $I_3 = 1mA + I_2$

$I_3 = 0$

$2kI_1 - 1kI_2 - 2kI_3 = 9$

$-2kI_1 + 1kI_2 + 1kI_3 = -9$

$2k \cdot I_1 - 1kI_2 - 2 - 2kI_2 = 9$

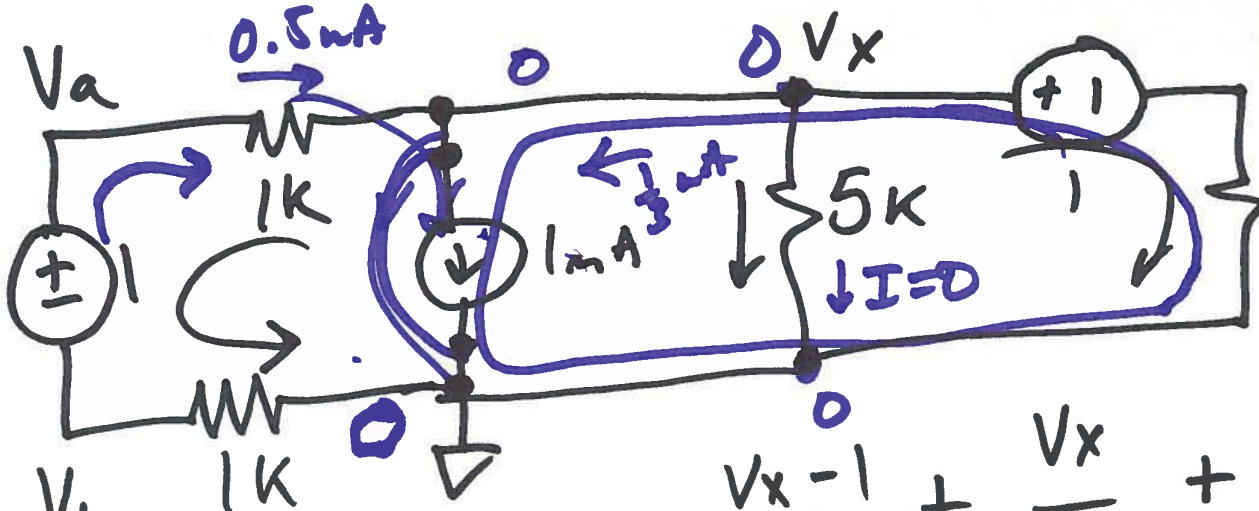
$-2kI_1 + 1kI_2 + 1 + 1kI_2 = -9$

$2kI_1 - 3kI_2 = 11$

$-2kI_1 + 2kI_2 = -10$

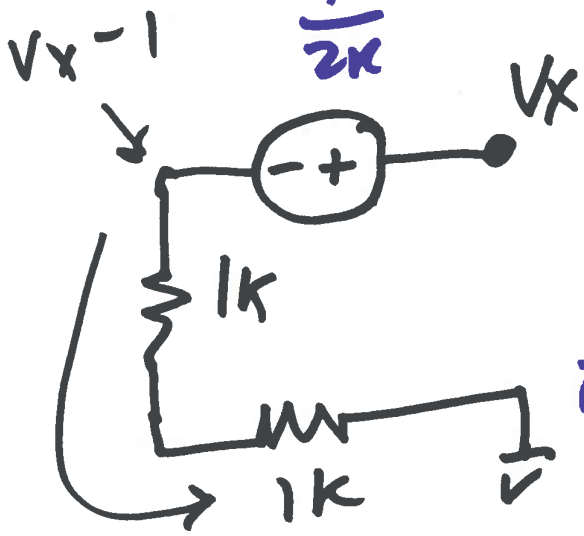
$-1kI_2 = 1$

