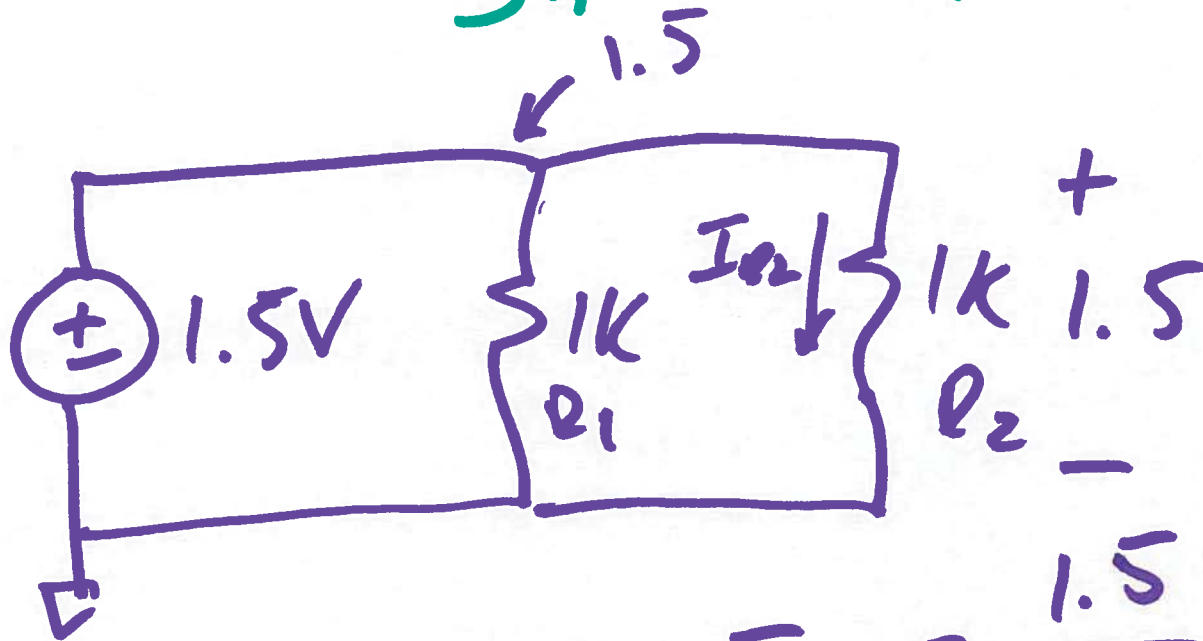


EE 220

Circuits I

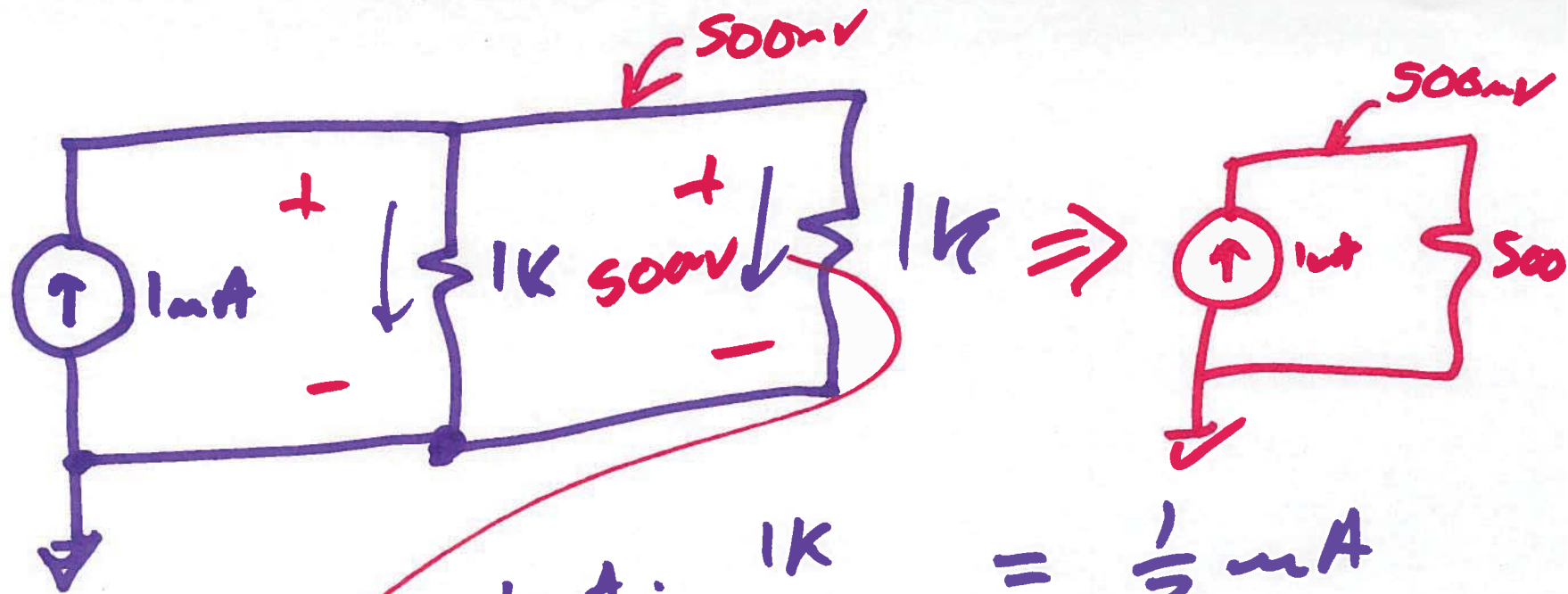
Sept. 16, 2017

Saturday Study Session



$$I_{R_2} = \frac{1.5}{1k} = \underline{\underline{1.5 \mu A}}$$

11

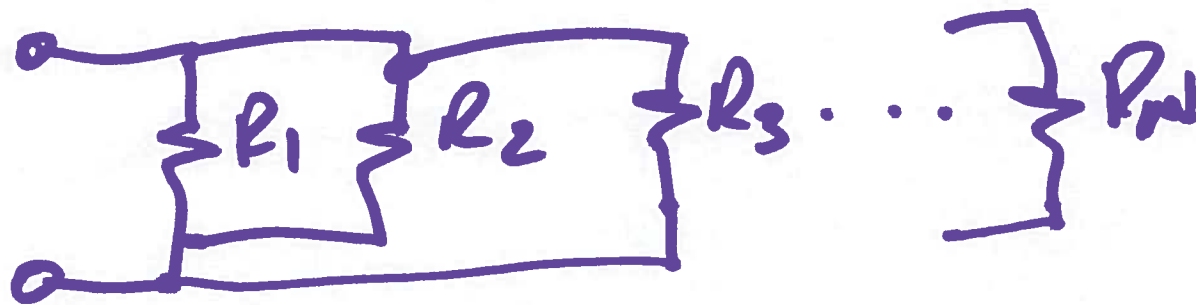


