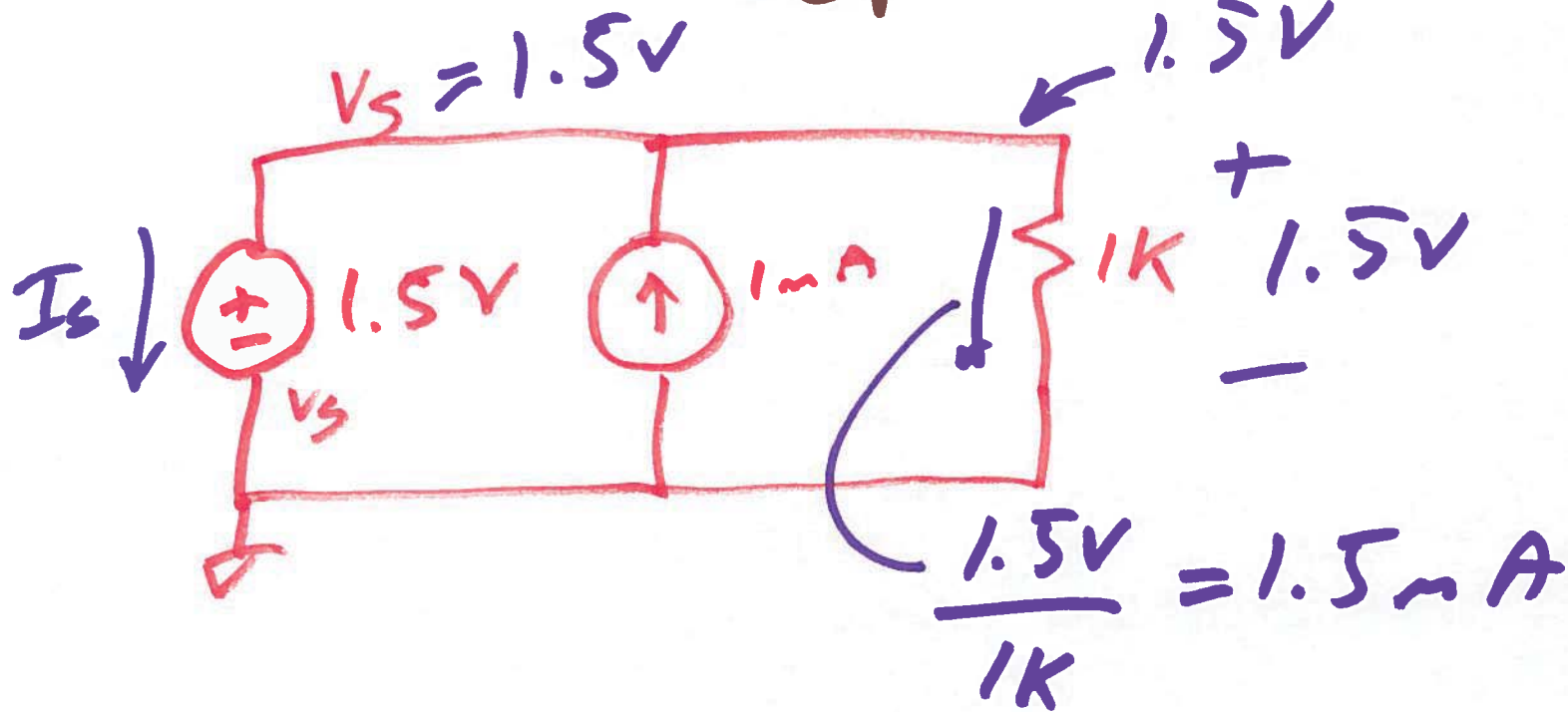


EE 220 Circuits I

Lecture 7

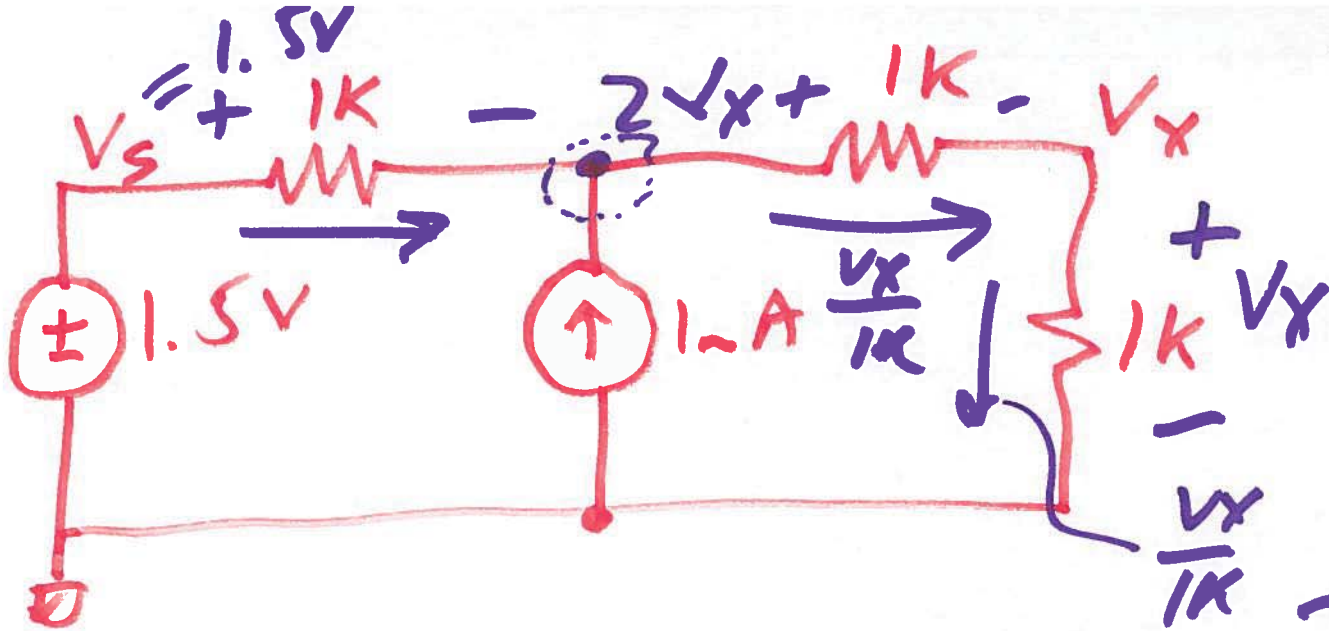
September 20, 2017



$$I_s + 1.5 \mu A = 1 \mu A$$

$$I_s = -\frac{1}{2} \mu A$$

1)



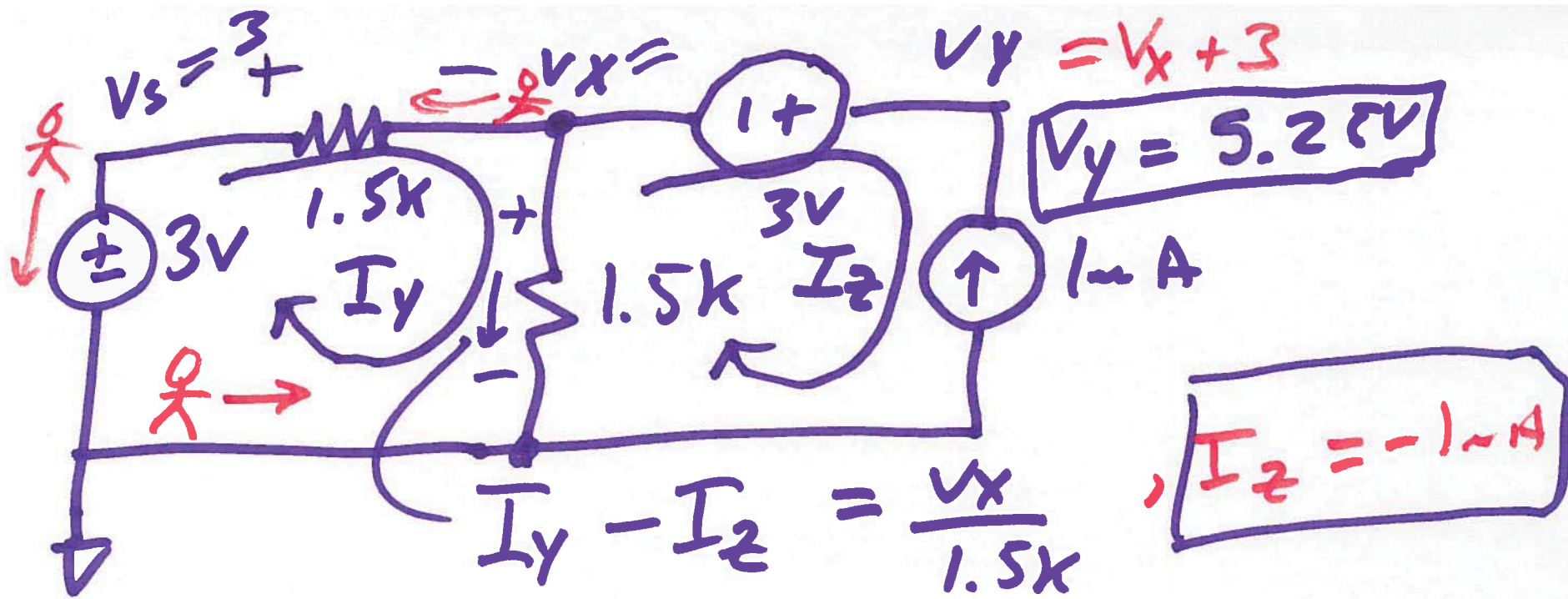
$$\frac{1.5 - 2V_x}{1k} + 1mA = \frac{2V_x - V_x}{1k}$$

$$1.5 - 2V_x + 1V = V_x$$

$$2.5V = 3V_x$$

$$V_x = 0.833V$$

2)