$I_2 = -1mA$



$$\frac{V_x - 1}{3k} + \frac{V_x}{5k} + 1mA + \frac{V_x - 1}{2k} = 0$$

$$\frac{5}{3}V_x - \frac{5}{3} + V_x + 5V + \frac{5}{2}V_x - \frac{5}{2} = 0$$



$$\frac{1}{R} = \frac{1}{2} + \frac{1}{5} + \frac{1}{3} = \frac{31}{30}$$

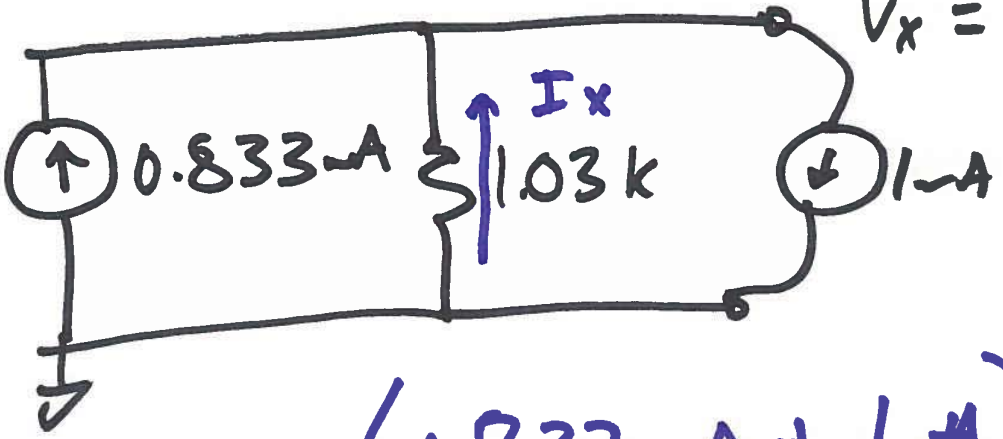
$$\frac{31}{6}V_x + \frac{5}{6} = 0$$

