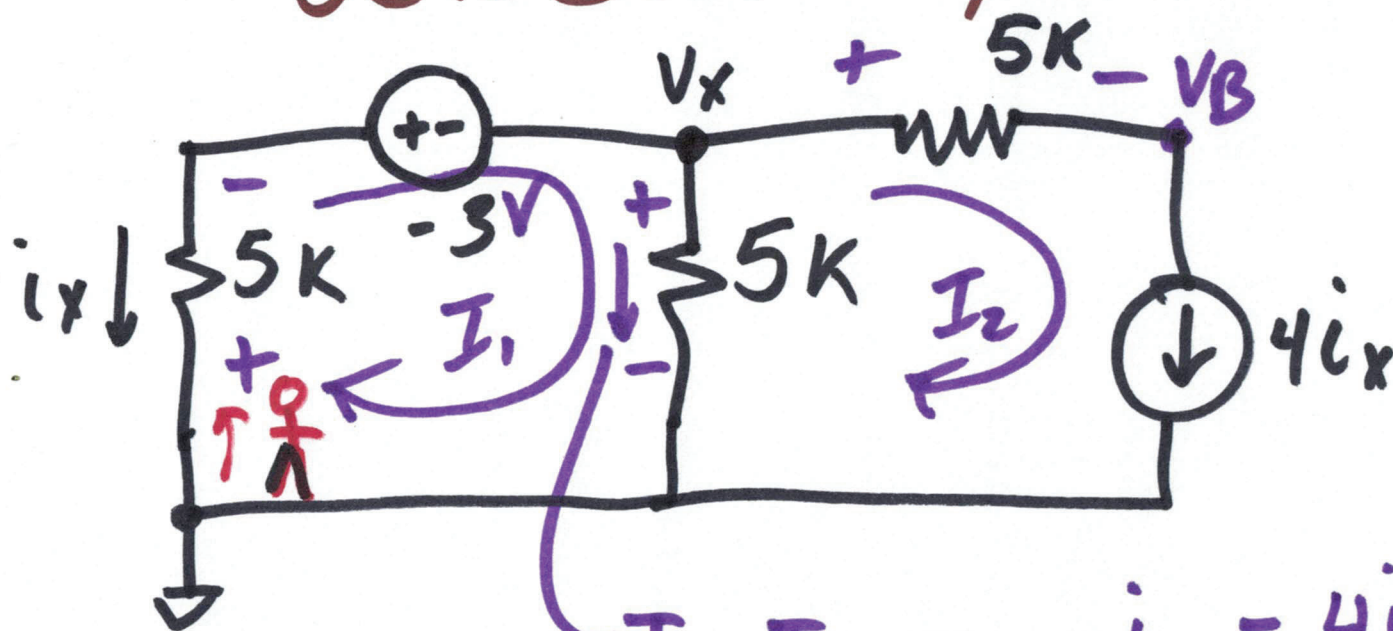


# EE 220 circuits 1

## Lecture 13

OCTOBER 6, 2021



$$I_1 - I_2 = -i_x - 4i_x = 5i_x$$

$$-5kI_1 - (-3) - 5k(I_1 - I_2) = 0$$

$$5ki_x + 3 - 5k(-5i_x) = 0$$

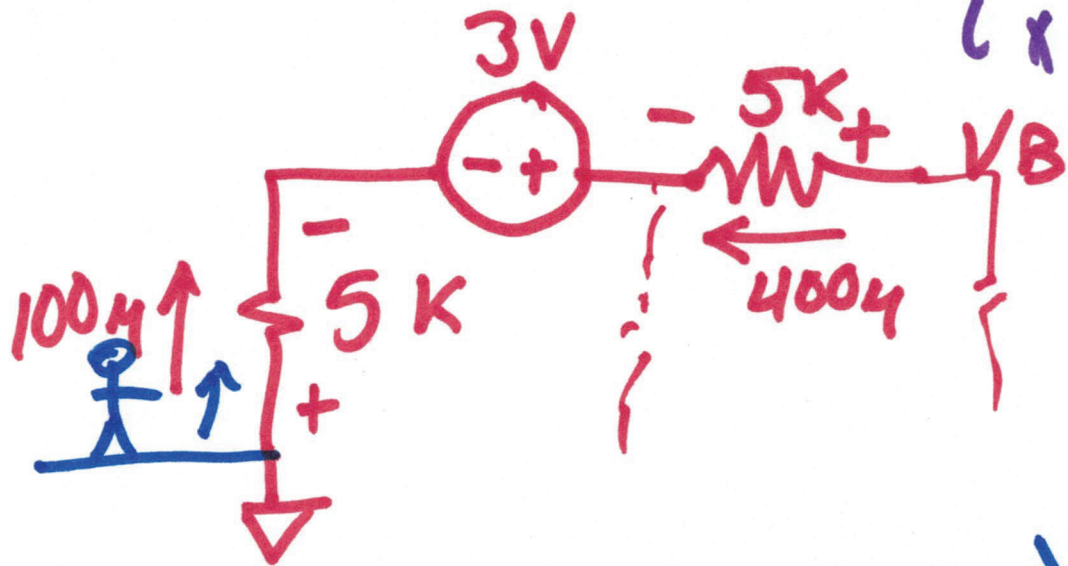
1)