$$+1.5k(I_y - I_z) + 1.5k \cdot I_y - 3 = 0$$

$$I_y + 1\mu A + I_y - 2\mu A = 0$$

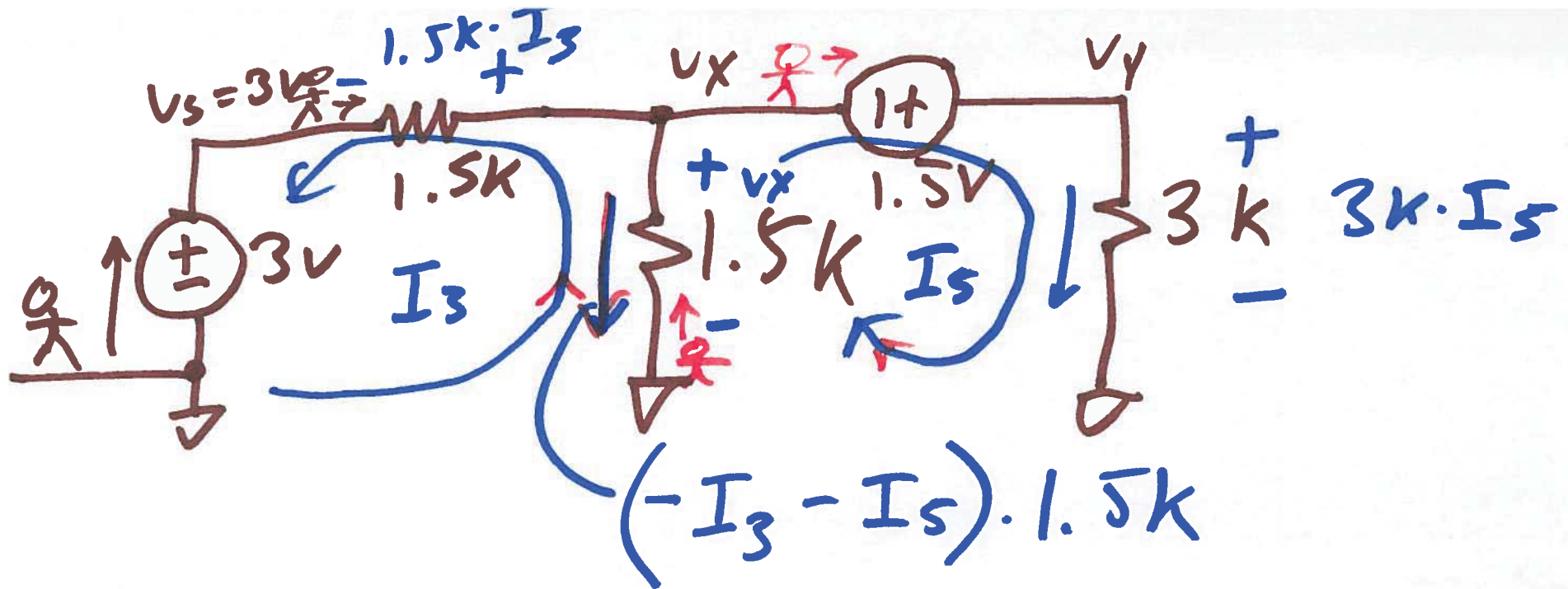
$$V_x = \left(\frac{1}{2}\mu A - (-1\mu A) \right) \cdot 1.5k$$

$$\boxed{V_x = 2.25V}$$

$$2I_y = 1\mu A$$

$$\boxed{I_y = \frac{1}{2}\mu A}$$

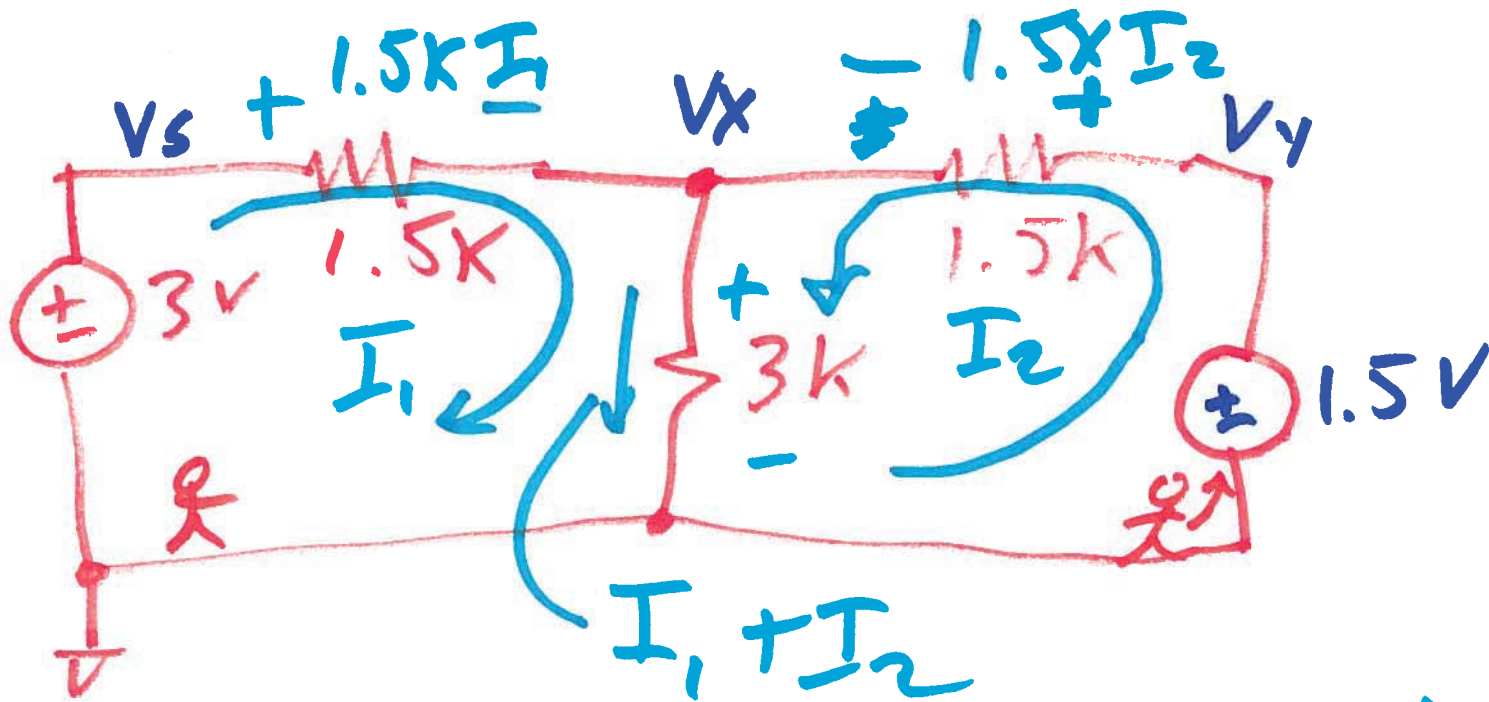
3)



