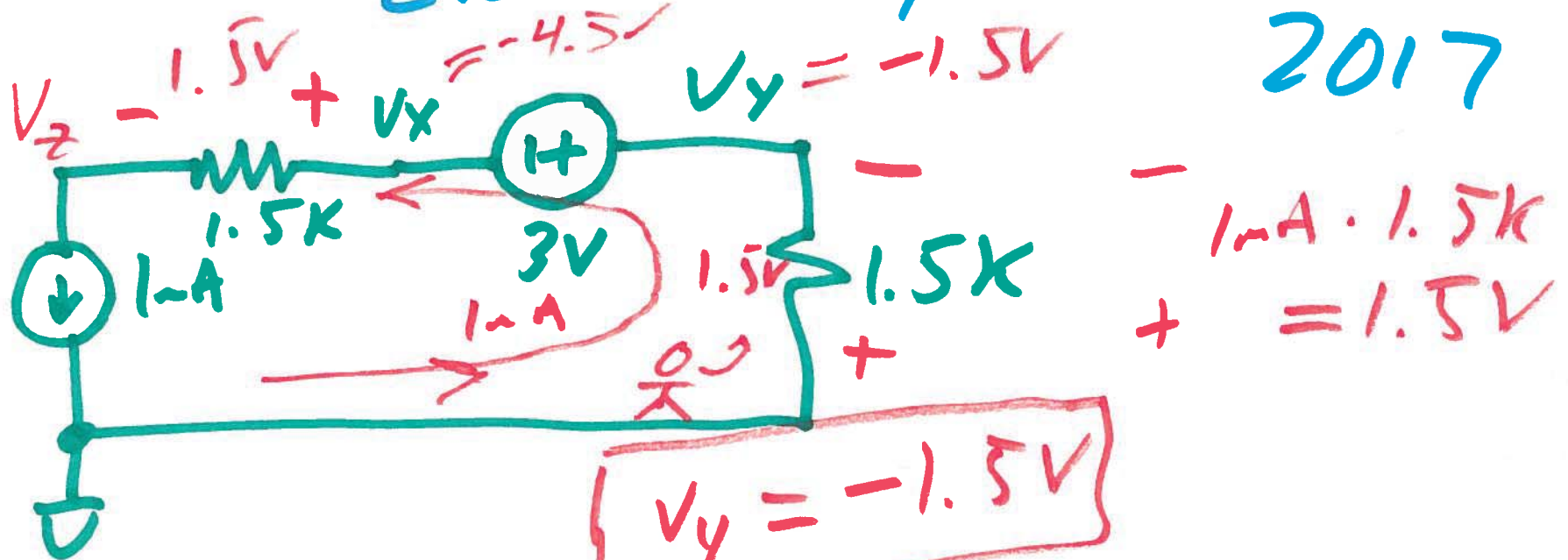


EE 220

Circuits 1

Lecture 8, Sept. 25, 2017

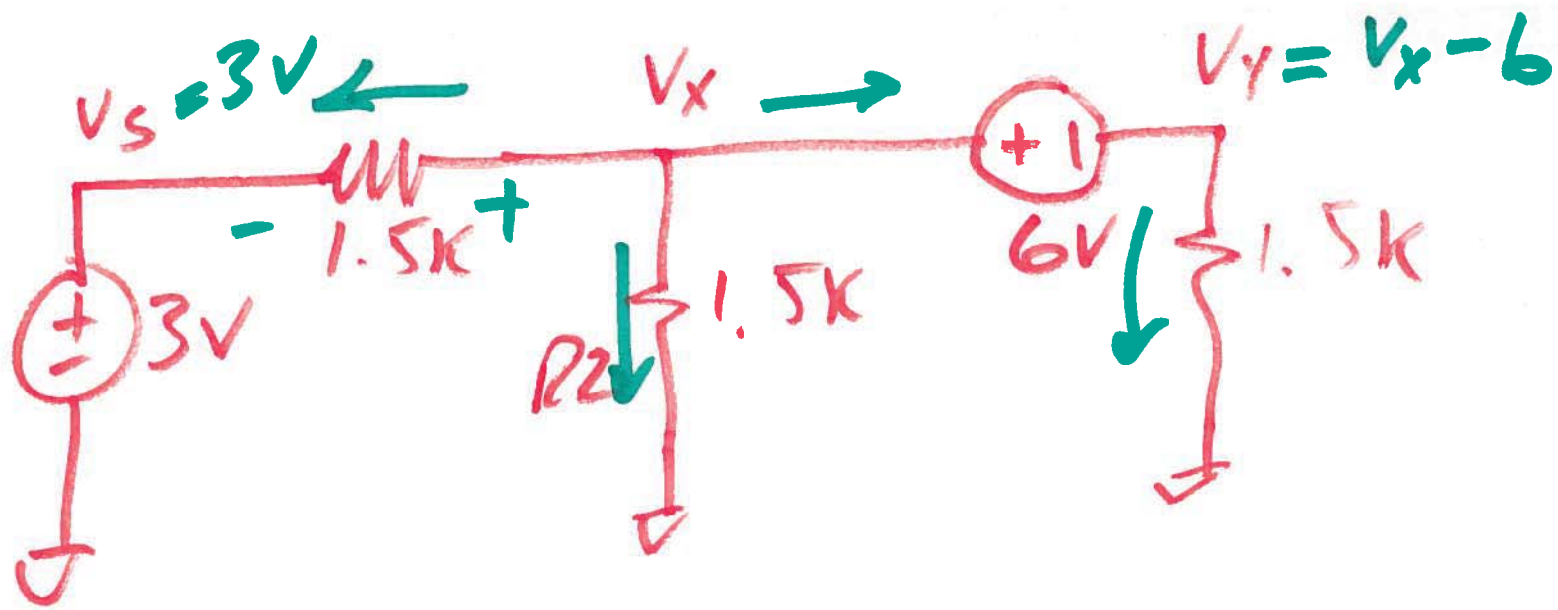


