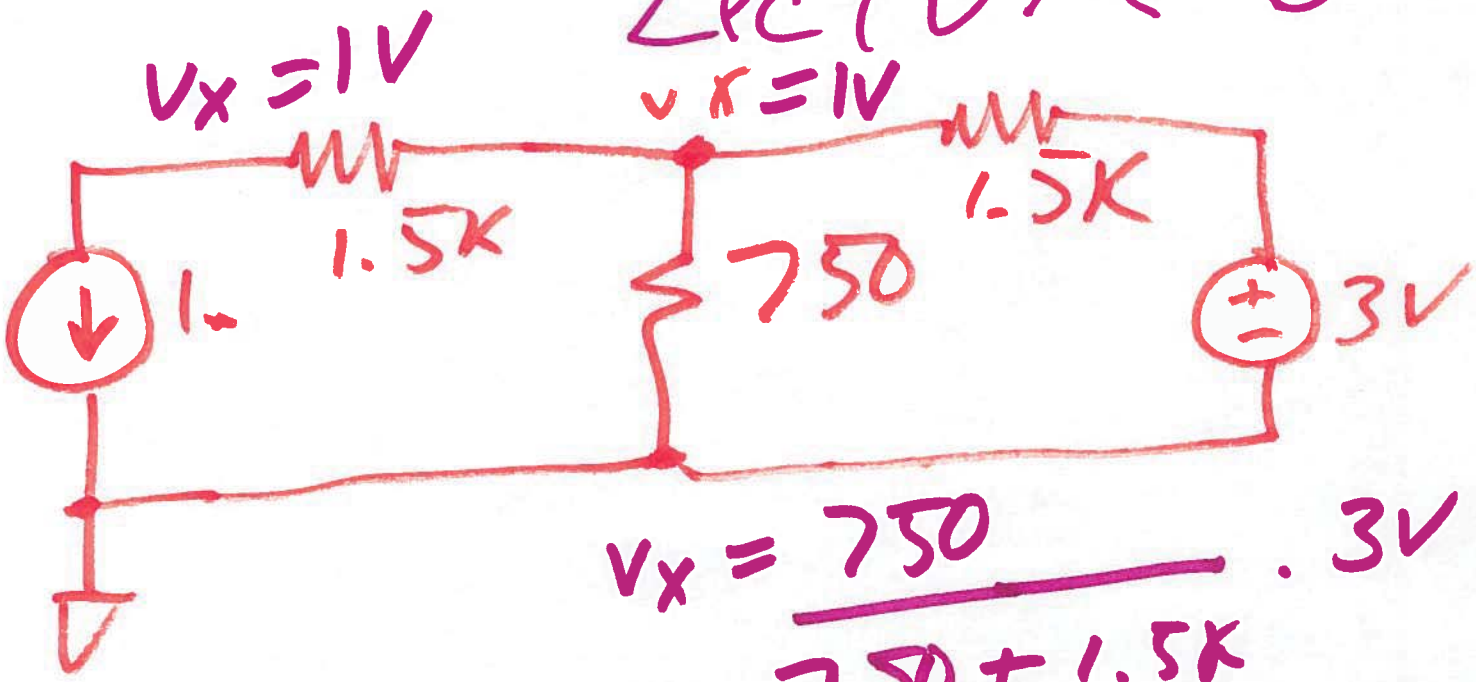
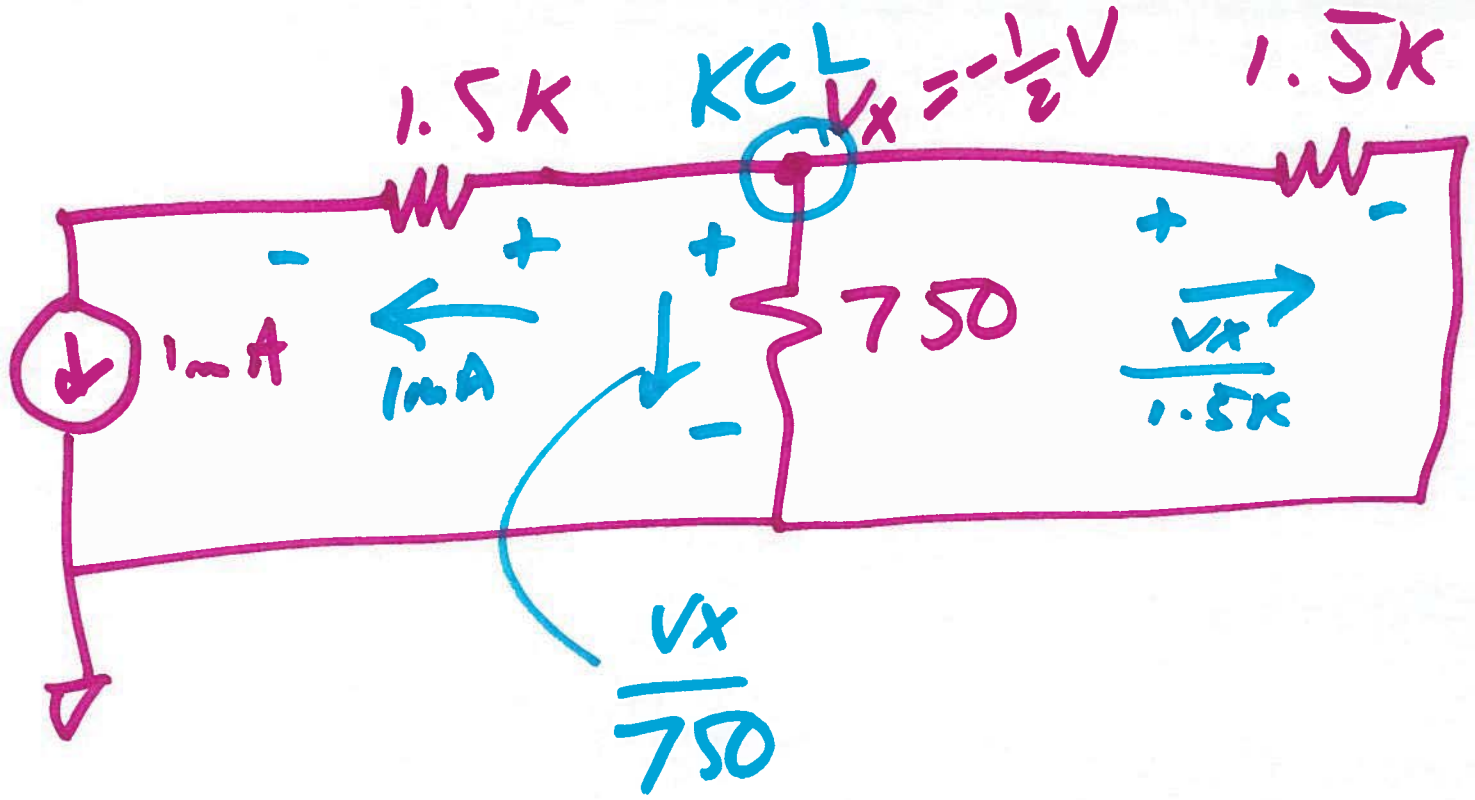
EE 220
Circuits I
Sept. 18, 2017
Lecture 6



