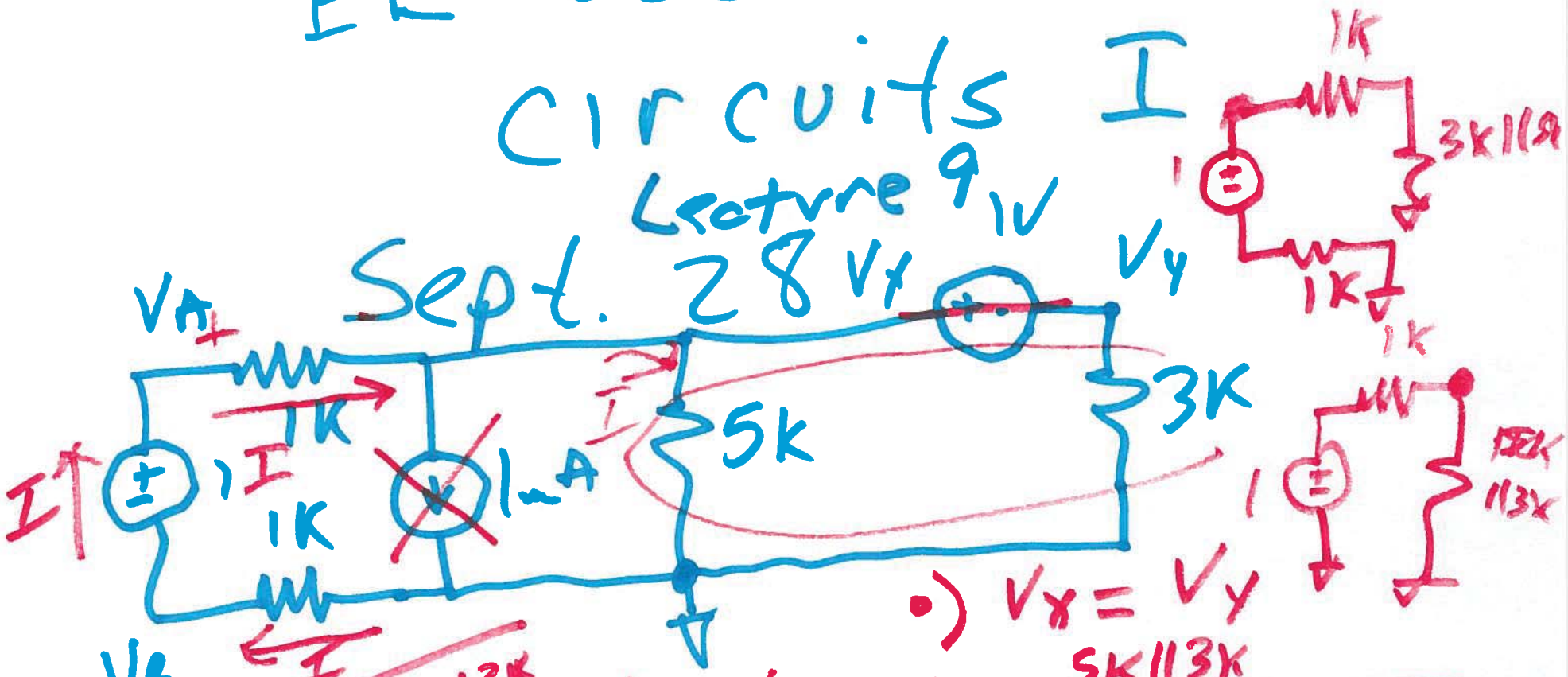
EE 220

Circuits I

Lecture 9

Sept. 28



•) $V_x = V_y$

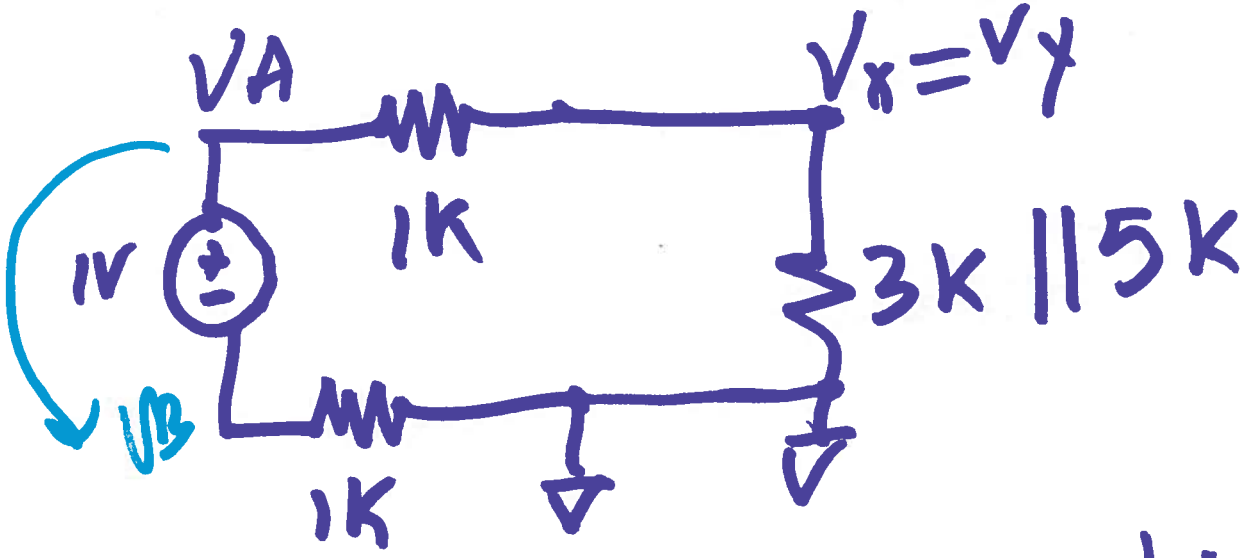
$$I = \frac{1}{1K + 1K + 5K||3K}$$