$$V_y = -1.5V$$

$$V_x = -4.5V$$

$$V_z = -6.0V$$

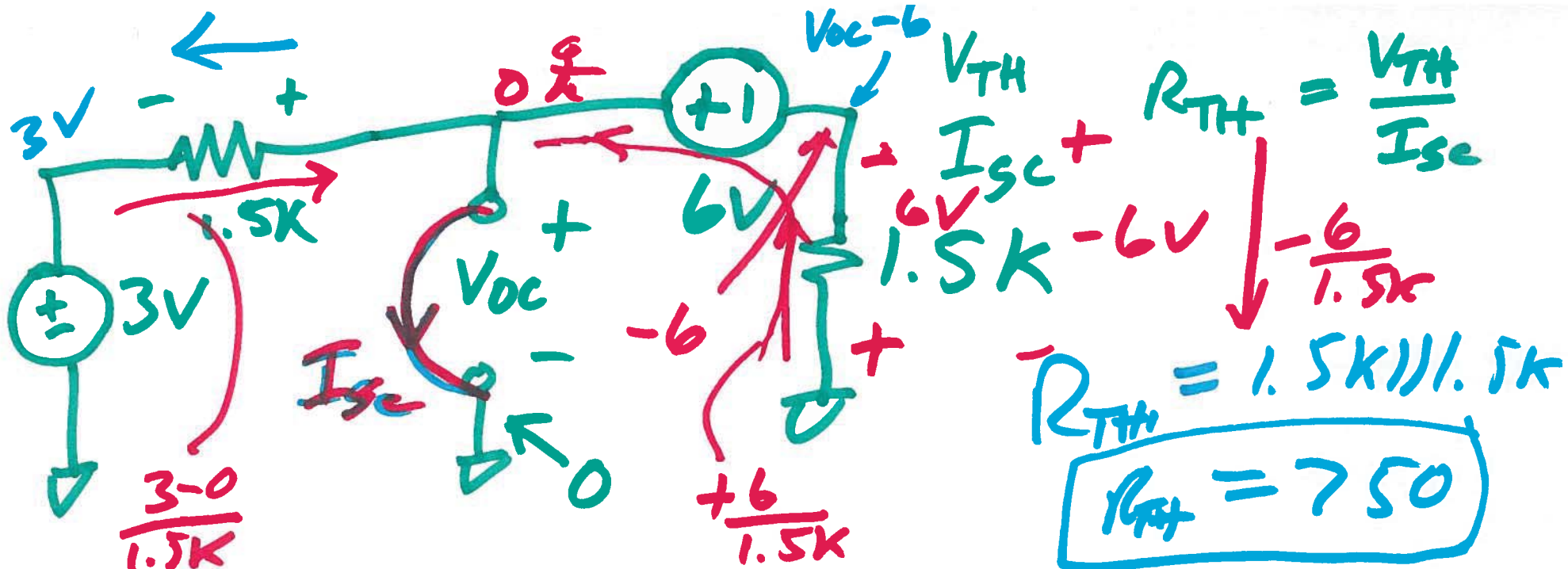
1)