$$3V + 1.5k \cdot I_3 - 1.5k(-I_3 - I_5) = 0$$

$$1.5k \cdot (-I_3 - I_5) + 1.5V - 3kI_5 = 0$$

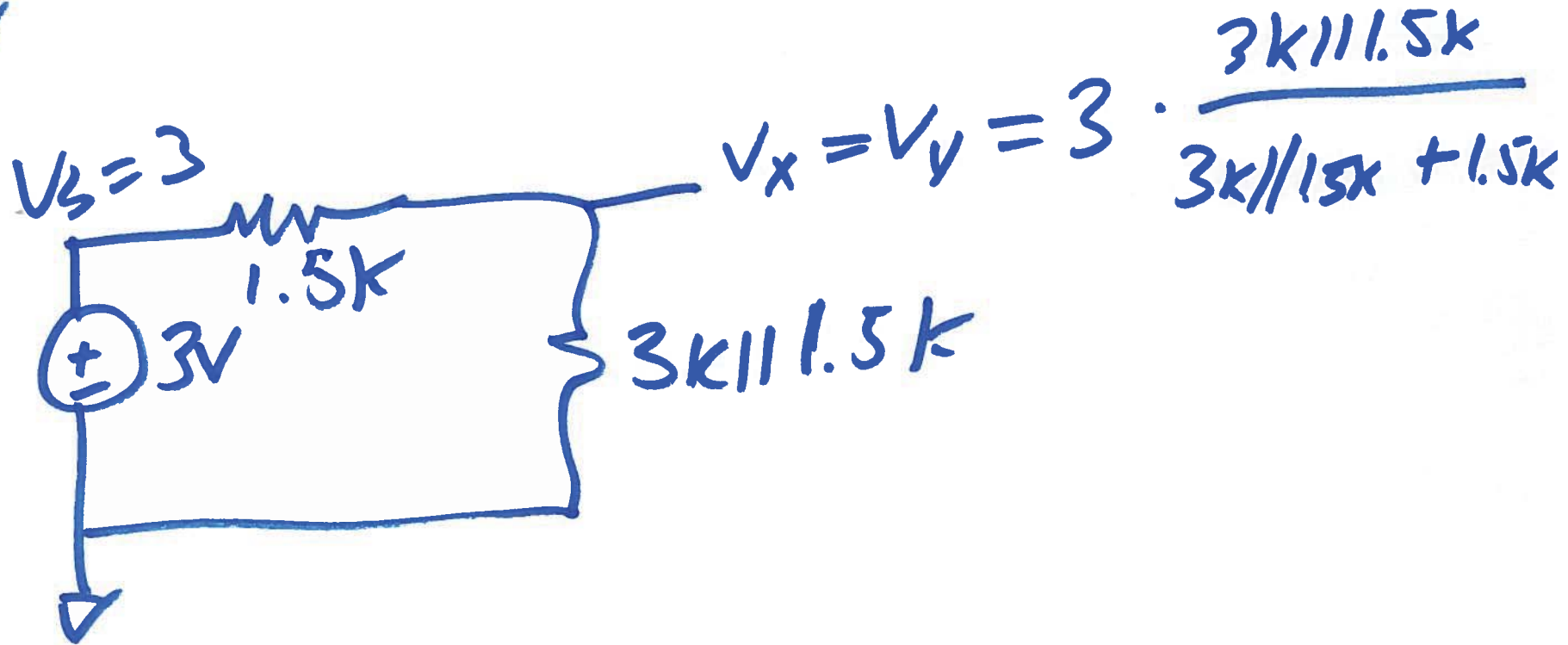
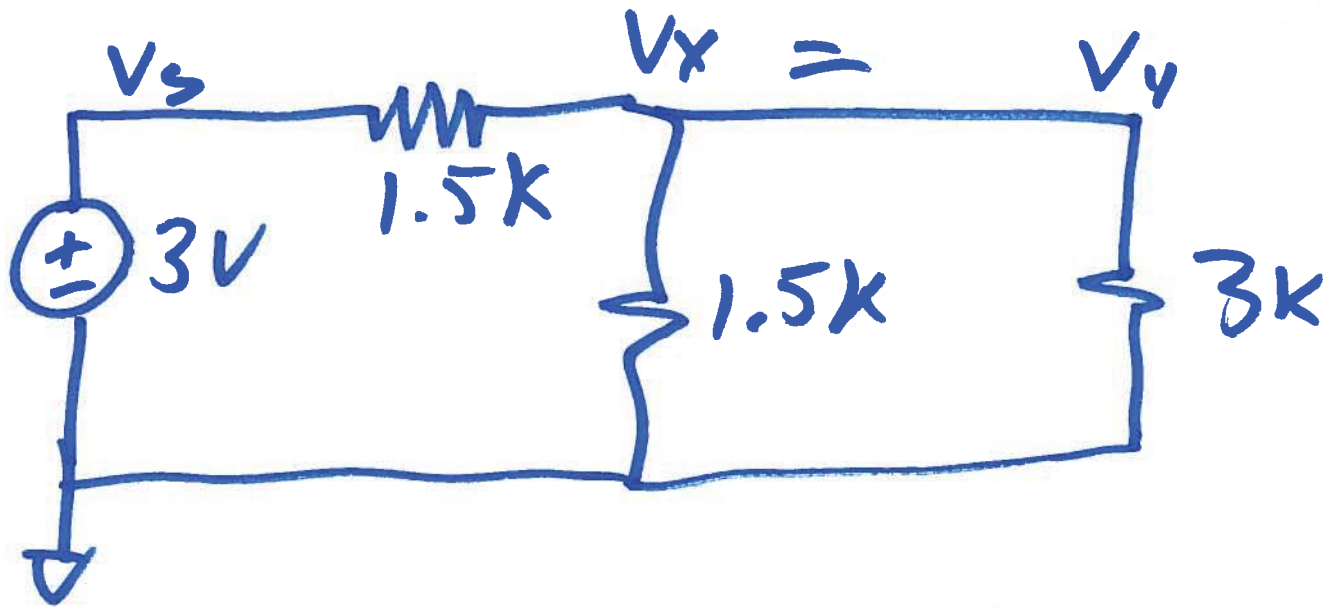
4)