$$V_x = I \cdot 5K||3K$$

$$V_x = 1 \cdot \frac{5K||3K}{5K||3K + 1K + 1K}$$

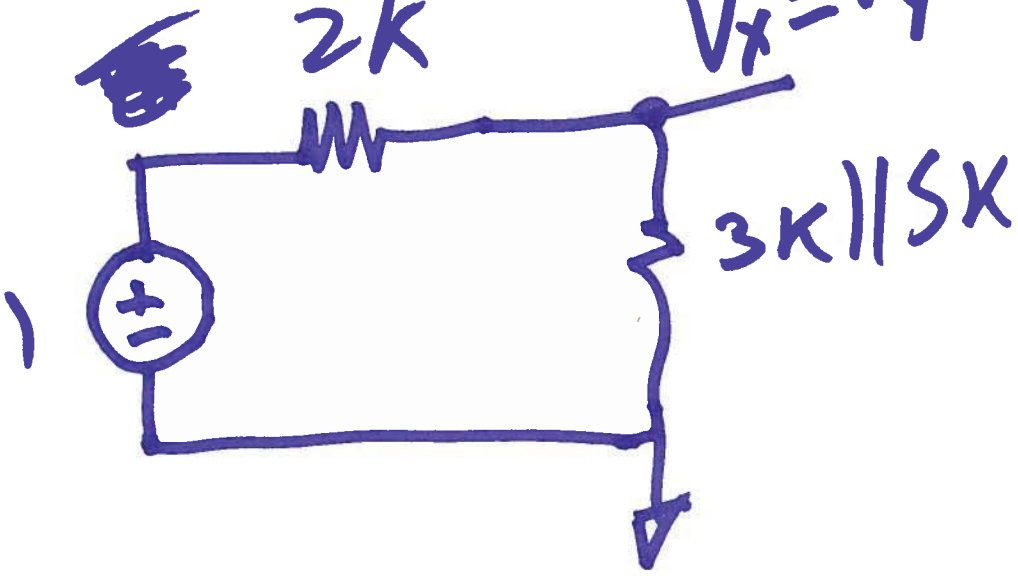
$$V_A = I \cdot (1K + 3K||5K)$$

$$V_B = V_A - 1$$