$$\frac{V_x - 3}{1.5k} + \frac{V_x}{1.5k} + \frac{V_x - 6}{1.5k} = 0$$

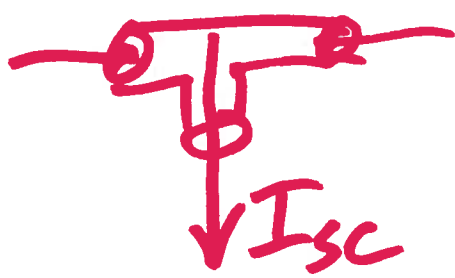
$$3V_x - 9 = 0, \boxed{V_x = 3V}$$

2)



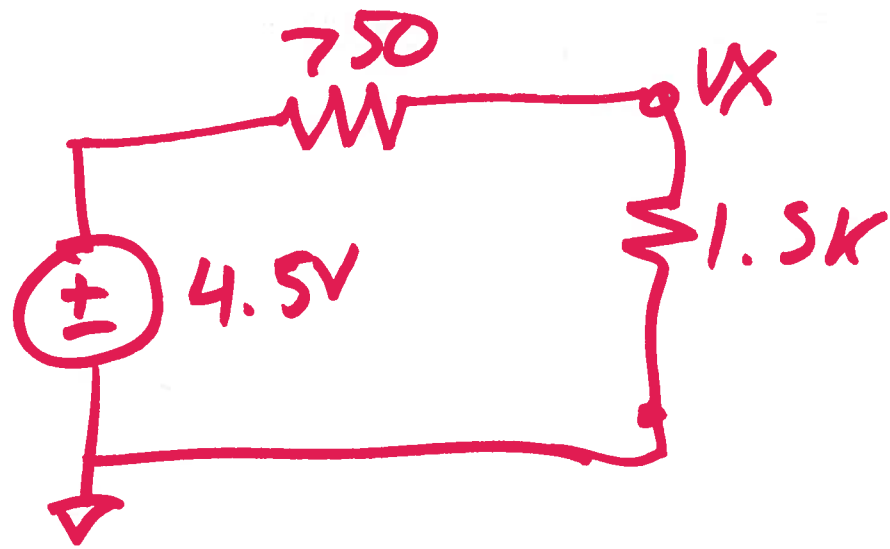
$$\frac{V_{oc} - 3}{1.5k} + \frac{V_{oc} - 6}{1.5k} = 0 \quad I_{sc} = \frac{V_{TH}}{R_{TH}} = \frac{4.5}{750}$$

$$V_{oc} = 4.5v = V_{TH} = 6\mu A$$



$$I_{sc} = \frac{3}{1.5k} + \frac{6}{1.5k} = 6\mu A = I_N$$

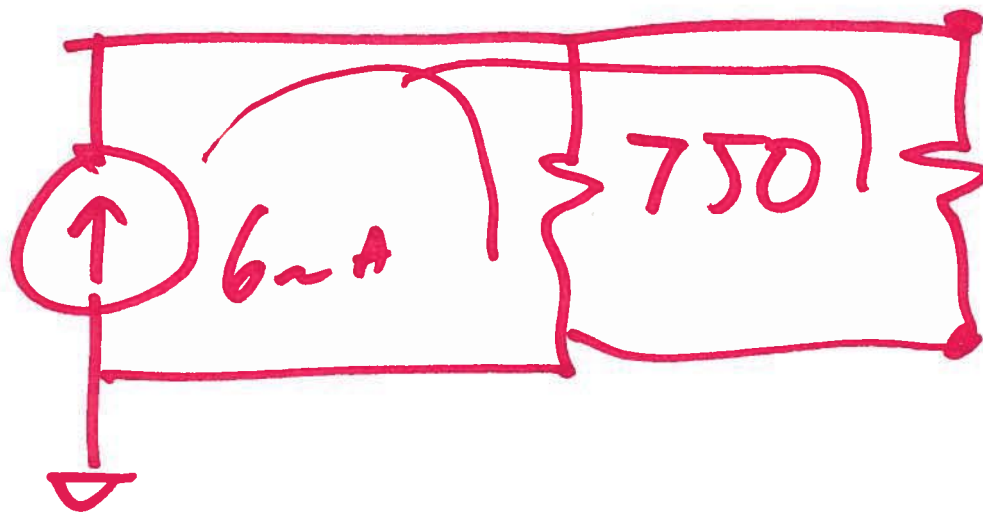
3)