$$5kix + 3 + 25kix = 0$$

$$30kix = -3$$

$$ix = -\frac{3}{30k} = -\frac{1}{10} \text{ mA}$$

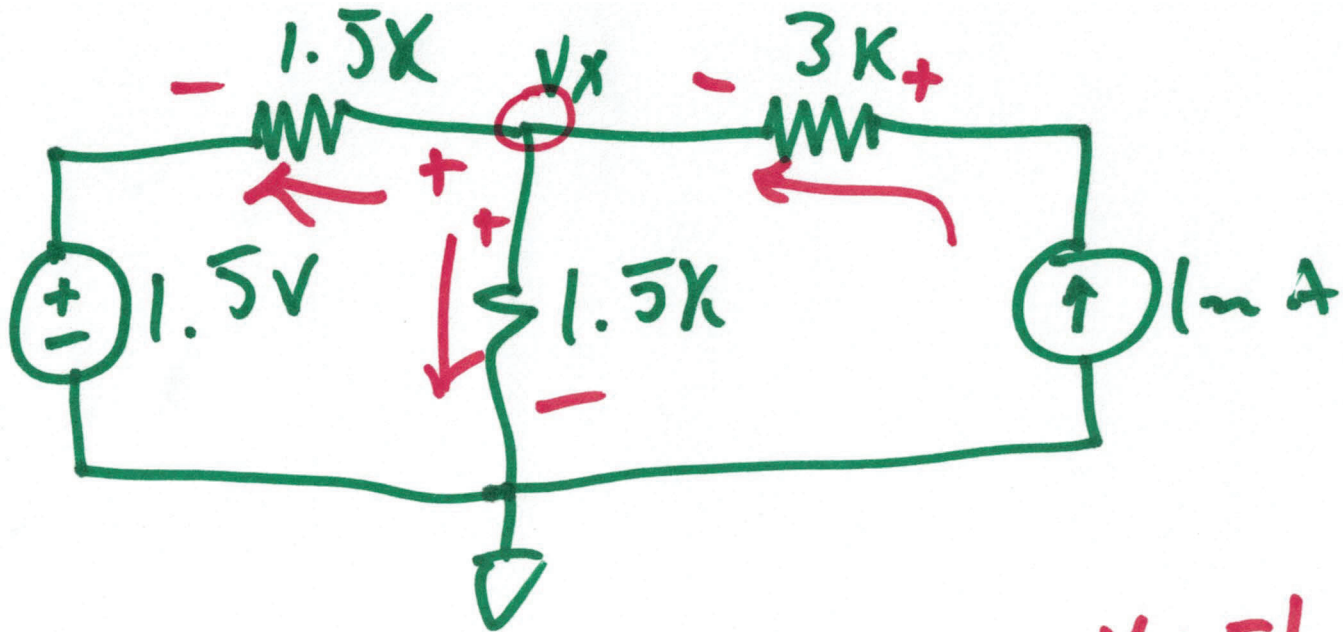
$$ix = 100 \mu\text{A}$$



$$V_B = -5k(0.1\text{mA}) + 3 + 5k(400\mu\text{A})$$

$$-\frac{1}{2} \text{V} + 3 + 2 \text{V}$$

$$V_B = 4.5 \text{V}$$

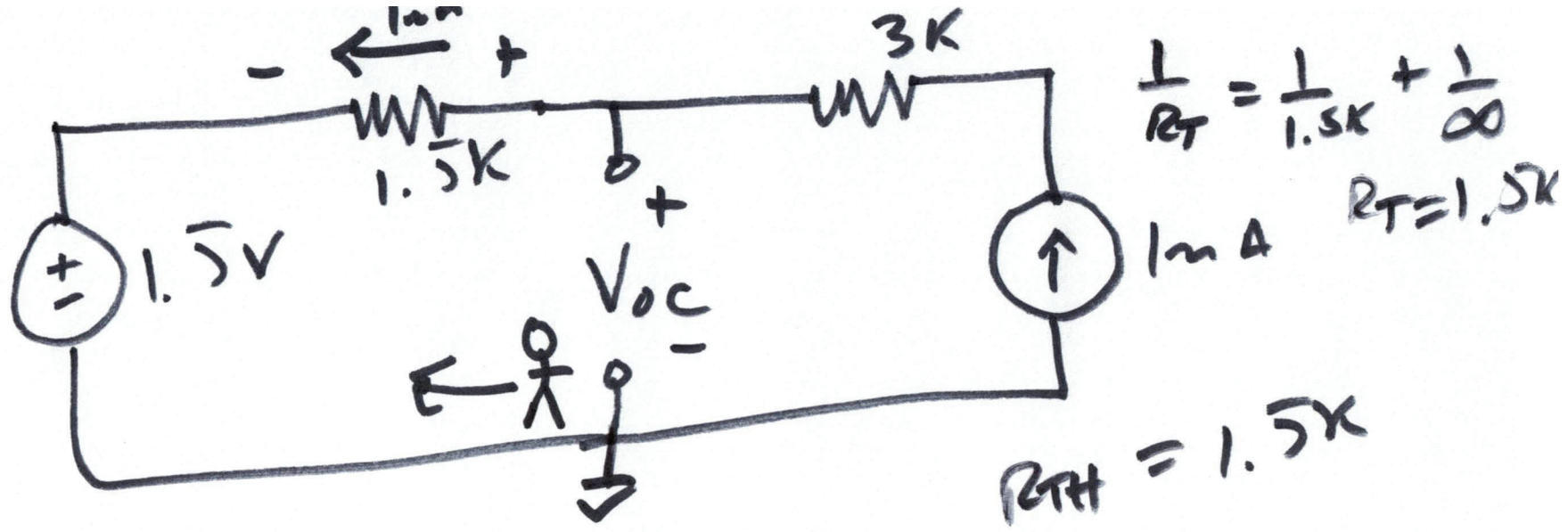