$$1\text{mA} \cdot \frac{1\text{k}}{1\text{k} + 1\text{k}} = \underline{\underline{\frac{1}{2}\text{mA}}}$$

$$I = \frac{500\text{mV}}{1\text{k}} = \underline{\underline{\frac{1}{2}\text{mA}}}$$

Parallel \rightarrow Same Voltages
Across devices

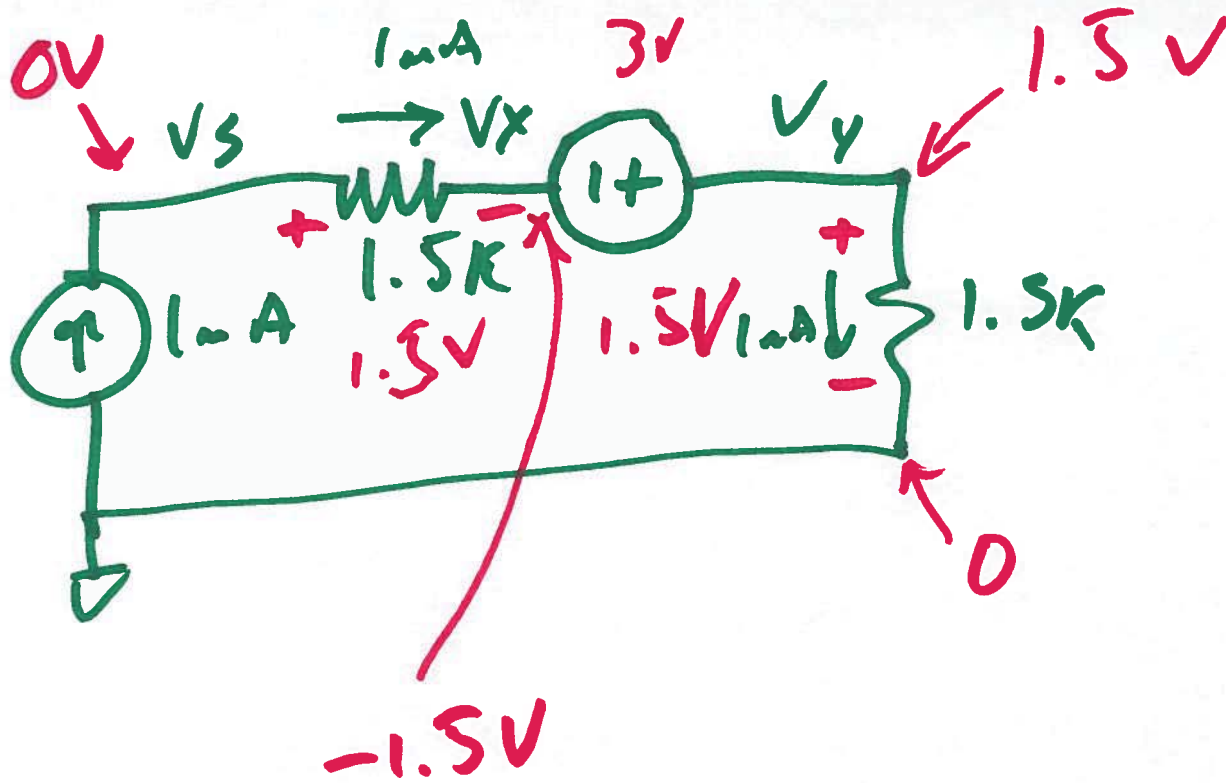
Series \rightarrow Same current
through
devices