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

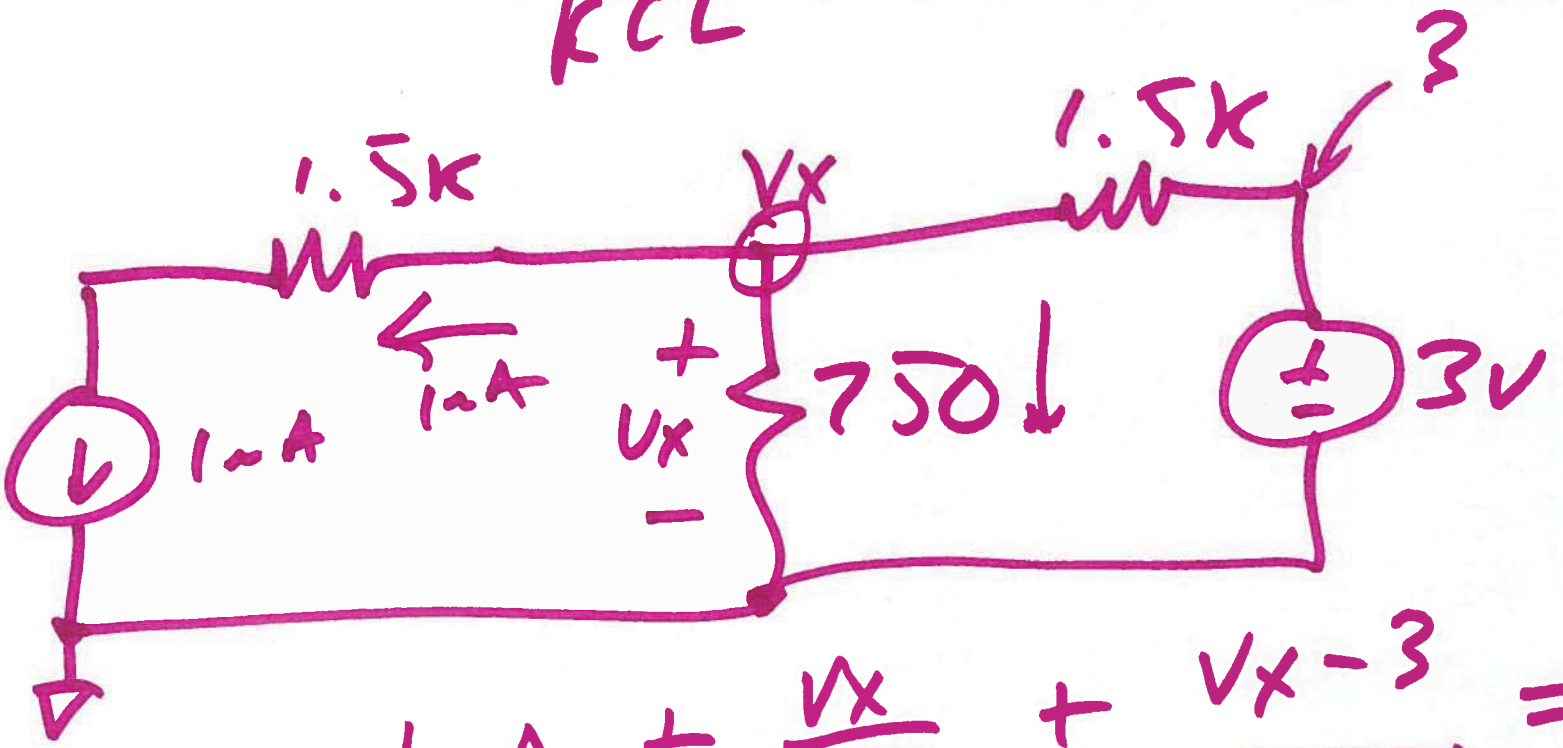


$$1mA + \frac{V_x}{750} + \frac{V_x}{1.5K} = 0$$

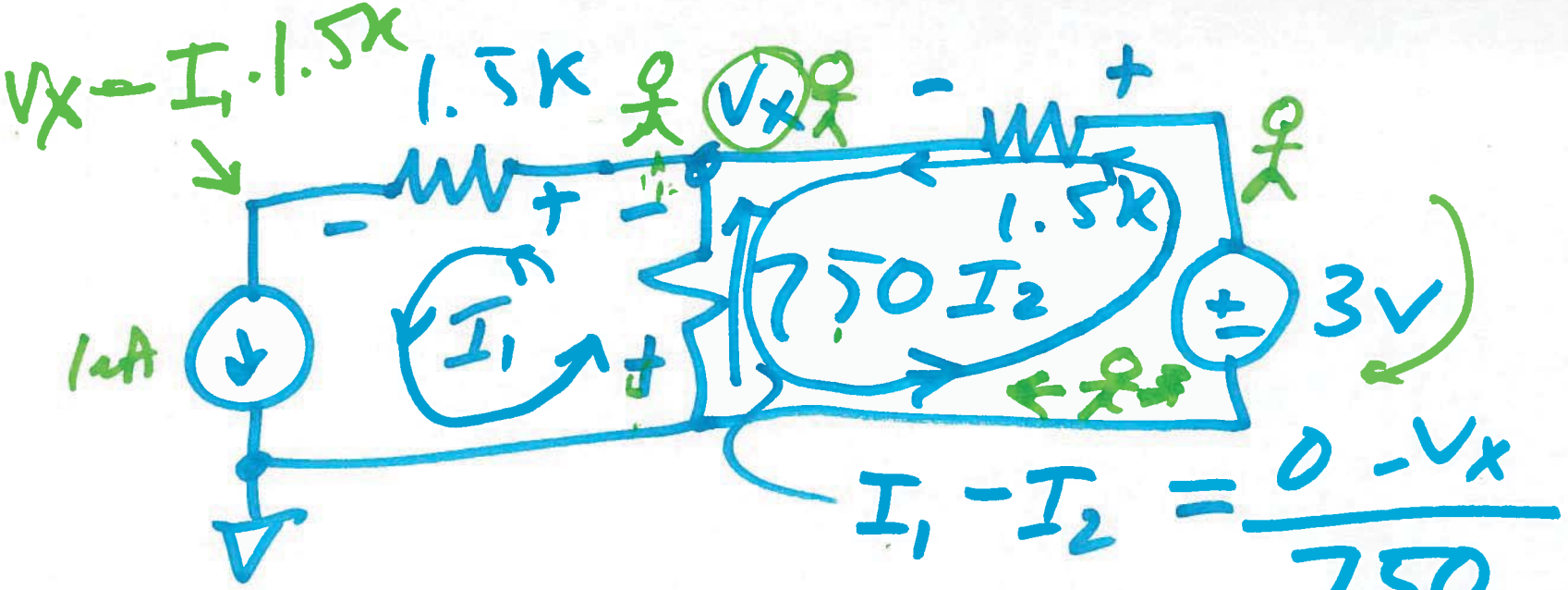
$$1.5V + 2V_x + V_x = 0$$

$$V_x = -\frac{1}{2}V$$

KCL



$$1mA + \frac{V_x}{750} + \frac{V_x - 3}{1.5K} = 0$$