$$V_x = 4.5 \cdot \frac{1.5k}{1.5k + 750}$$

$$= 4.5 \cdot \frac{2}{2+1}$$

$$V_x = 3V$$



$$V_x = 6mA \cdot 750 \parallel 1.5k$$

$$1.5k = 6mA \cdot \frac{750 \cdot 1.5k}{750 + 1.5k}$$

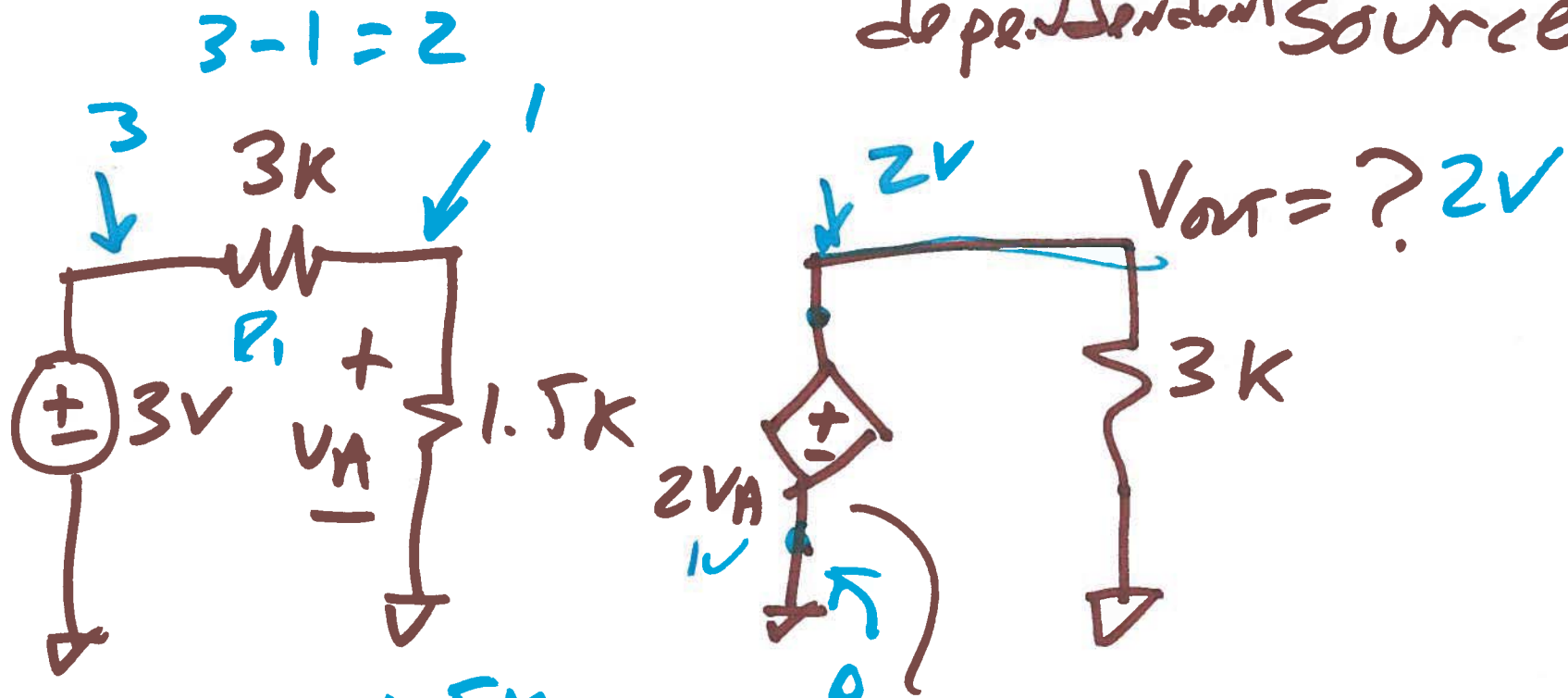
$$= 6mA \cdot \frac{1.5k}{1+2}$$

$$V_x = 3V$$

4)