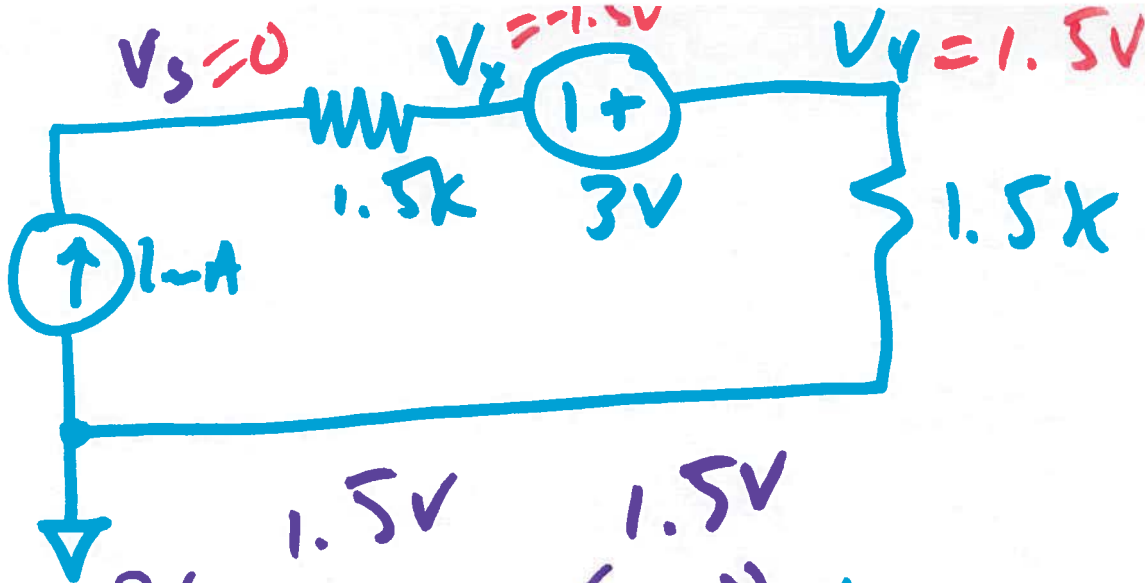
$$\frac{1}{R_{eq}} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \dots + \frac{1}{R_n}$$

$$\frac{1}{R_{eq}} = \frac{1}{R} + \frac{1}{R} + \frac{1}{R} = \frac{3}{R}$$
$$R_{eq} = \frac{R}{3}$$