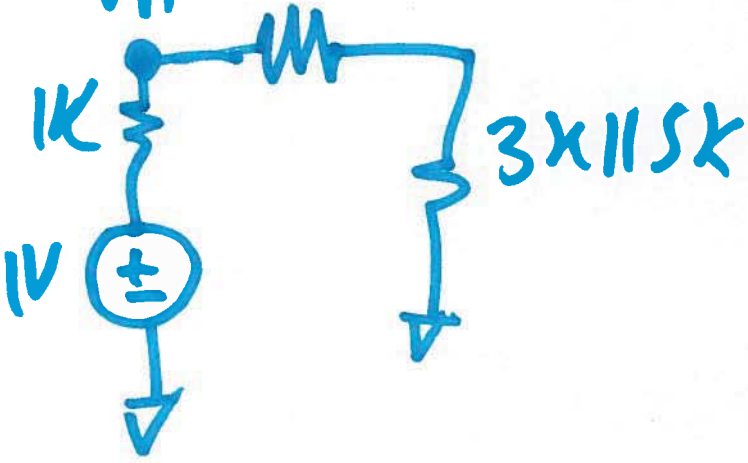


$$V_x = V_y = 1 \cdot \frac{3K||5K}{2K + 3K||5K}$$

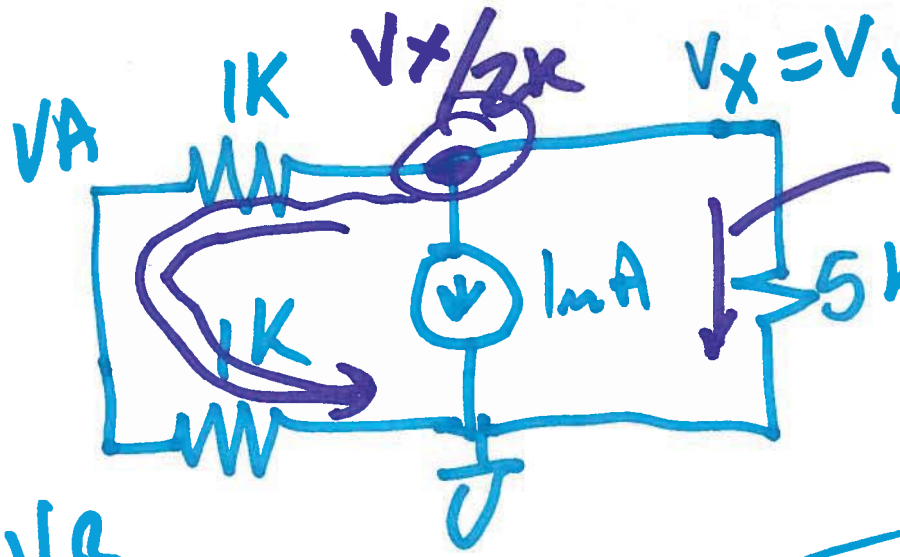
$$1V \cdot \frac{1K + 3K||5K}{1K + 3K||5K + 1K}$$