$$V_x = \frac{-5}{31}$$

$$R_{TH} = 2k \| 5k \| 3k = \frac{31}{30}k \approx 1k$$

$$V_{TH} =$$

$$I_{SC} = 0.833mA$$



$V_x = -\frac{5}{31}\,V$

$(-0.833mA + 1mA) \cdot 1.03k$

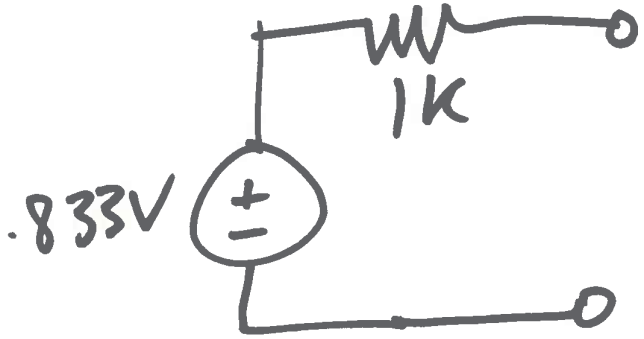
$0.833mA + I_x = 1mA$

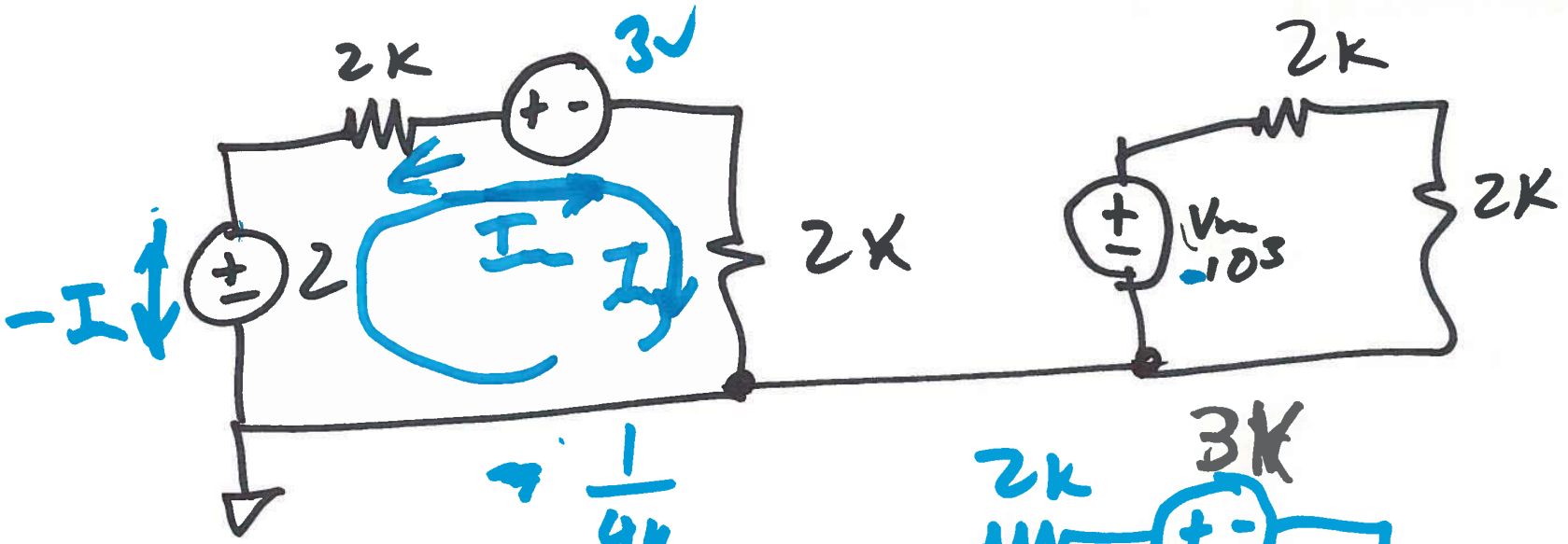