1b

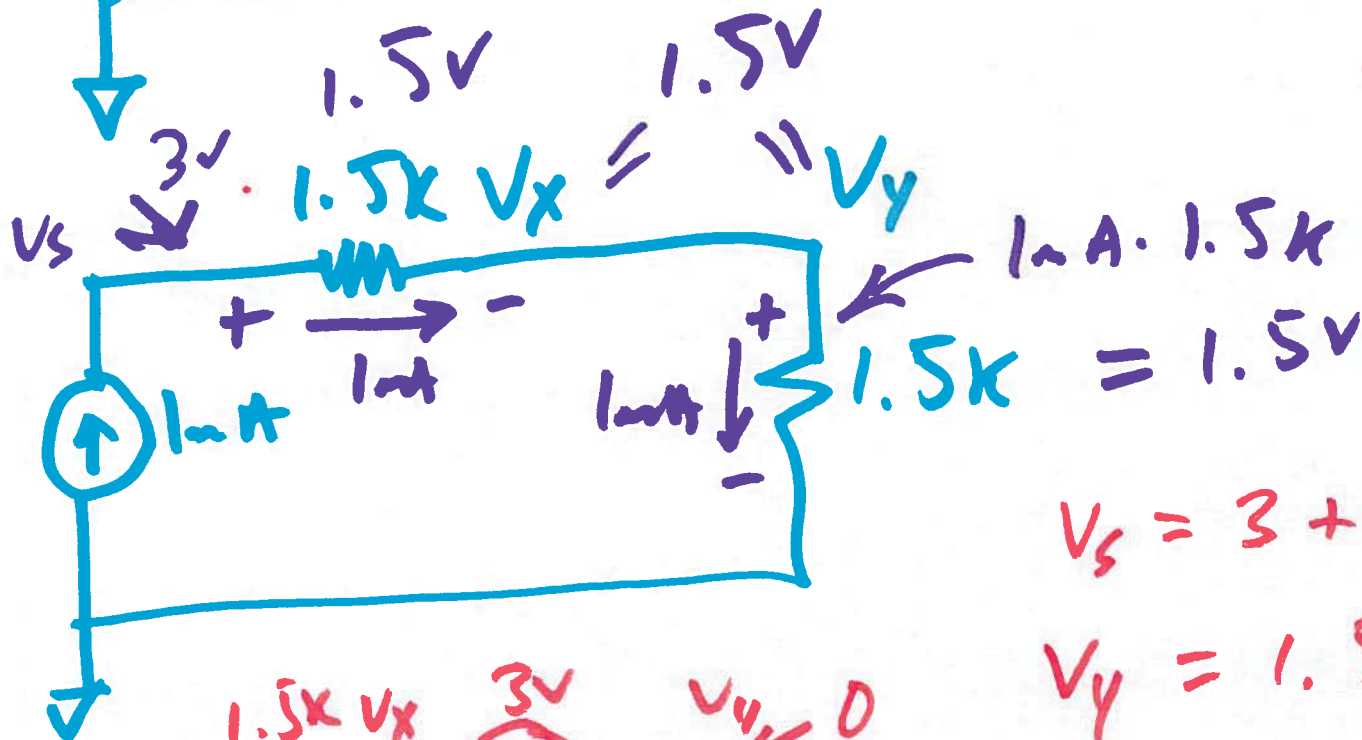


4)



$$I \downarrow \quad \begin{matrix} 5V \\ + \\ - \\ 0 \end{matrix} \quad \begin{matrix} 0 \\ + \\ - \\ 0 \end{matrix} \\ \parallel \quad \quad \quad \parallel \\ 0 \quad \quad \quad 0$$