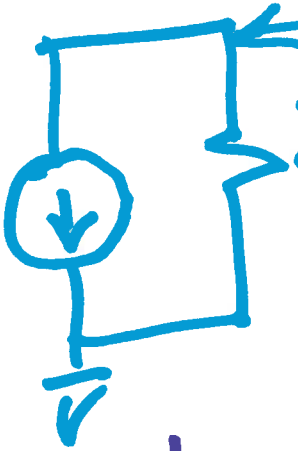
$$V_A = 1K$$



$$V_B = V_A - 1$$



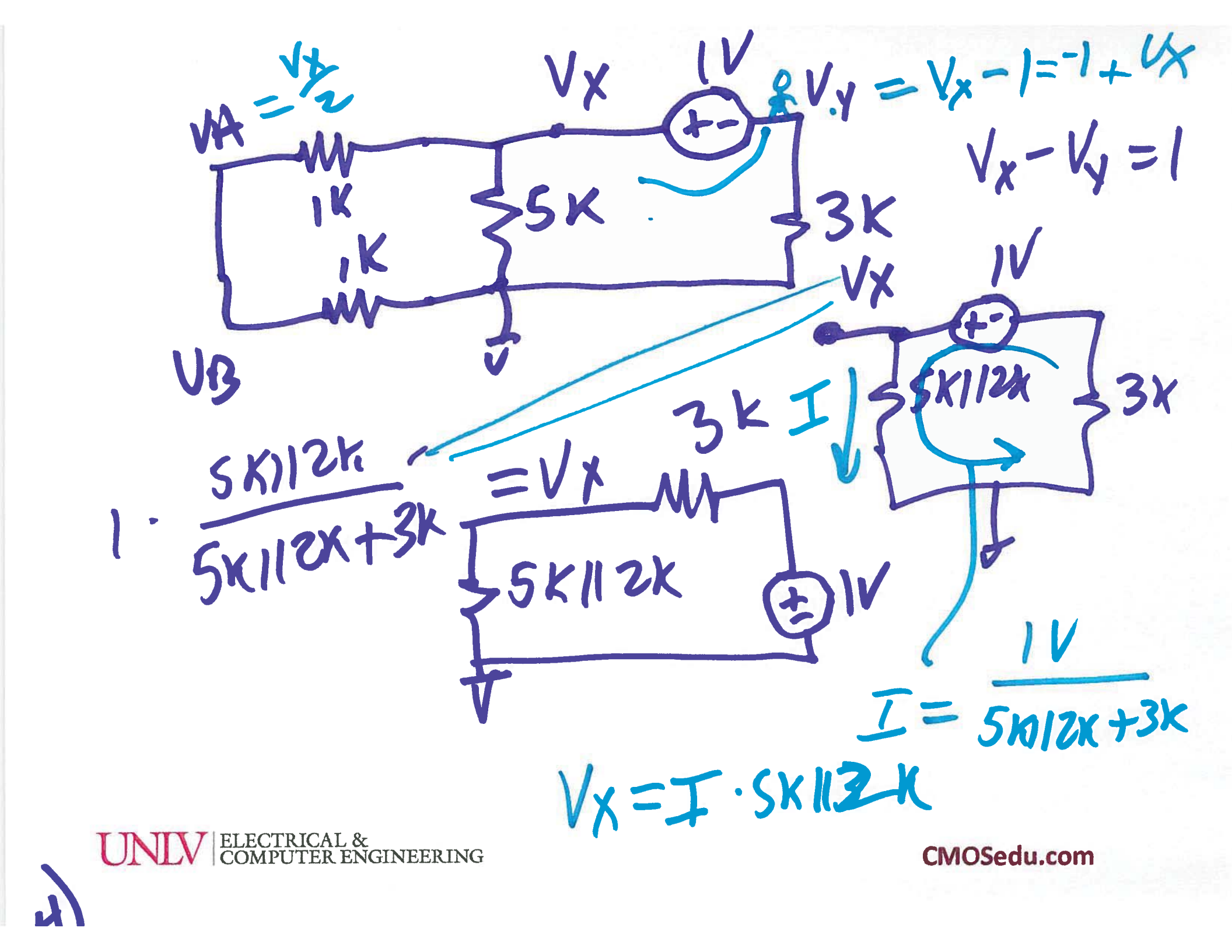
$V_x = V_y = -1mA \cdot (2K \| 5K \| 3K)$