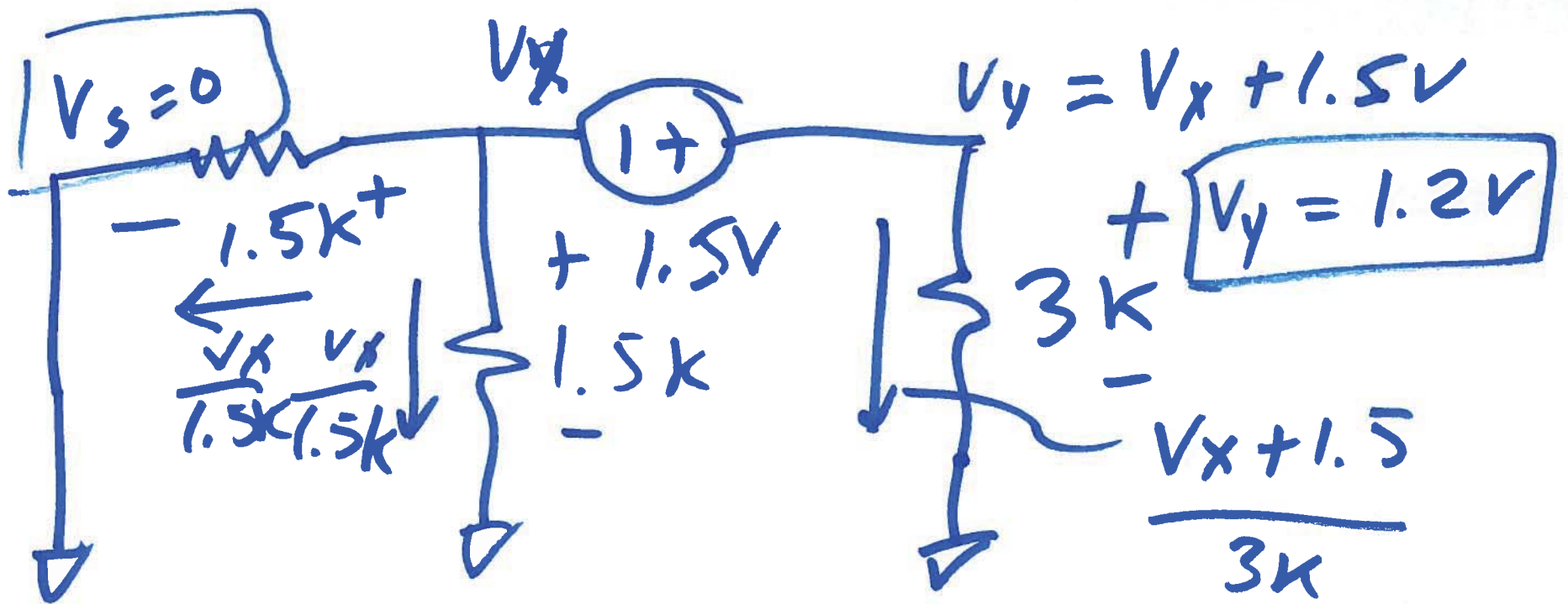
$$V_x = 3k(I_1 + I_2)$$

$$3V - 1.5k \cdot I_1 - 3k(I_1 + I_2) = 0$$

$$1.5V - 1.5k \cdot I_2 - 3k(I_1 + I_2) = 0$$



b)