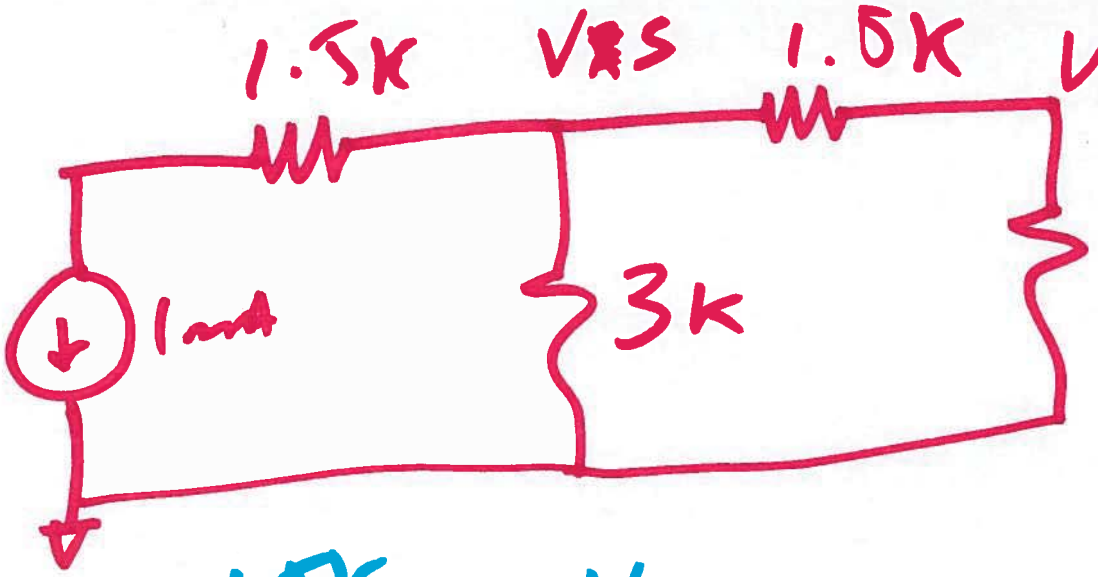
$$I_1 - I_2 = \frac{0 - V_x}{750}$$

$$-750 \cdot (I_1 - I_2) + 1.5k I_2 - 3 = 0$$

$$I_1 = 1m\,A$$

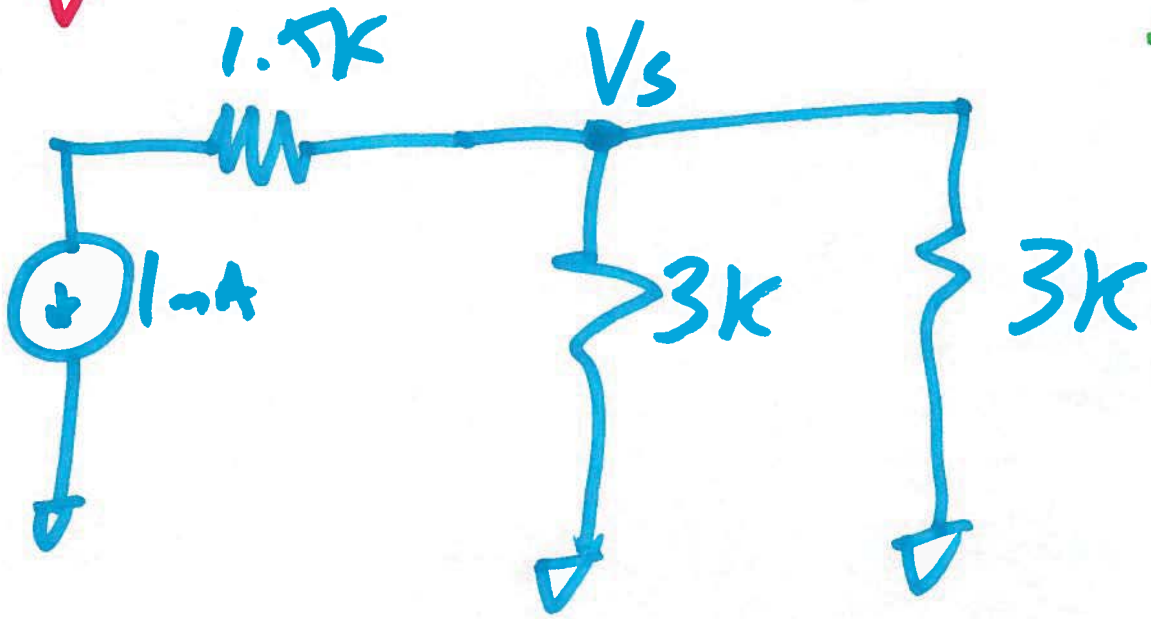
$$V_x - I_1 \cdot 1.5k$$

$$V_x = -750 \cdot (I_1 - I_2)$$