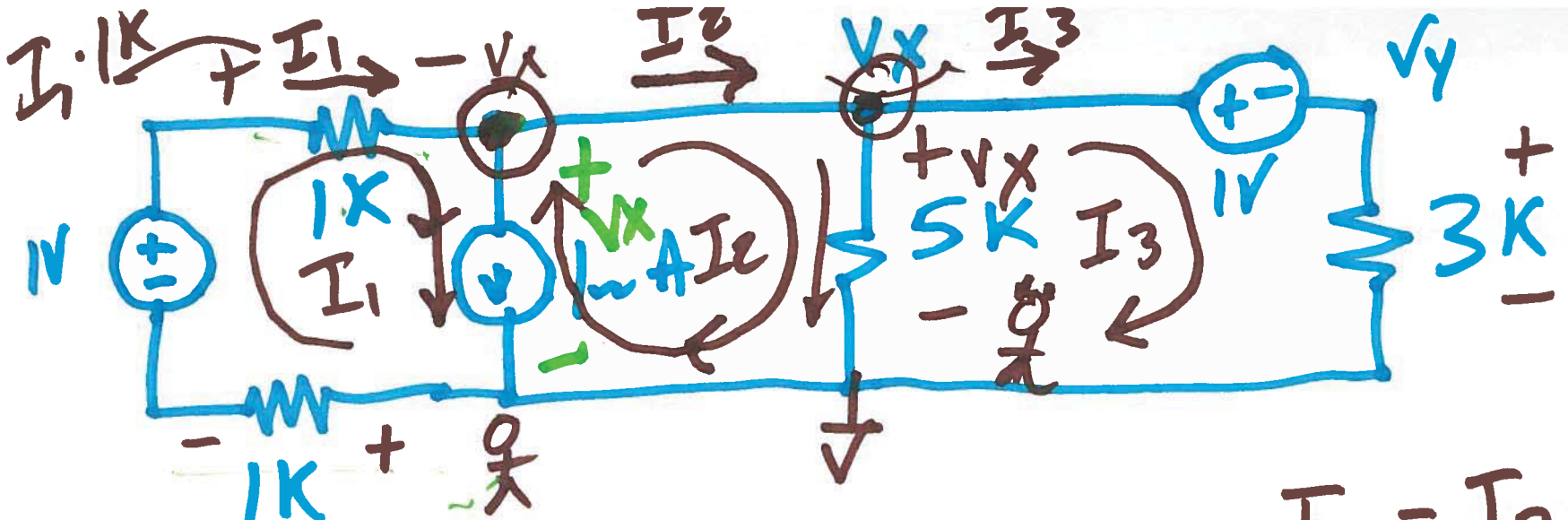


$$V_A = V_B = V_x \cdot \frac{1K}{1K+1K} = \frac{V_x}{2}$$

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \qquad 1mA + \frac{V_x}{2K} + \frac{V_x}{5K \| 3K} = 0$$

$$R_T = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} = R_1 \| R_2 \qquad V_x = \frac{-1mA}{\frac{1}{2K} + \frac{1}{5K \| 3K}} = -1mA \cdot 2K \| 5K \| 3K$$


VA = VB/2
VX
1V
VY = VX − 1 = −1 + VX
VX − VY = 1
1K
1K
5K
3K
VB
VX
1V
5K||12K
3K
3K I
1 · 5K||12K / (5K||12K + 3K) = VX
5K||12K
1V
I = 1V / (5K||12K + 3K)
VX = I · 5K||12K