Dependent + sources

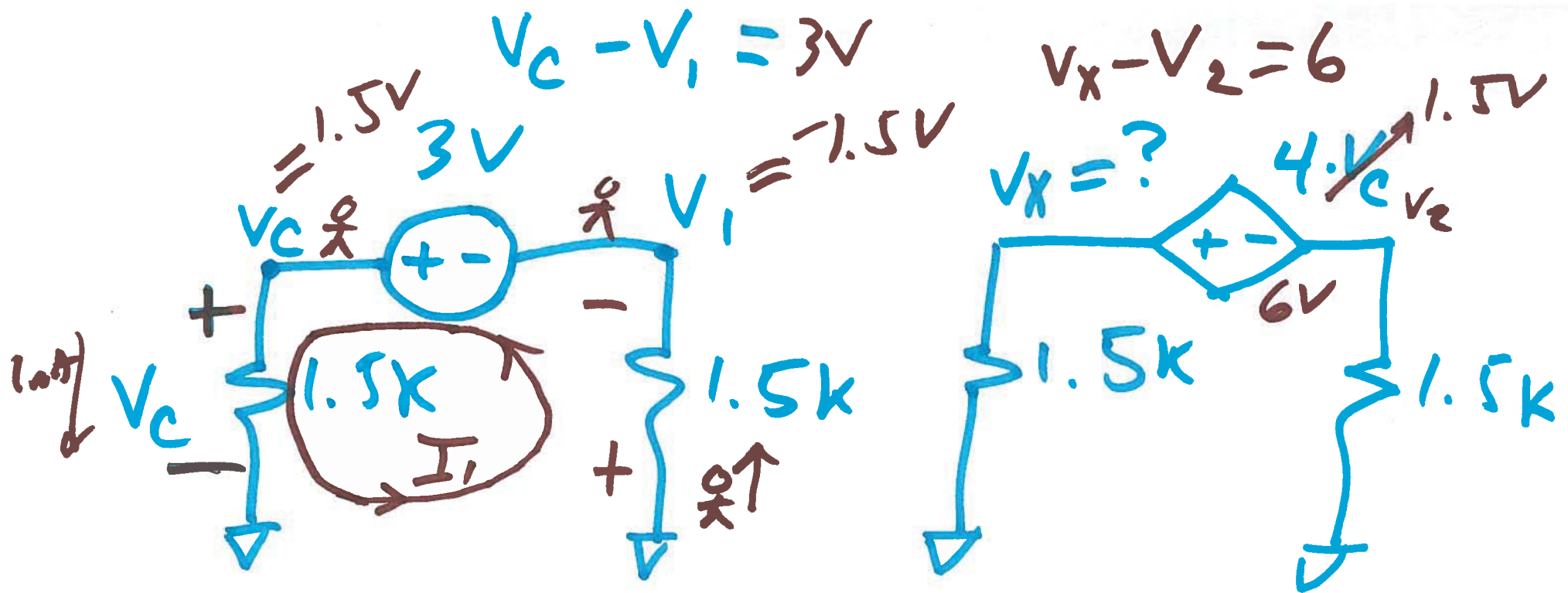
Voltage - Controlled Voltage dependent source (VCVS)



$$V_A = 3 \cdot \frac{1.5k}{1.5k + 3k}$$

$$V_A = 1V$$

S)