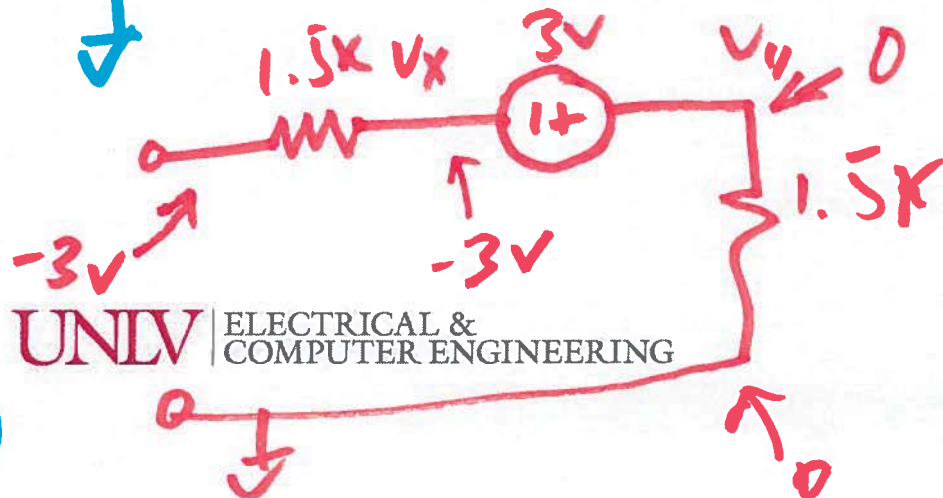
$$V = IR$$



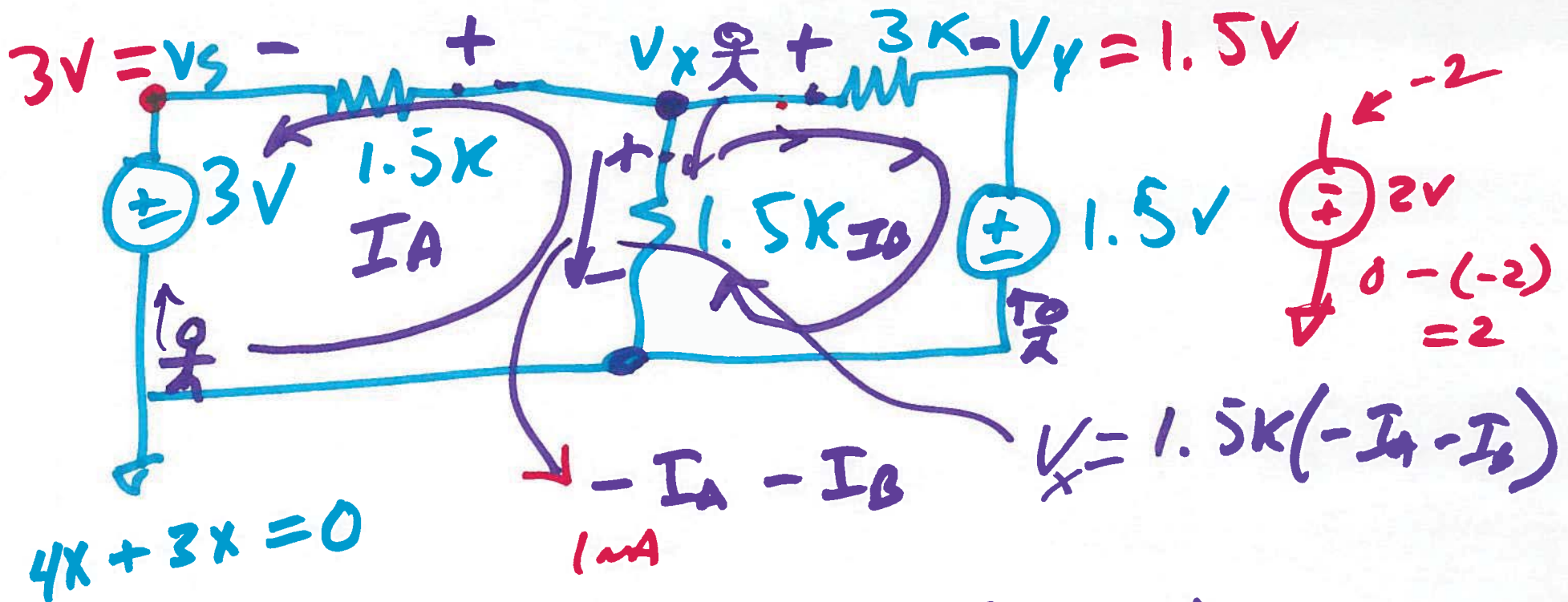
$$V_s = 3 + (-3) = 0$$

$$V_y = 1.5 + 0 = 1.5$$

$$V_x = 1.5 + (-3) = -1.5V$$



5)



$$3V + I_A \cdot 1.5k - 1.5k(-I_A - I_B) = 0$$

$$1.5 + 3k \cdot I_B - 1.5k(-I_A - I_B) = 0$$

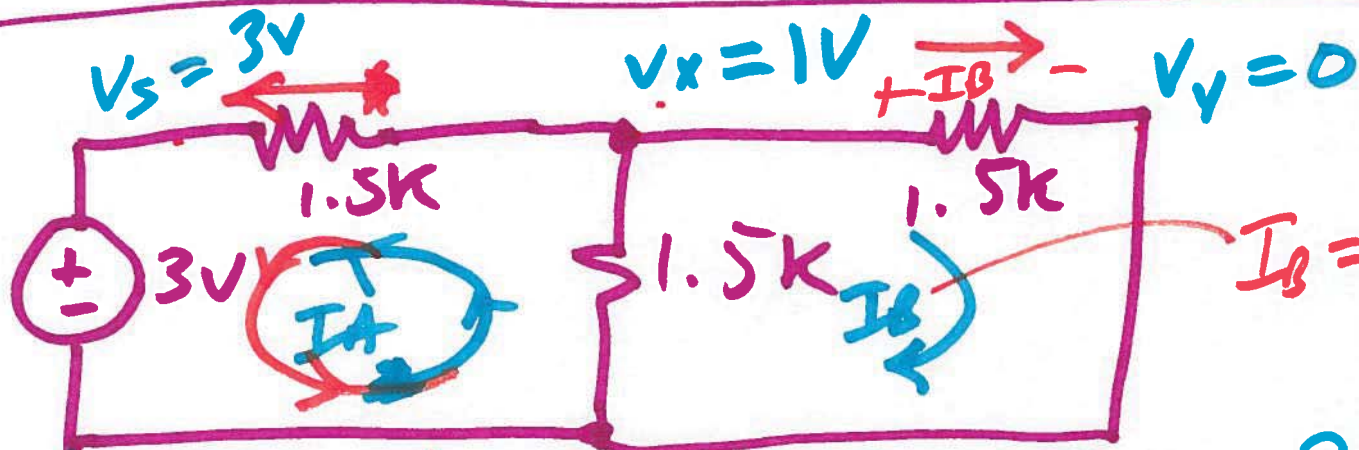
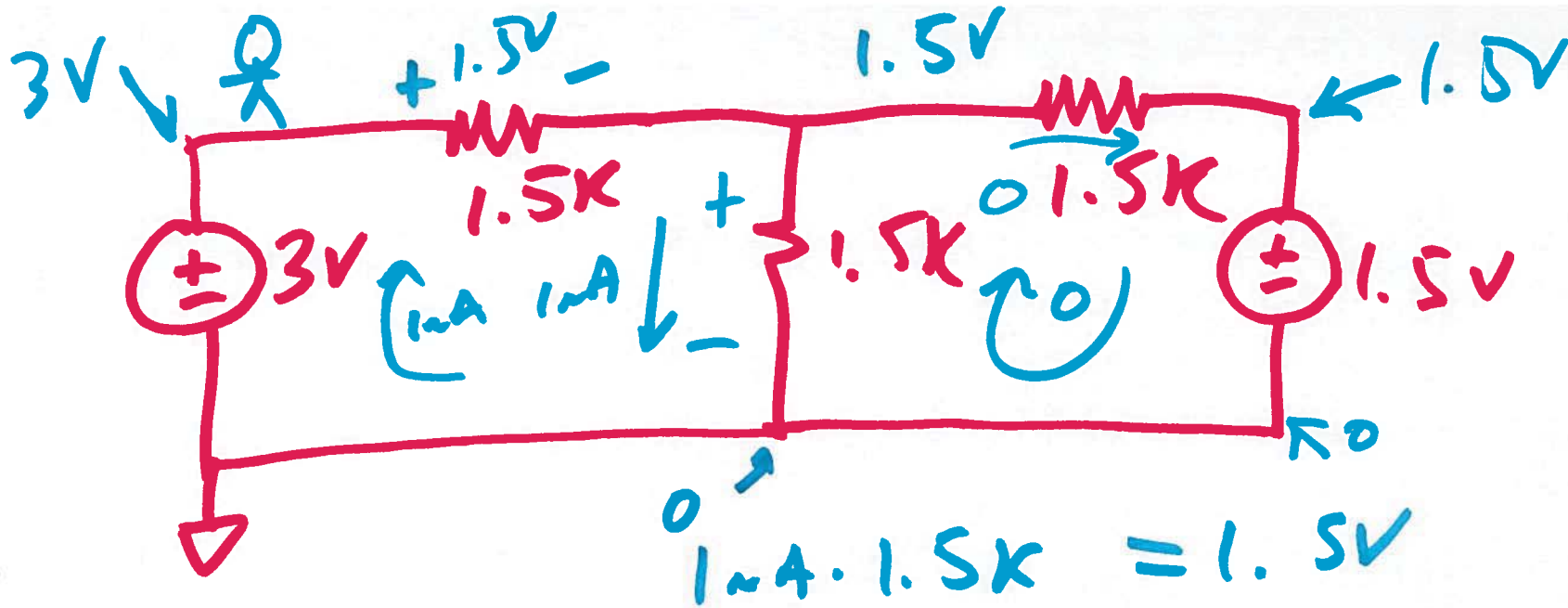
$$2mA + I_A + I_A + I_B = 0 \rightarrow 2I_A = -I_B - 2mA$$