$$1\text{mA} = \frac{V_x}{1.5\text{k}} + \frac{V_x - 1.5}{1.5\text{k}}$$

$$1.5\text{V} = 2V_x - 1.5$$

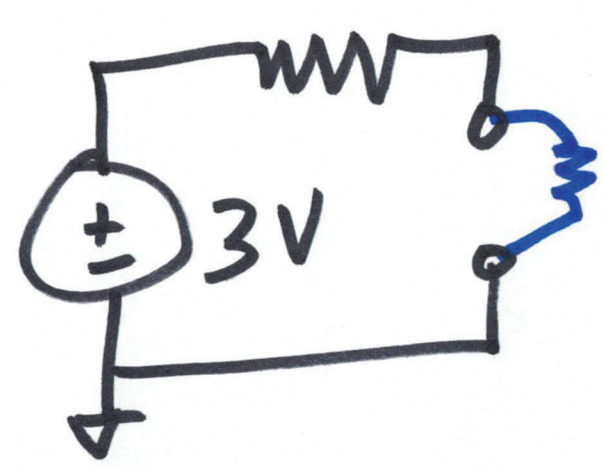
$$2V_x = 3$$

$$\boxed{V_x = 1.5}$$



$$V_{oc} = 1.5 + 1.5k \cdot 1mA$$

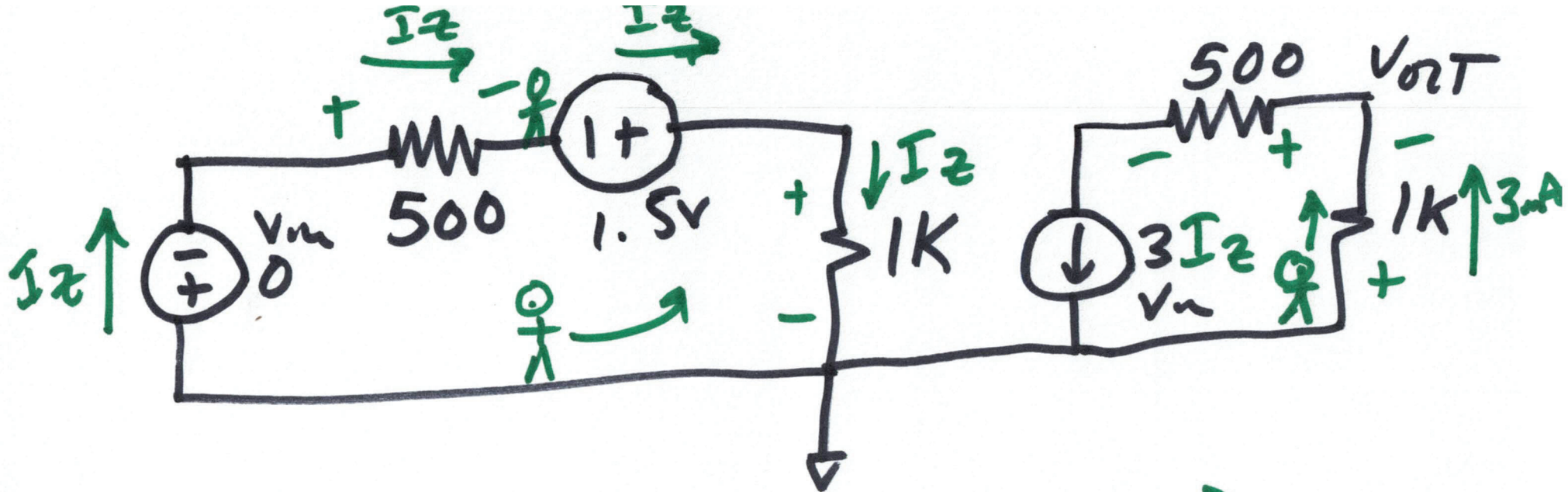
$$V_{oc} = V_{TH} = 3V$$



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

$$V_+ = 1.5V$$

a)