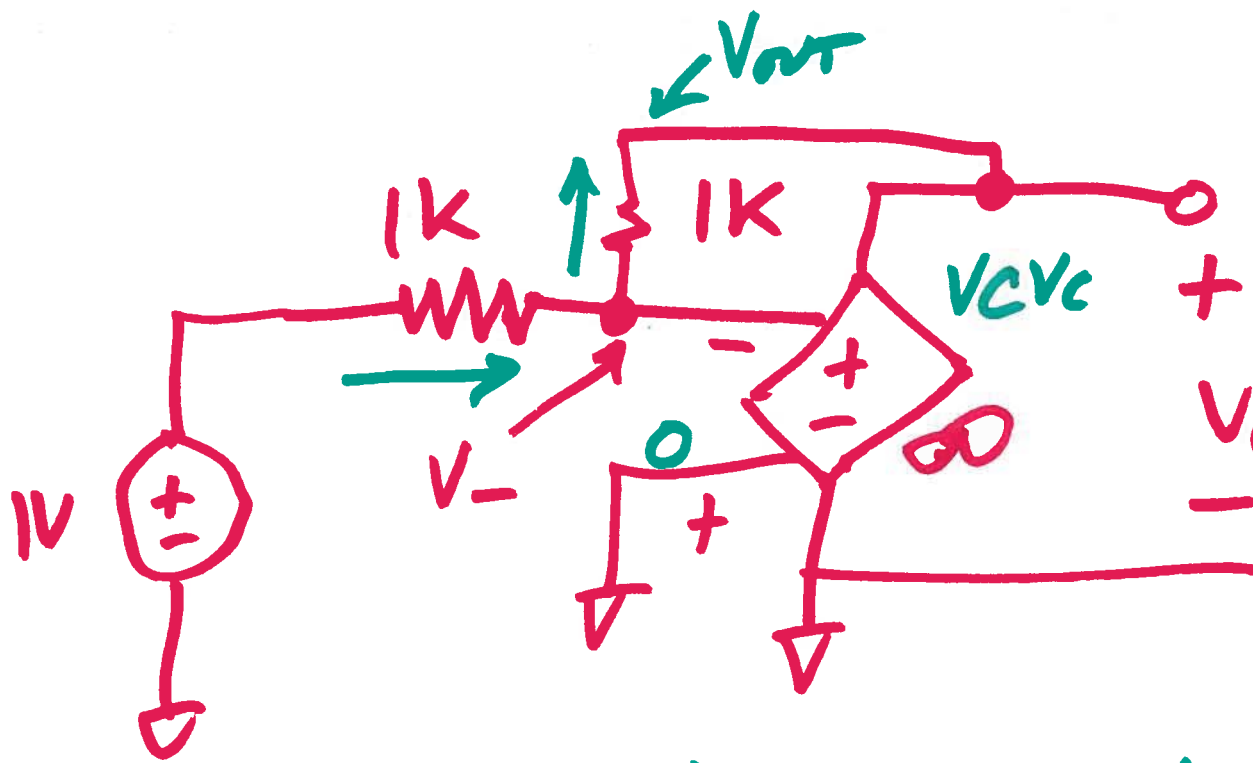
$$-I_1 \cdot 1.5k + 3 - I_1 \cdot 1.5k = 0$$

$$I_1 = 1mA$$

$$V_x = 3V$$

$$V_2 = -3V$$

6)



$$V_{out} = \infty(0 - V_-)$$

$$V_- = \frac{-V_{out}}{\infty}$$

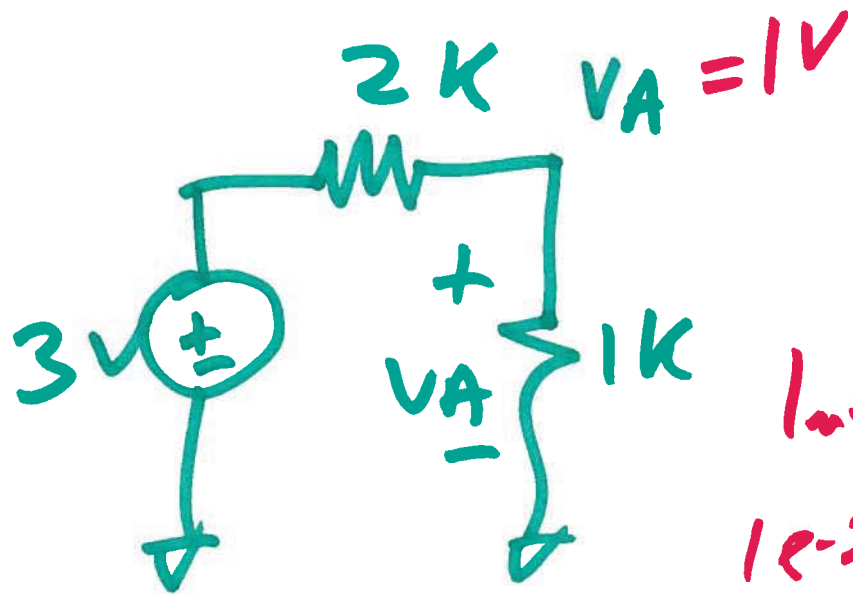
$$\frac{1 - V_-}{1k} = \frac{V_- - V_{out}}{1k}$$