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

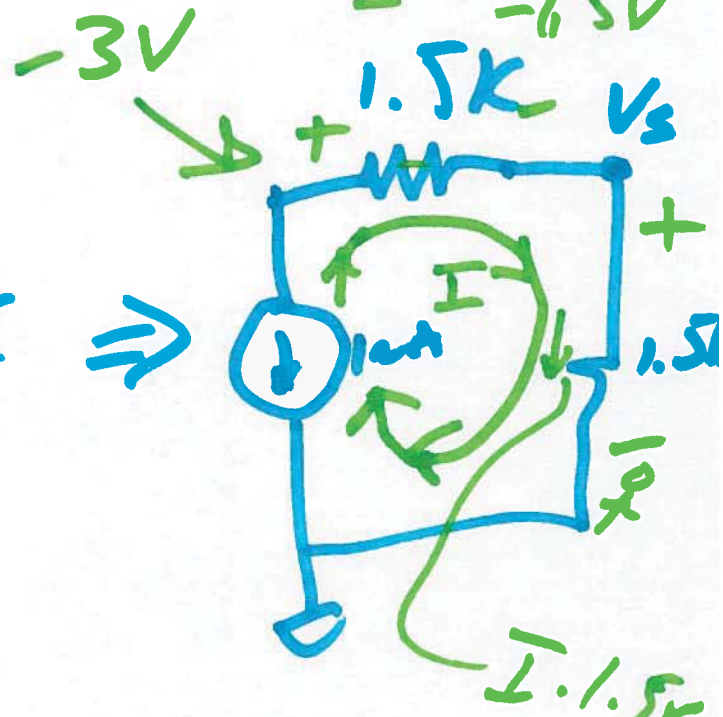
$$V_x = \frac{V_s}{2} = -.75V$$



$$V_s = I \cdot 1.5k$$

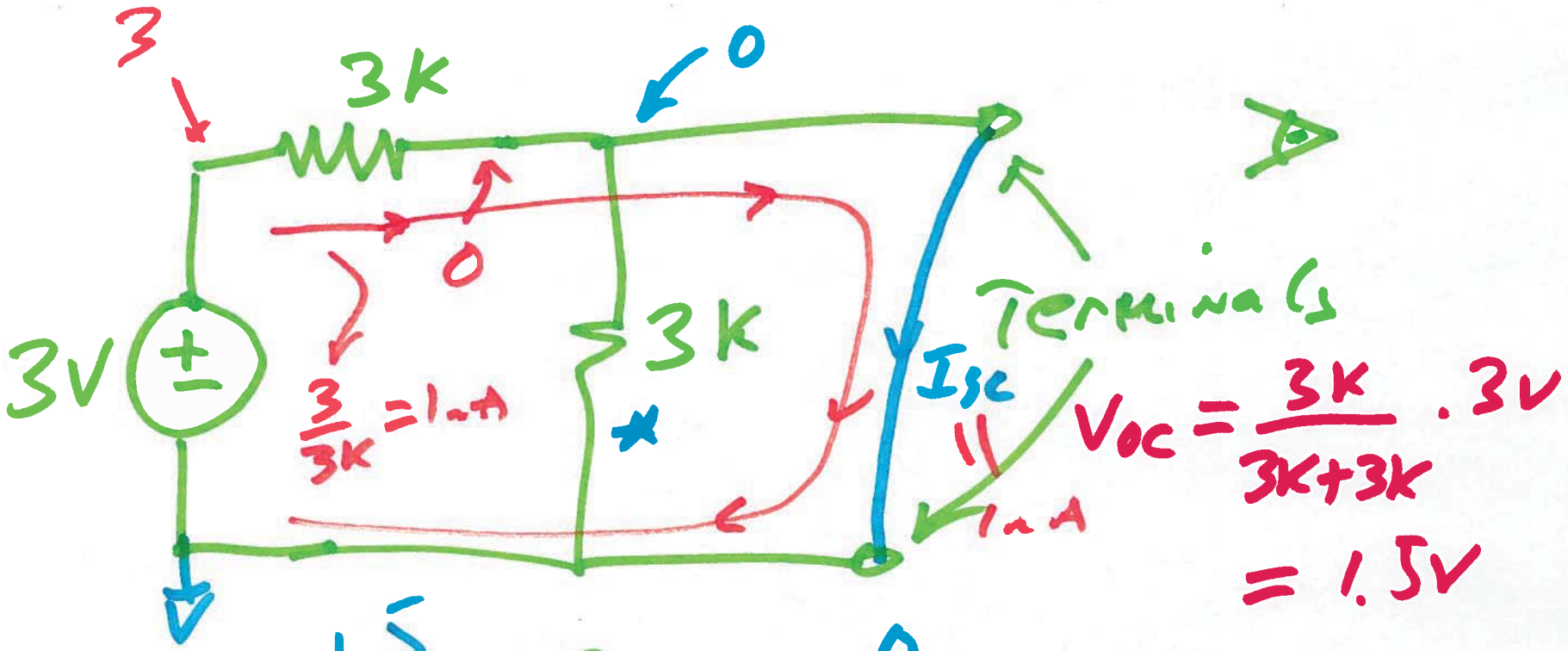
$$= -1.5V$$

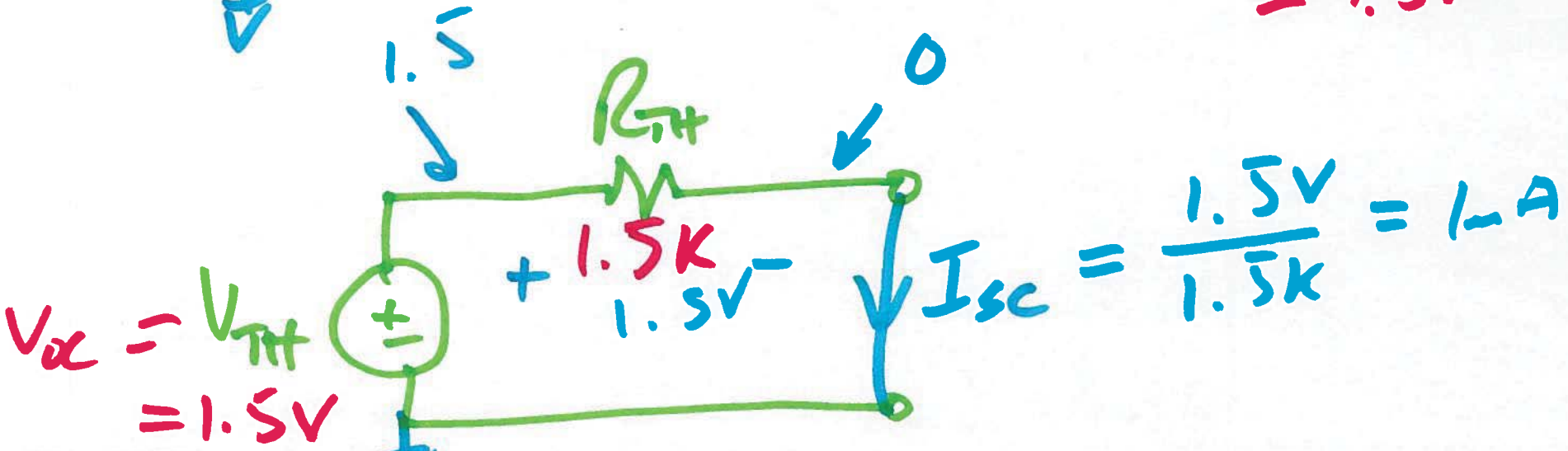
$I \cdot 1.5k = -1.5V$