$$+1\text{K} I_z - 1.5\text{V} + 500 I_z = 0$$

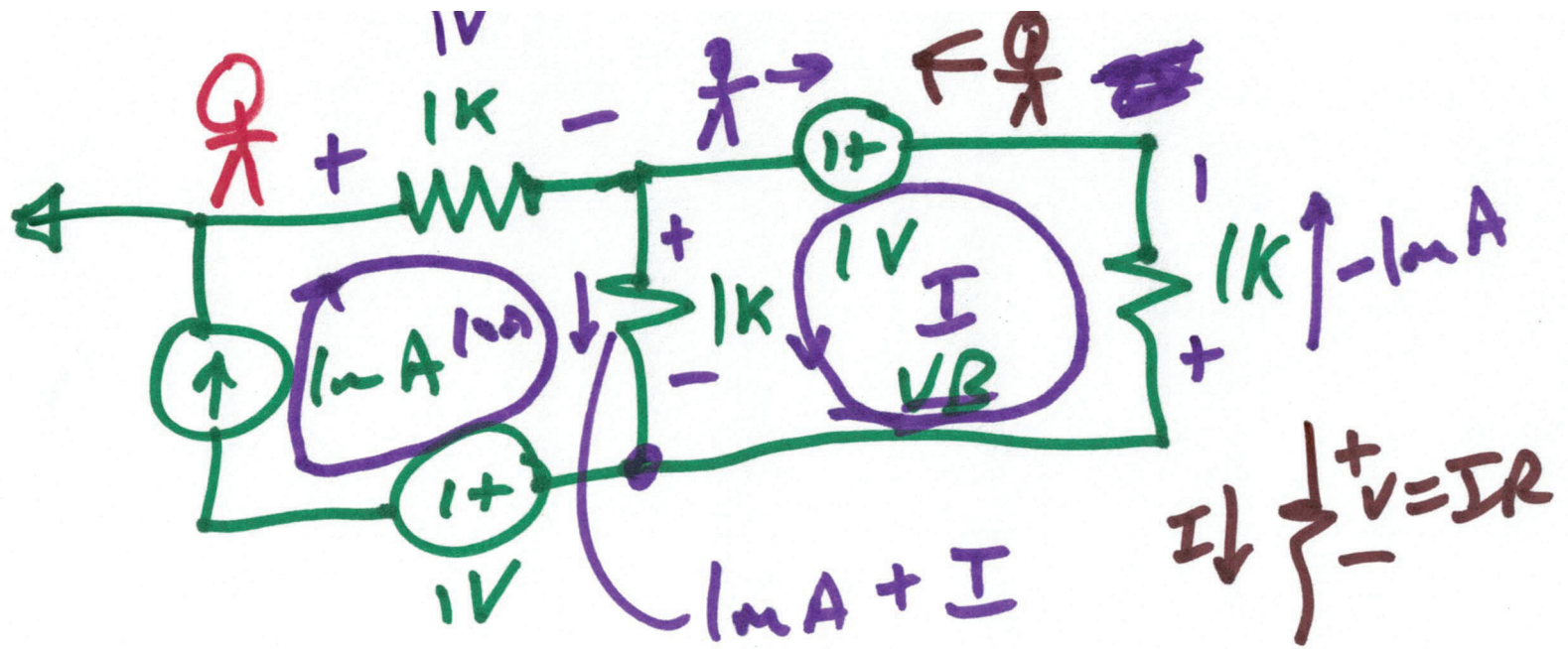
$$1.5\text{K} I_z = 1.5\text{V}$$

$$I_z = 1\text{mA}$$

$$V_o = -1\text{K} \cdot 3\text{mA}$$

$$V_o = -3\text{V}$$

5)



$$1V + 1kI + 1k(1mA + I) = 0$$