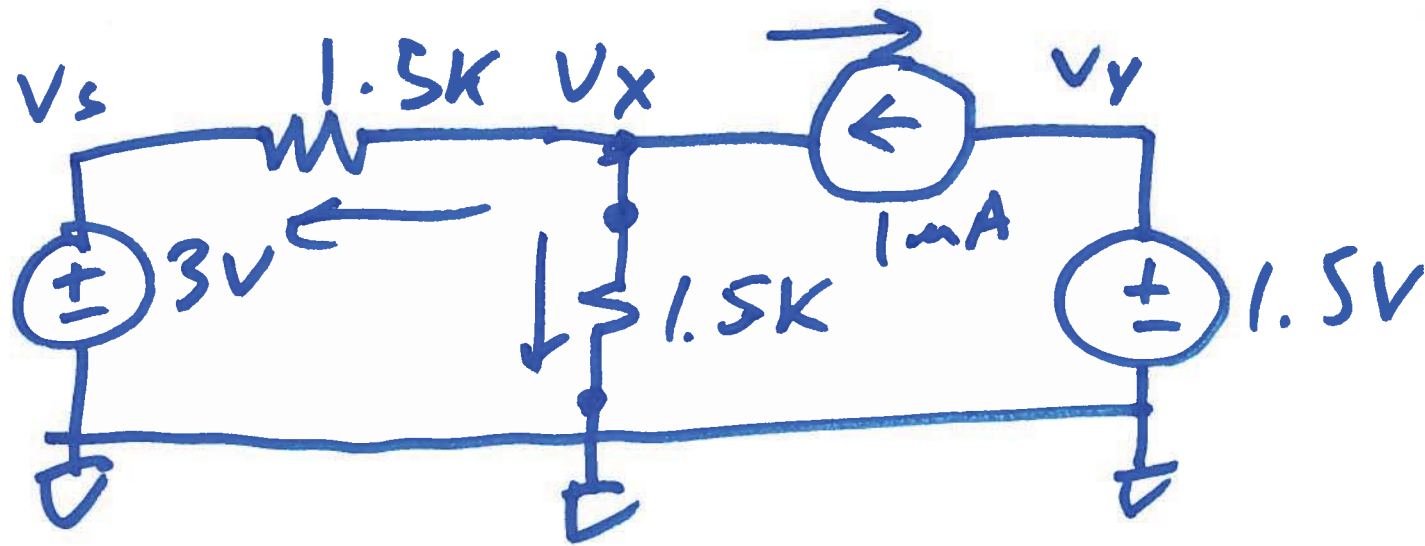
$$\frac{V_x}{1.5k} + \frac{V_x}{1.5k} + \frac{V_x + 1.5V}{3k} = 0$$

$$2V_x + 2V_x + V_x + 1.5V = 0$$

$$5V_x = -1.5V$$

$$V_x = -0.3$$

7)