$$1mA + 2I_B + I_A + I_B = 0 \rightarrow I_A = \frac{1}{2}(-I_B - 2mA)$$

$$1mA + 3I_A + \frac{I_B}{2} - 1mA = 0$$

$$I_B = 0 \quad I_A = -1mA$$

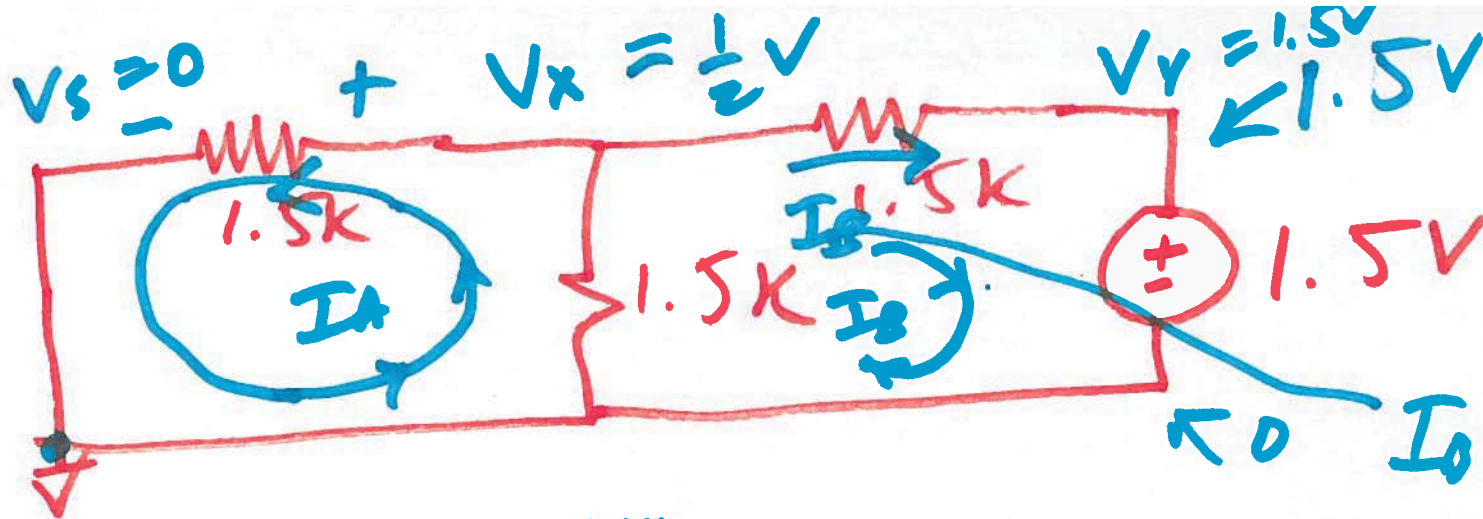
6)