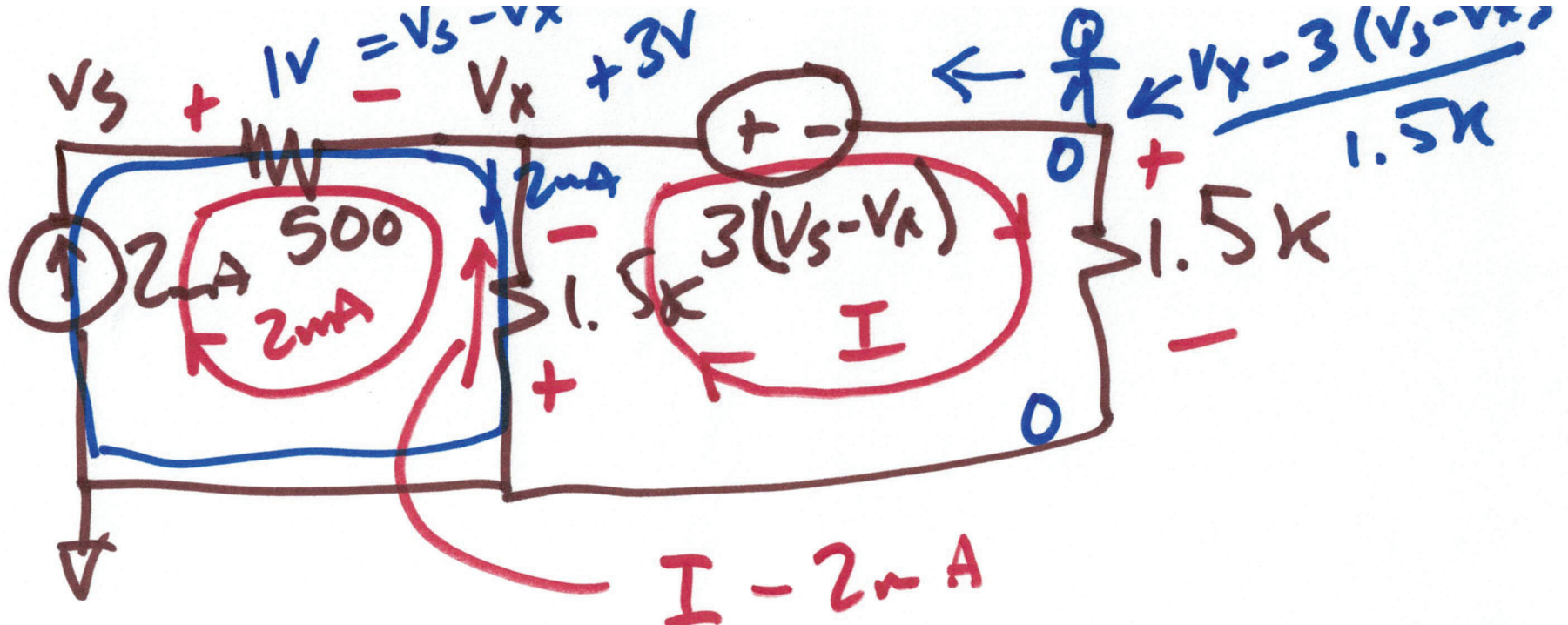
$$2V + 2kI = 0$$

$$I = -1mA$$

$$V_B = -1k(1mA) - 1k(1mA + (-1mA))$$

$$V_B = -1V$$

b)



$$0 = +3(V_s - V_x) + 1.5k(I - 2mA) + 1.5kI$$

$$0 = \cancel{3} + 1.5kI - \cancel{3V} + 1.5kI$$

$$\boxed{I = 0}$$