$$1 - V_- = V_- - V_{out}$$

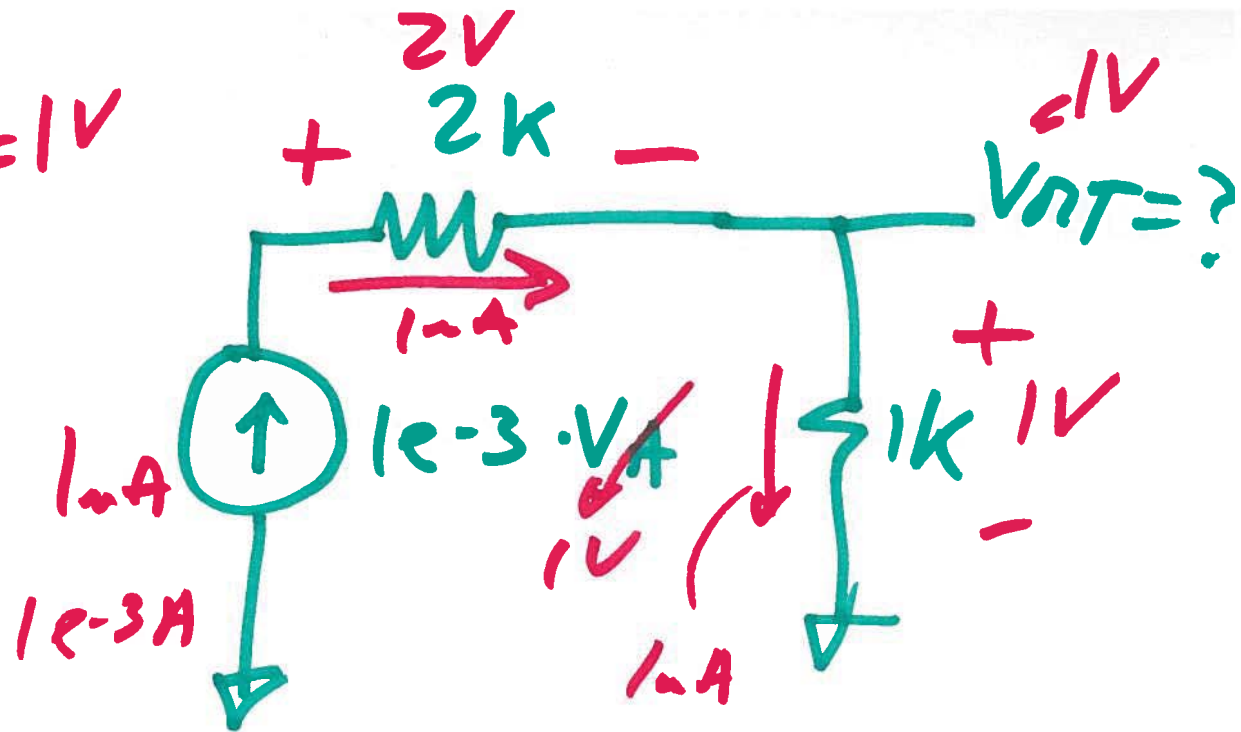
$$1 + \frac{V_{out}}{\infty} = -V_{out} \left(1 \neq \frac{1}{\infty}\right)$$

$$1 = -V_{out} \quad \boxed{V_{out} = -1V}$$





$$V_A = 3 \cdot \frac{1k}{1k + 2k} = 1V$$



8)