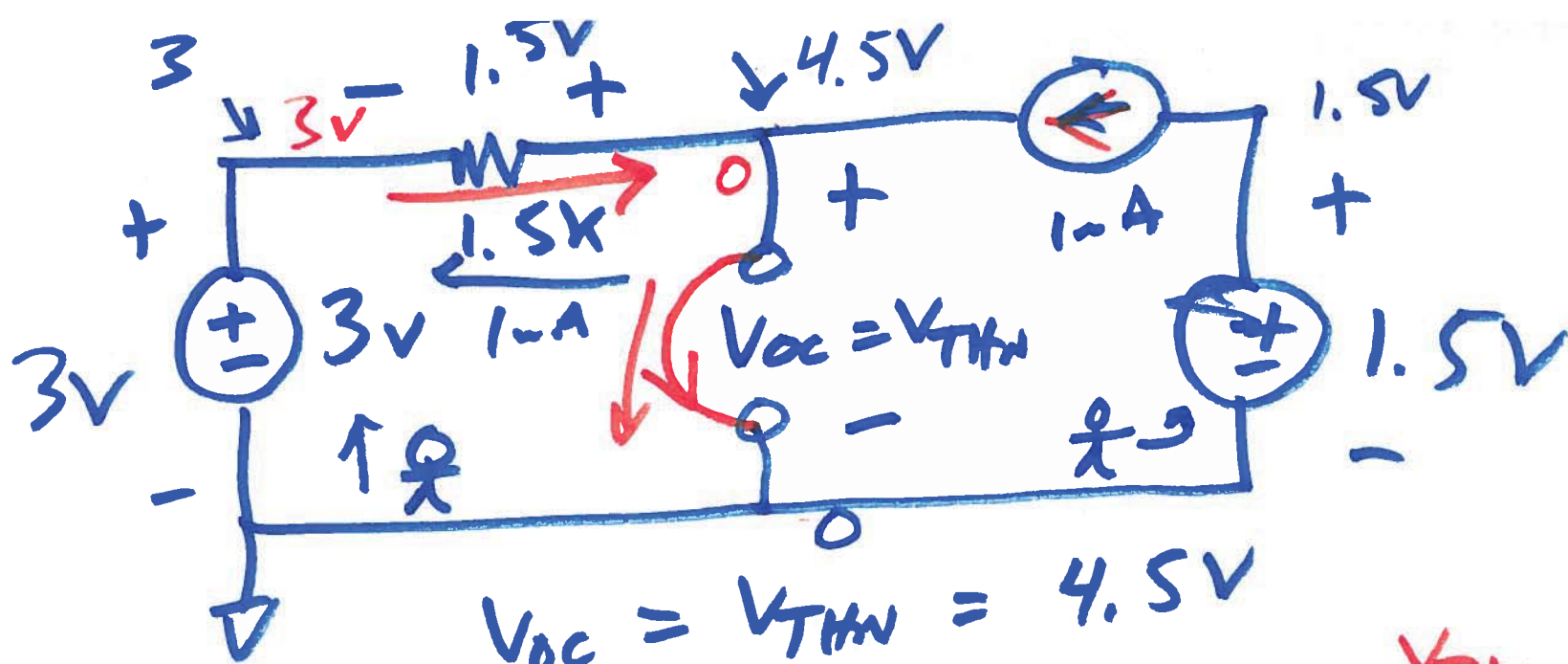


$$\frac{V_x - 3}{1.5k} + \frac{V_x}{1.5k} - 1mA = 0$$

$$V_x - 3 + V_x - 1.5V = 0$$

$$2V_x = 4.5V$$