$V_x = -I_x \cdot 1.03k$

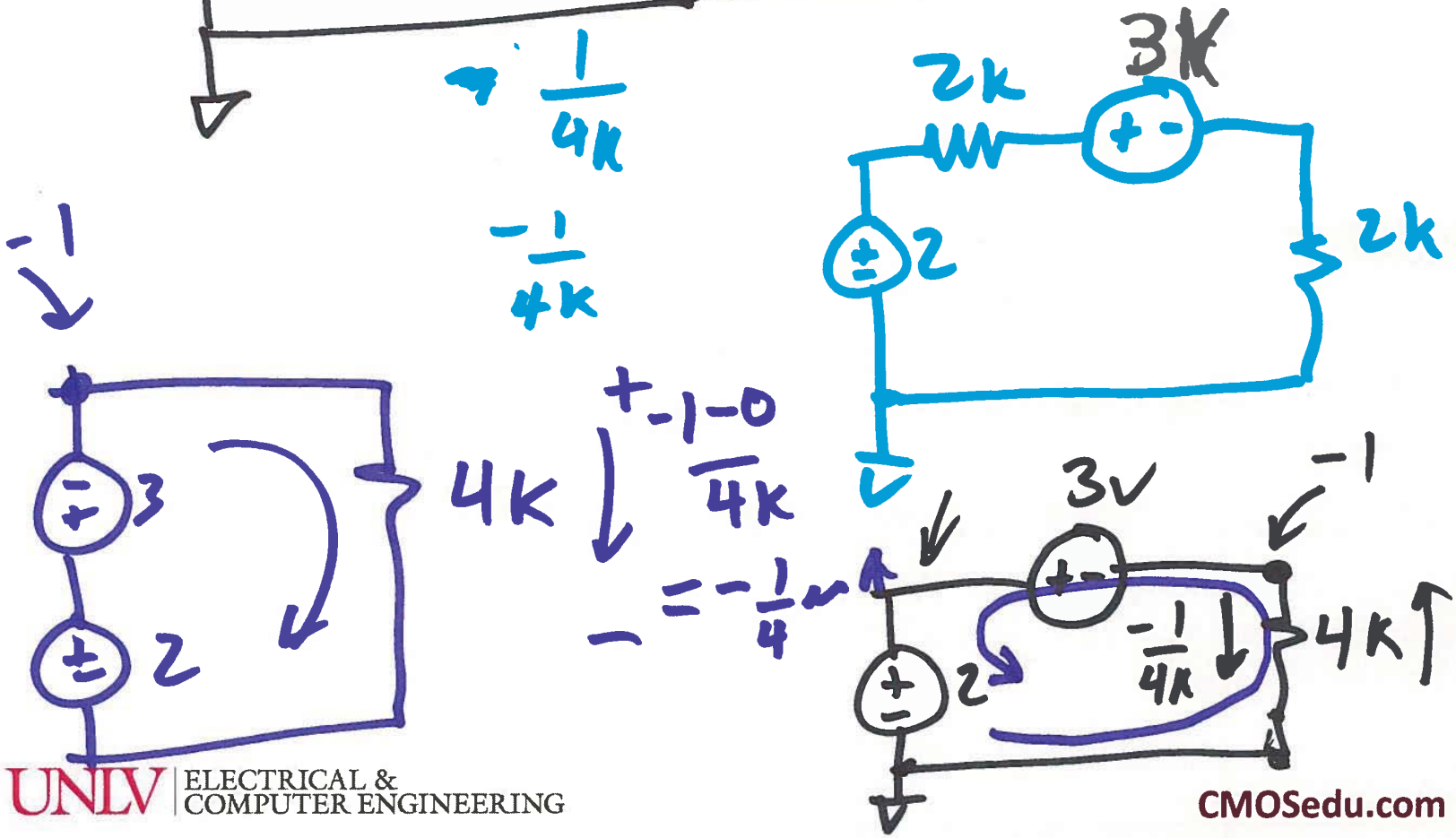
$I_x = 1mA - 0.833$

$= -0.167mA \cdot 1.03k$

$= -\frac{5}{31}\,V$







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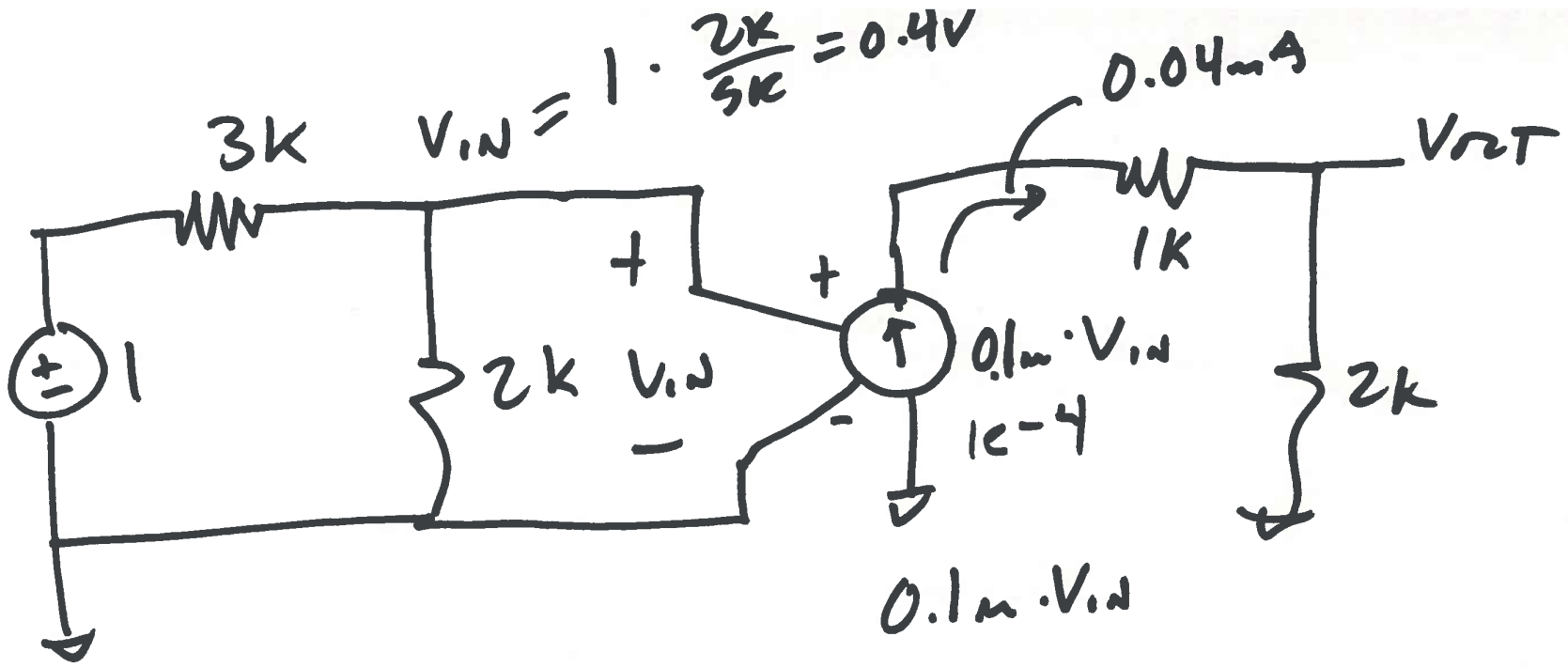

$$V_{OUT} = 0.04mA \cdot 2k$$

$$= 0.08V$$

$$= \underline{\underline{80mV}}$$