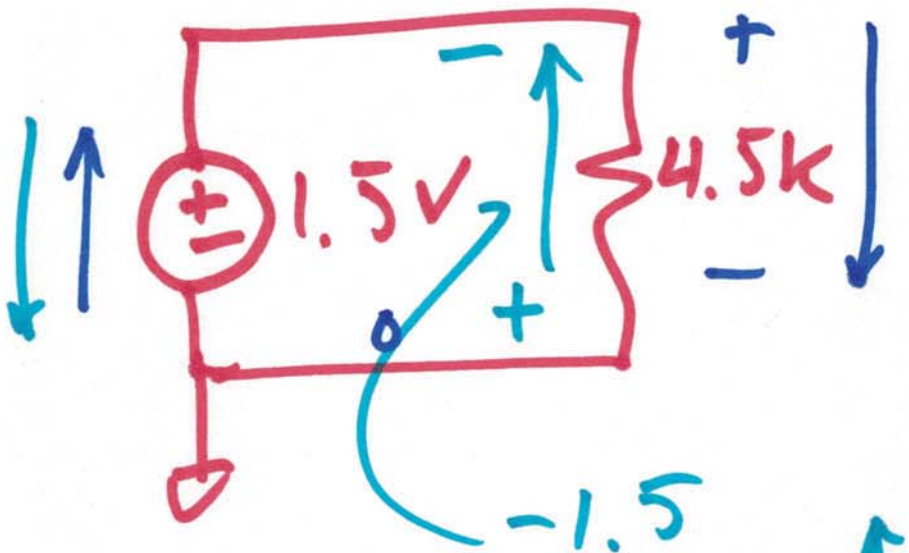
EE 220 Circuits 1

Lecture 13

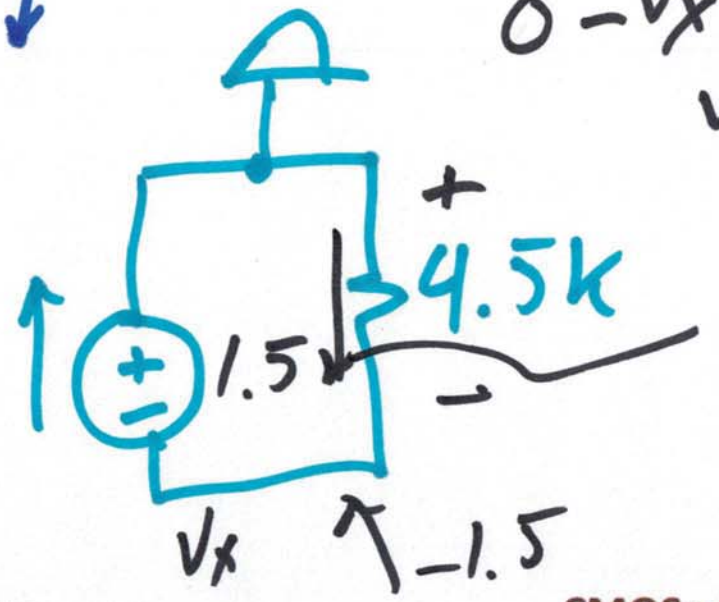
OCT. 9, 2019



$$\frac{1.5}{4.5k} = \frac{1.5}{4.5}\,mA = \frac{1}{3}\,mA$$

$$0 - V_x = 1.5$$

$$V_x = -1.5$$



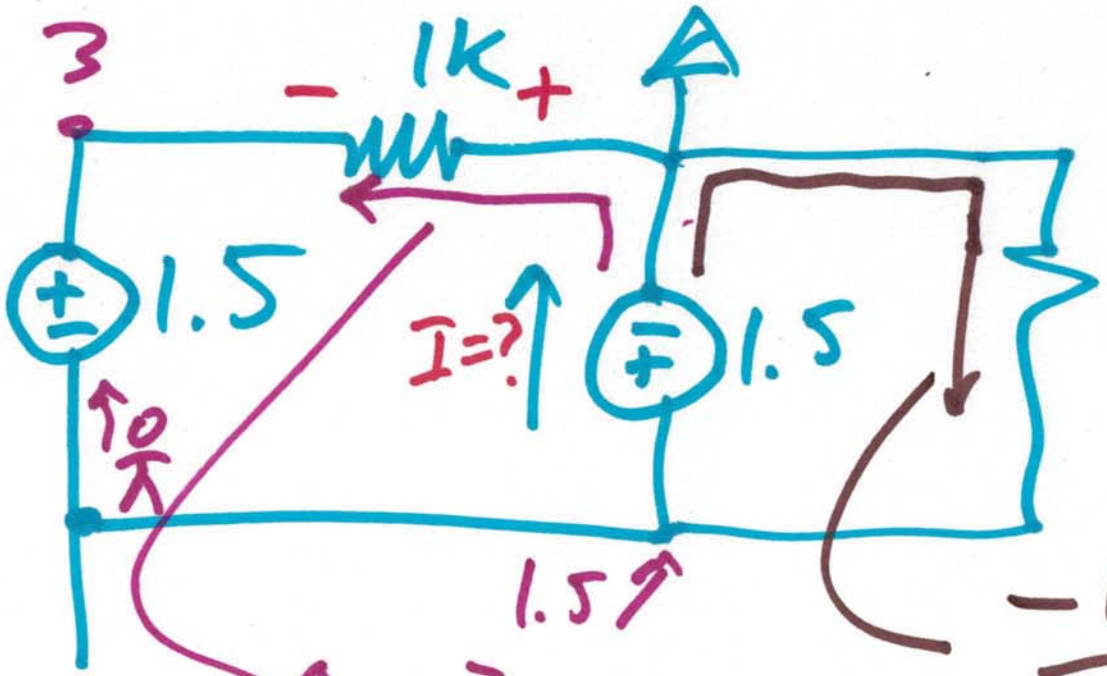
$$\frac{1.5}{4.5k} = \frac{1}{3}\,mA$$

$$\frac{1\,pool}{10h} + \frac{1\,pool}{20h} + \frac{1\,pool}{30} = \frac{1\,pool}{total}$$