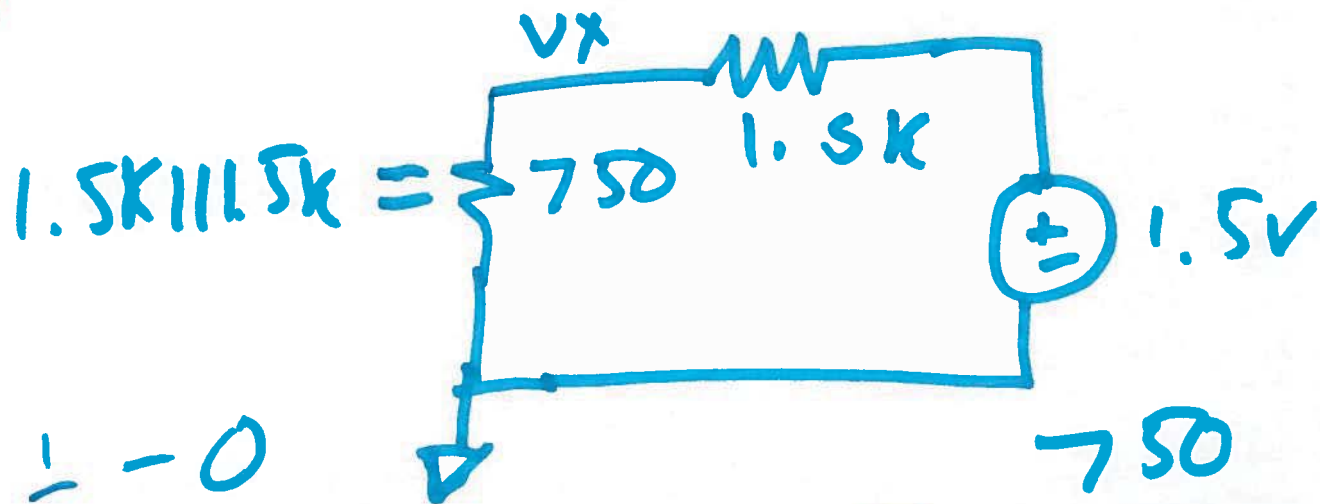
$$I_A = \frac{3 - 1}{1.5k} = 1.333\mu A$$

$$3 \cdot \frac{750}{1.5k + 750} = 1V$$

))



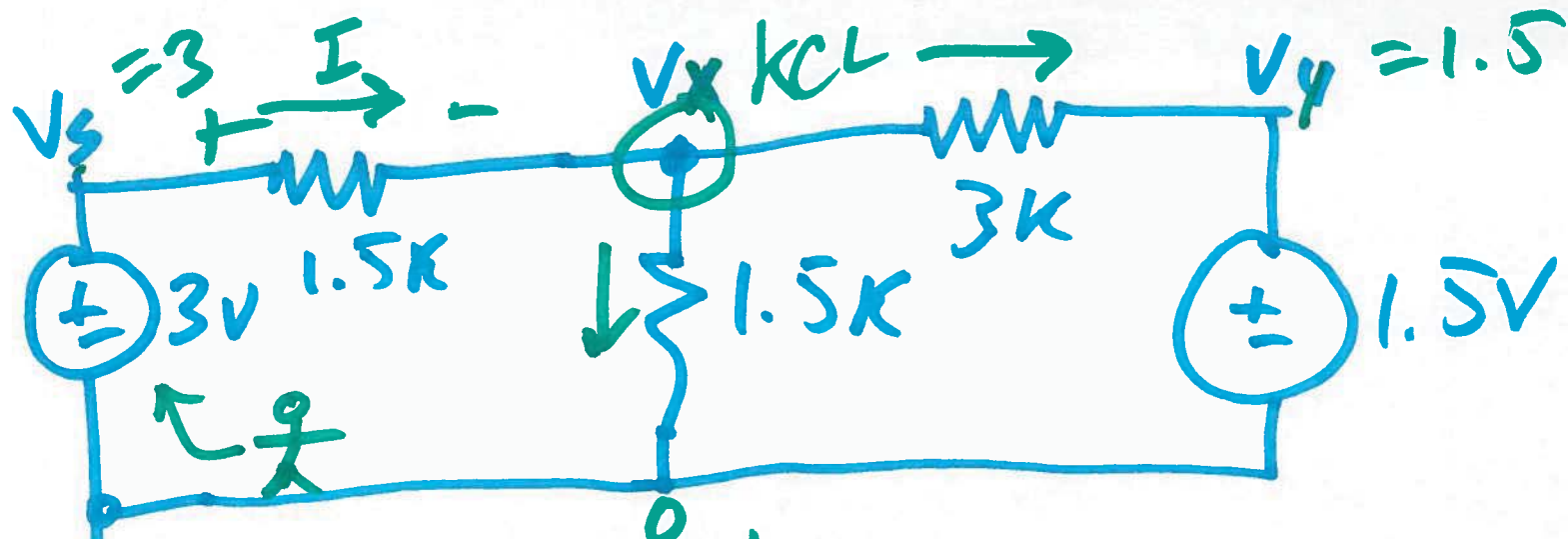
$$I_0 = \frac{\frac{1}{2} - 1.5}{1.5k} = -666.7 \mu A$$