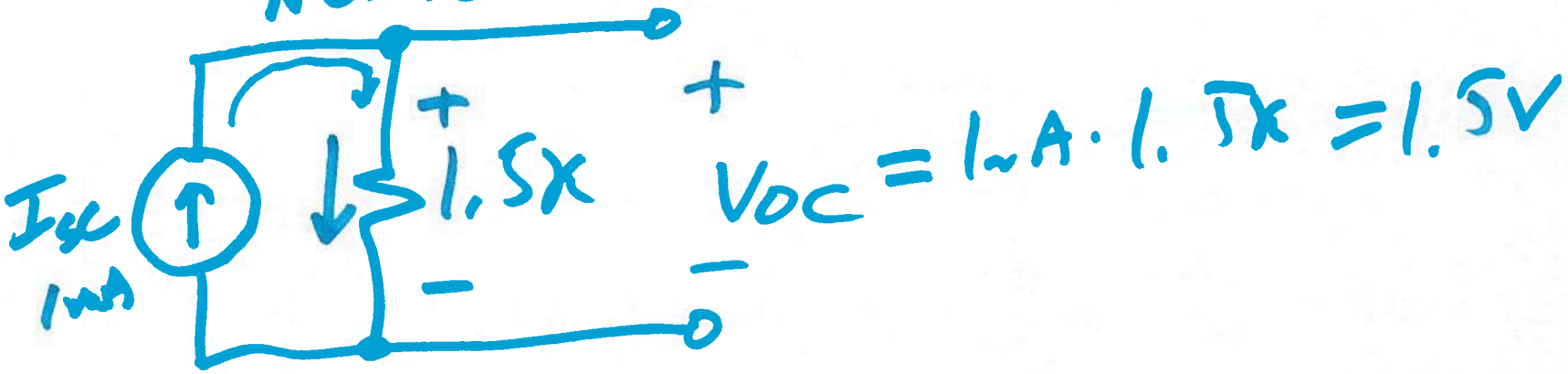
$$I = -1mA$$

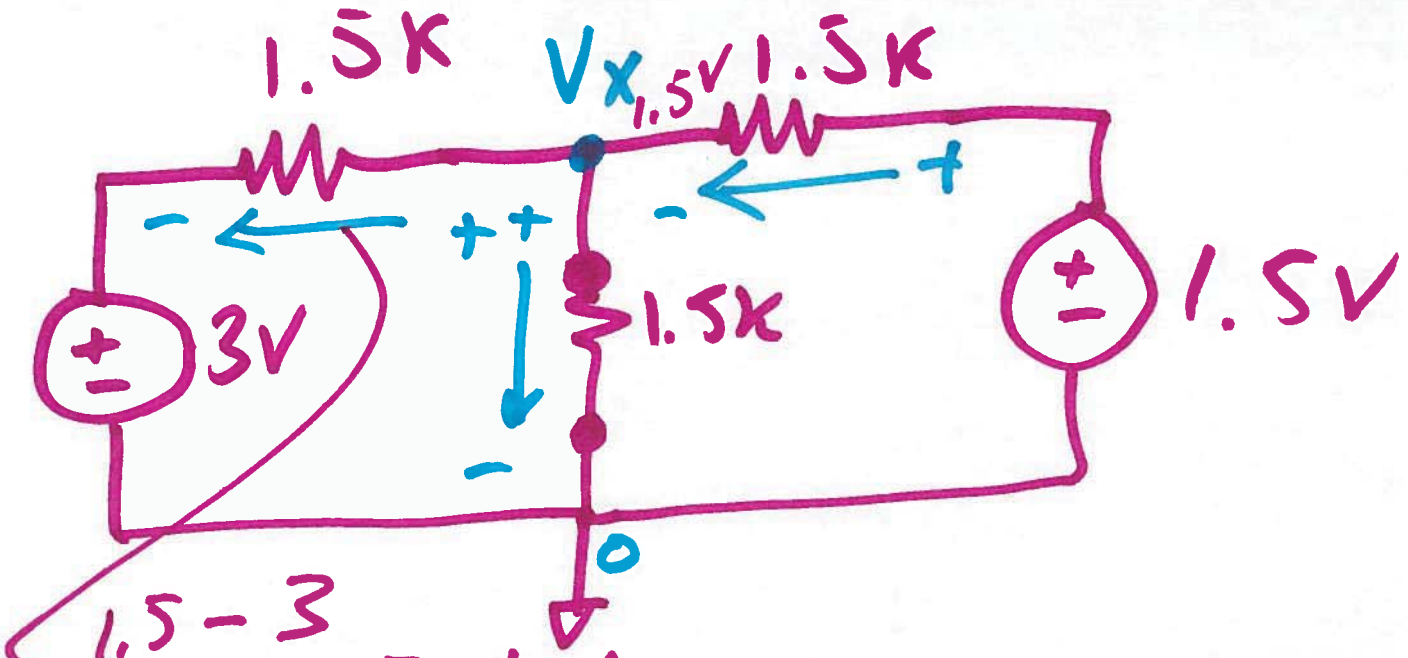
Thevenin's Theorem






THEVENIN EQ
1.5K
1.5V


NORTON'S EQUIVALENT
+
1.5K
−
+
$V_{OC} = 1mA \cdot 1.5K = 1.5V$
−



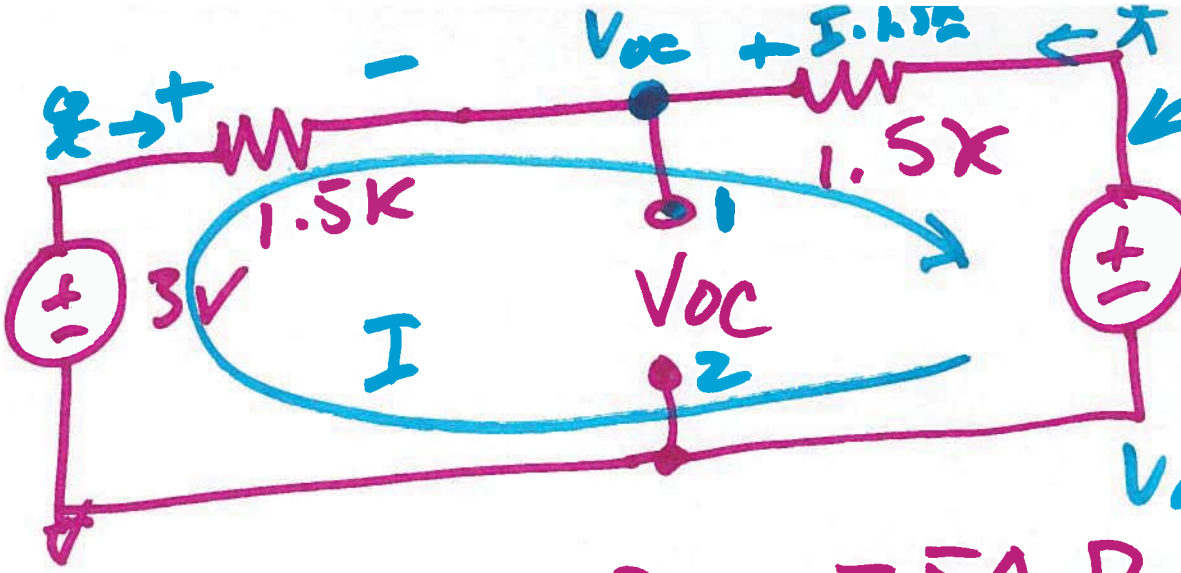
$$\frac{1.5-3}{1.5K} = -1mA$$