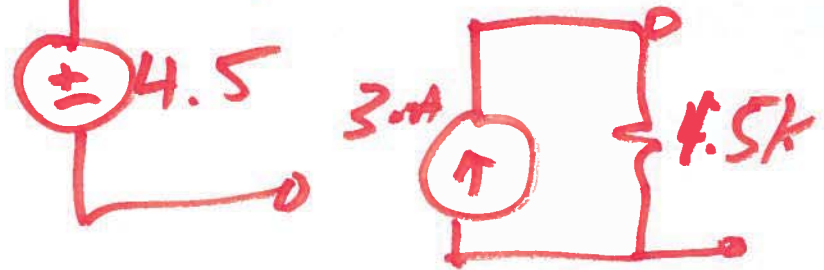
$$V_x = 2.25V$$



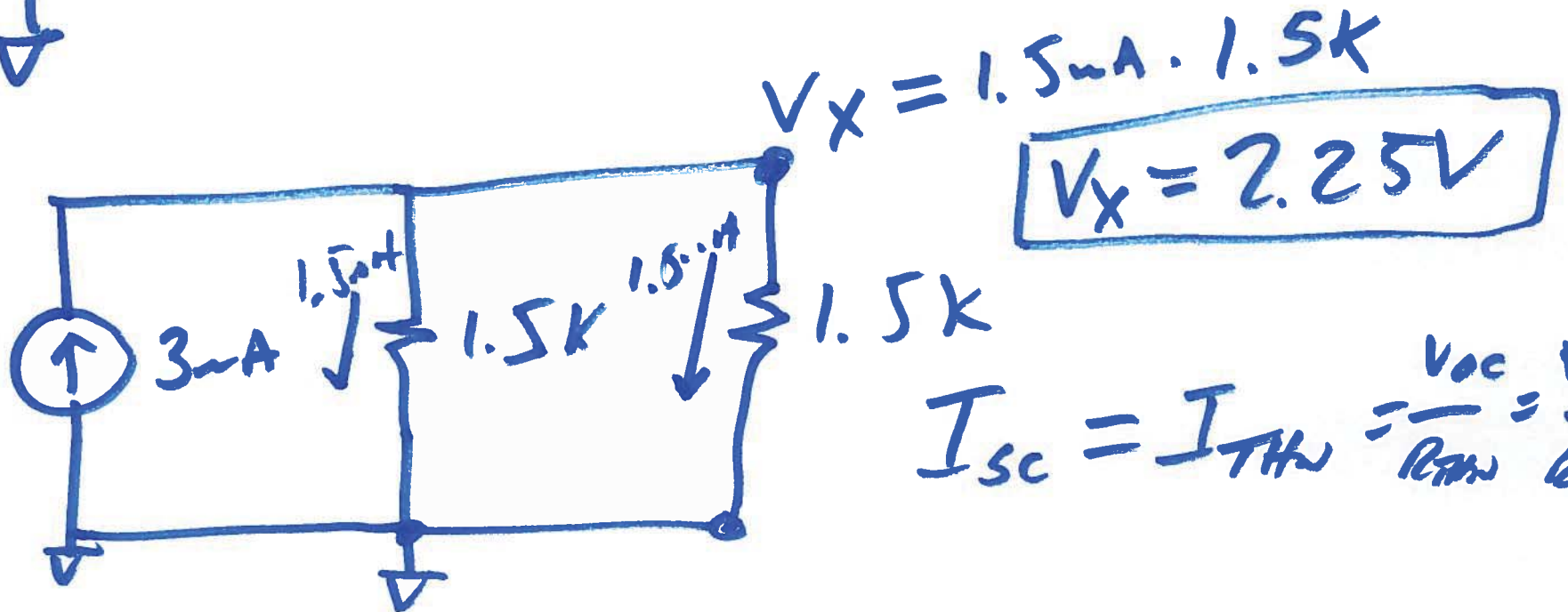
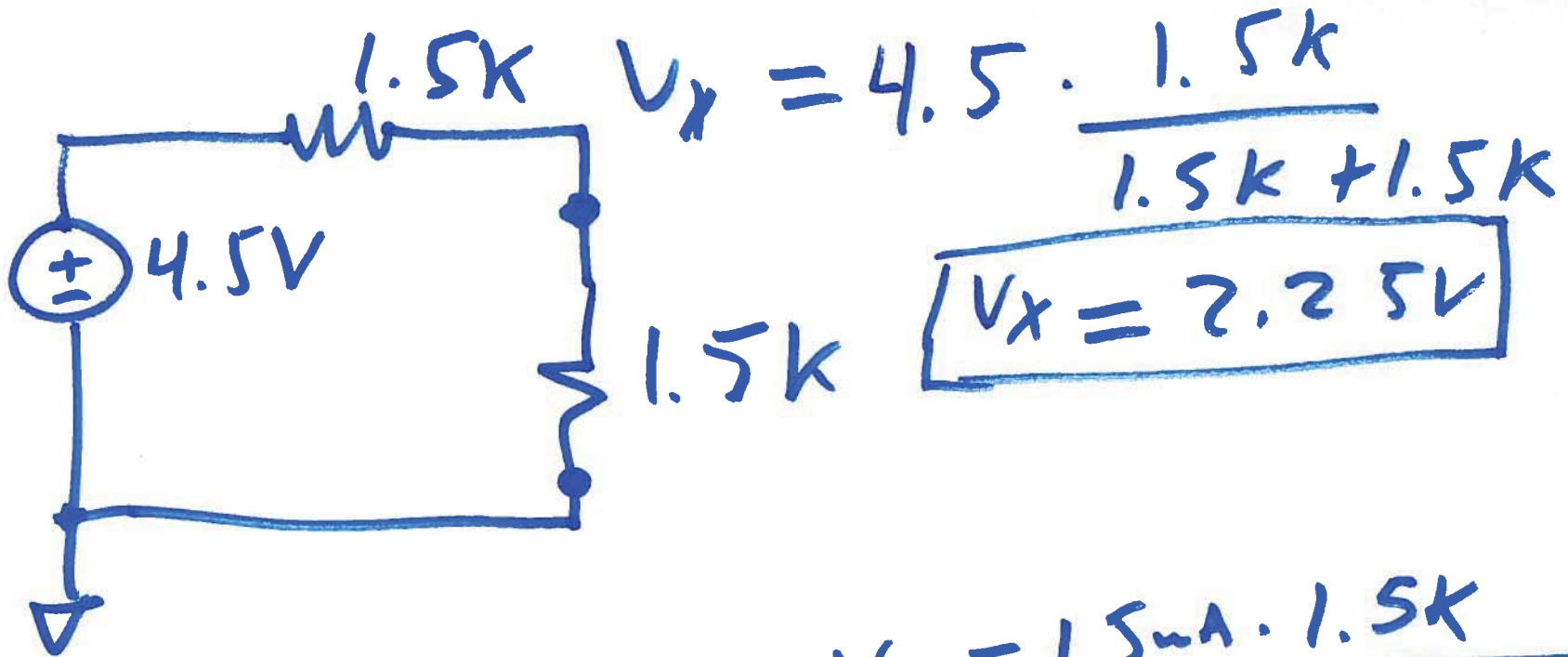
$$I_{sc} = 1A + \frac{3V - 0}{1.5k} = 3A$$