$$I_A = \frac{\frac{1}{2} - 0}{1.5k} = \frac{1}{3} mA$$

$$V_x = \frac{750}{1.5k + 750} \cdot 1.5V = \frac{1}{2} V$$

8)



KCL

$$\frac{V_+ - V_-}{R} = I$$
 Ohm's Law

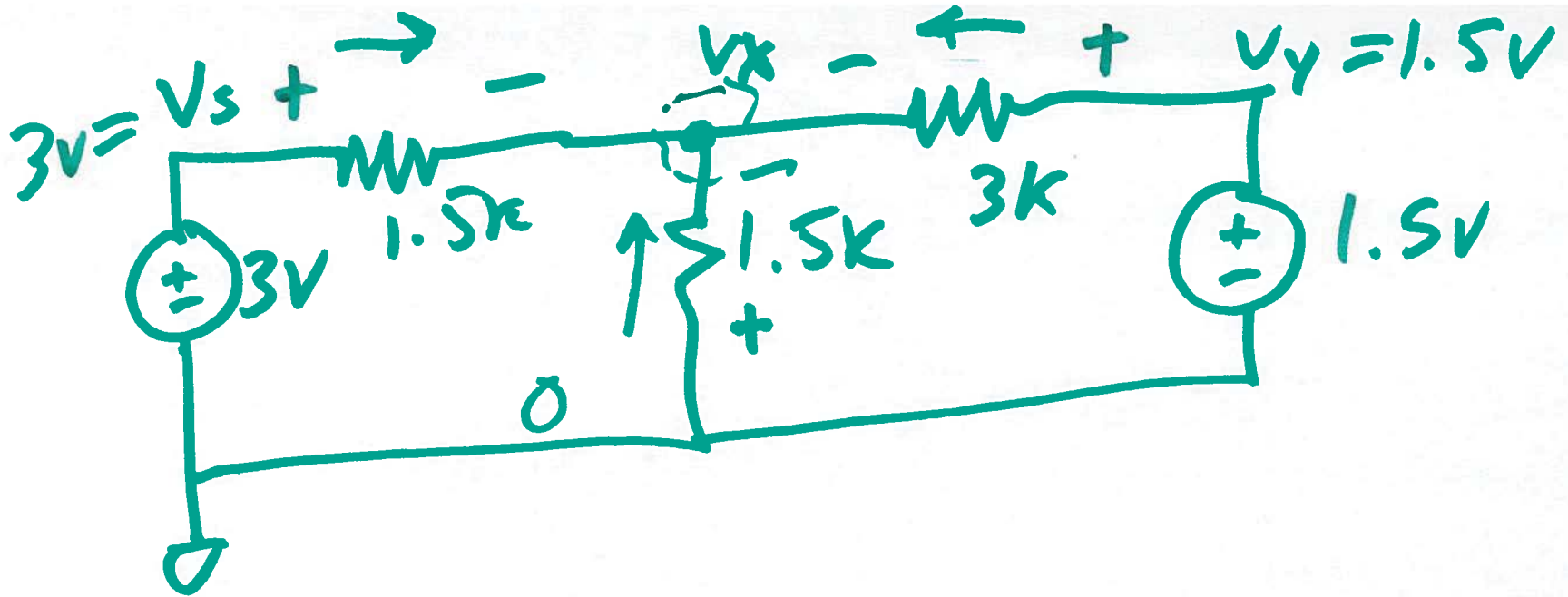
$$\frac{3 - V_x}{1.5k} = \frac{V_x - 0}{1.5k} + \frac{V_x - 1.5}{3k}$$

$$6 - 2V_x = 2V_x + V_x - 1.5V$$

$$7.5 = 5V_x$$

$$\boxed{V_x = 1.5V}$$

9)



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

$$6 - 2V_x - 2V_x + 1.5 - V_x = 0$$

$$7.5 = 5V_x$$

$$V_x = 1.5V$$