$$I_2 = I_3 + \frac{V_x}{5k}$$

$$V_y = V_x - 1$$

$$I_3 = \frac{V_y}{3k}$$

$$1mA = I_1 - I_2$$

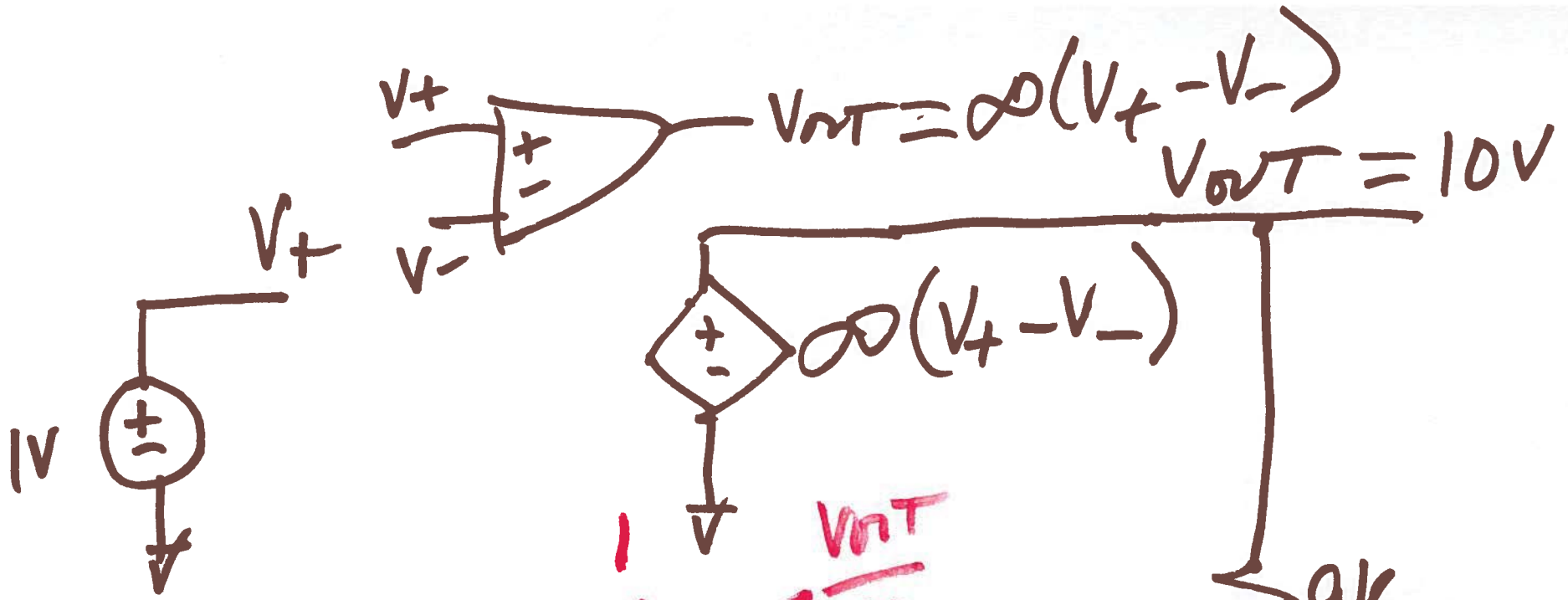
$$I_1 = I_2 + 1mA$$

$$\frac{V_x}{5K} = I_2 - I_3$$

$$V_x = 5k(I_2 - I_3)$$

$$1k \cdot I_1 + 1 - I_1 \cdot 1K - V_x = 0$$

$$V_x - 1 + I_3 \cdot 3K = 0$$



$V_{OUT} = \infty(V_+ - V_-)$

$V_{OUT} = \infty - \frac{V_{OUT} \cdot \infty}{10}$

$V_{OUT}\left(1 + \frac{\infty}{10}\right) = \infty$

$V_{OUT} = \frac{\infty}{1 + \frac{\infty}{10}} = \frac{1}{\frac{1}{\infty} + \frac{1}{10}} = 10$

$V_- = V_{OUT} \cdot \frac{1k}{1k + 9k} = \frac{V_{OUT}}{10}$

b)