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

$$2V_x - 3 = 1.5 - V_x$$

$$3V_x = 4.5$$

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



V_{OC} $1.5 + 1.5k \cdot \frac{1}{3}mA$

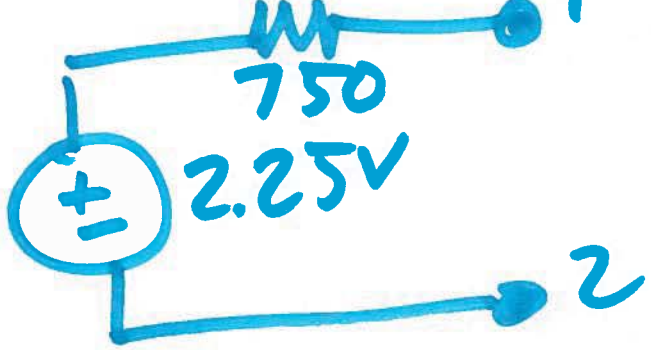
$R_{TH} = 750\,\Omega$ $\quad V_{OC} = 2.25V$

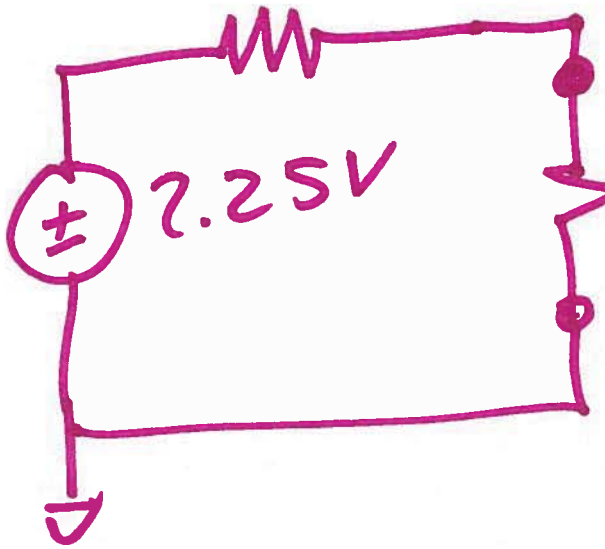
$-I \cdot 1.5k - I \cdot 1.5k - 1.5V + 3 = 0$

$-I \cdot 3k = -1.5V$

$I = \frac{1}{2}mA = 500\mu A$

$= 0.5mA$





$$V_x = 2.25 \cdot \frac{1.5K}{1.5K + 750}$$

$$= \cancel{2.25} \cdot \frac{1.5K}{\cancel{2.25K}}$$

$$= 1.5V$$

YAY!