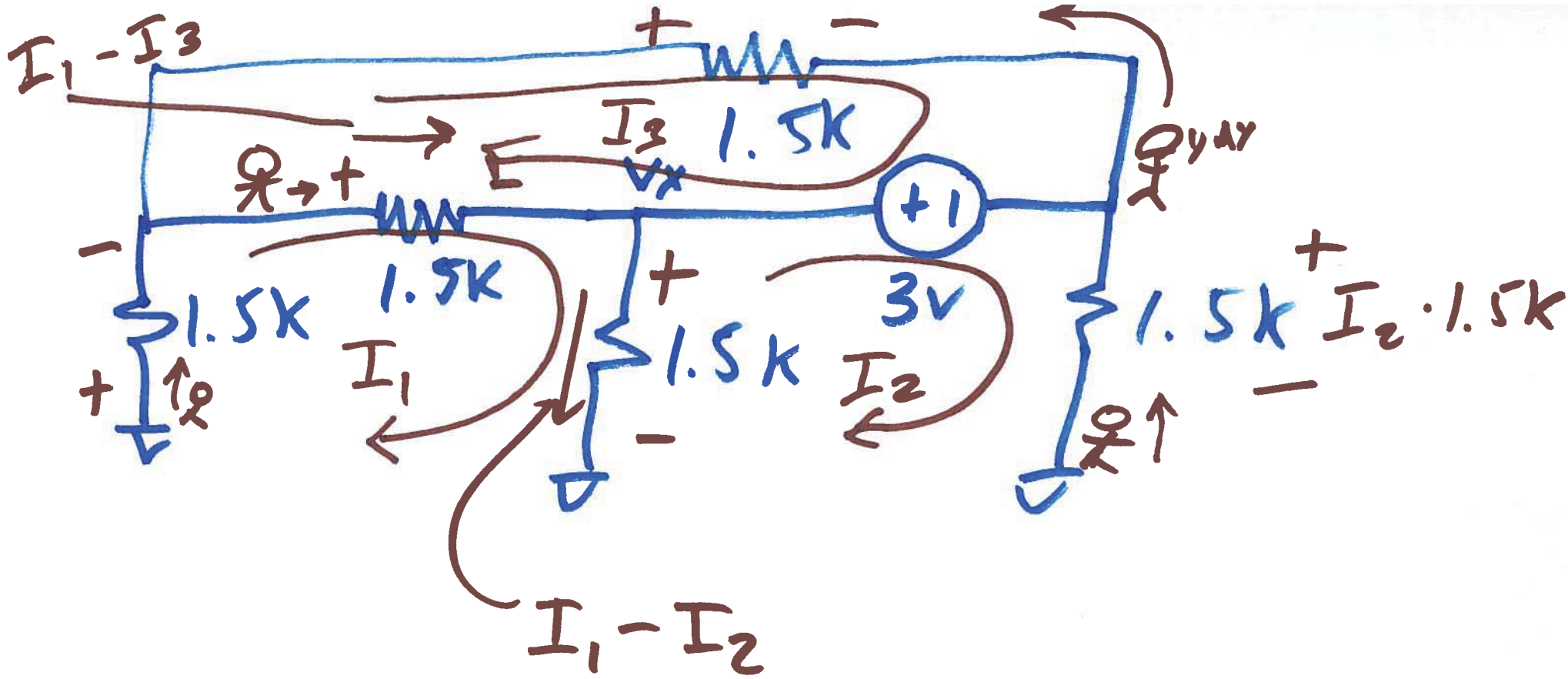
$$I_{sc} = \frac{V_{THN}}{R_{THN}} = I_{THN}$$

$$= \frac{4.5V}{1.5k} = 3A$$



a)





$$\begin{aligned}
 -1.5k \cdot I_1 - 1.5k(I_1 - I_3) - (I_1 - I_2) \cdot 1.5k &= 0 \\
 +1.5kI_2 + 3 - 1.5k(I_1 - I_2) &= 0 \\
 1.5k \cdot I_3 - 1.5k(I_1 - I_3) - 3 &= 0
 \end{aligned}$$

11)