$$0.1 + 0.05 + 0.0333 = \frac{1\,pool}{total}$$

$$0.1833 = \frac{1\,pool}{total}$$

$$total = \frac{1}{0.1833}\ hrs$$



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

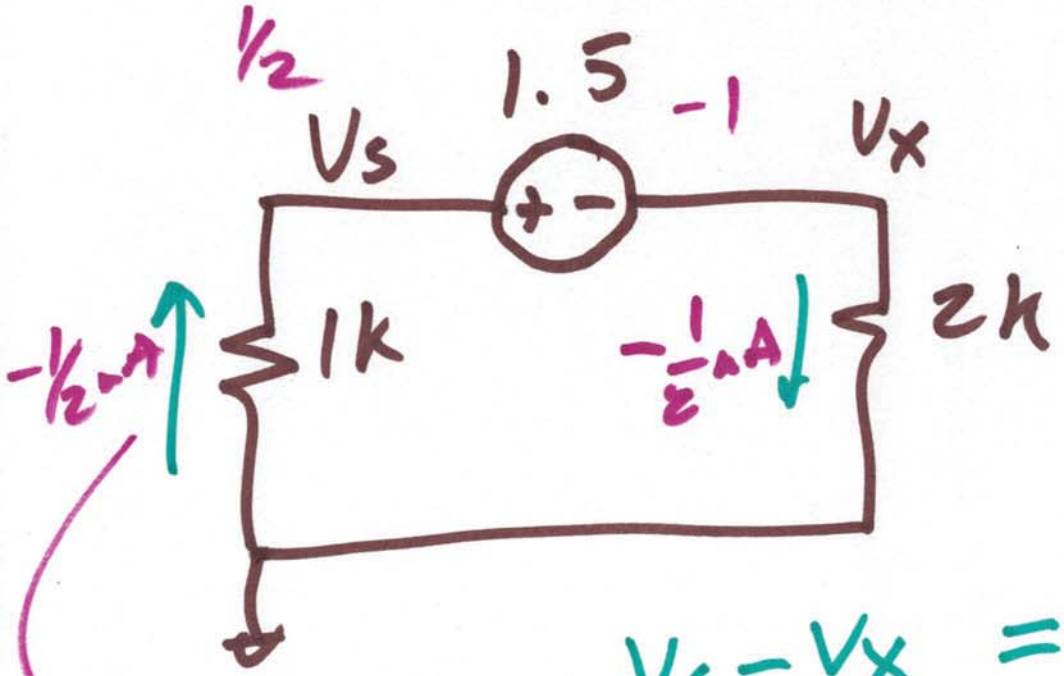
$$\frac{-1.5V}{2k} = -750\mu A$$

$$= -.75mA$$

$$= -\frac{3}{4}mA$$

$$I = -3mA + -\frac{3}{4}mA$$

$$\boxed{I = -3.75mA}$$



$V_x = -1V$

$V_s - V_x = 1.5V, \quad \frac{1}{2} - V_x = 1.5$

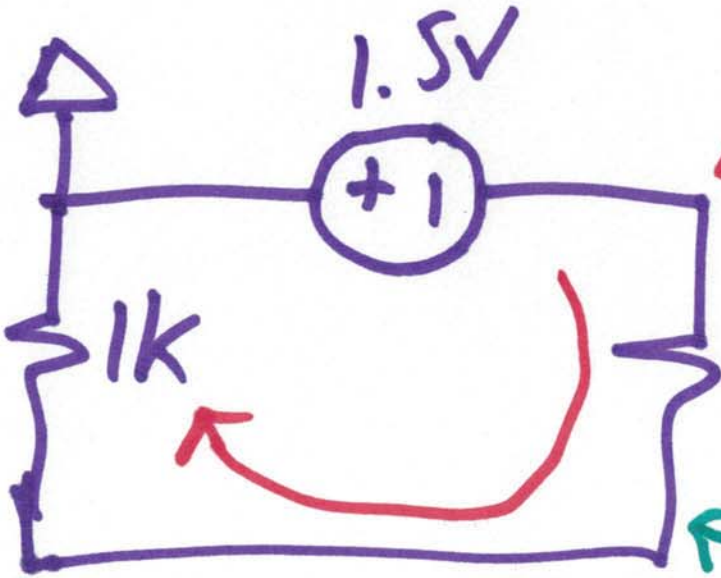
$\frac{0 - 1/2}{1k}$

$\frac{0 - V_s}{1k} = \frac{V_x}{2k} \rightarrow \frac{V_s - 1.5}{2k} = \frac{-V_s}{1k}$

$V_s - 1.5 = -2V_s$

$3V_s = 1.5$

$V_s = \frac{1}{2}V$



$-1.5 \cdot \frac{1k}{1k+2k}$

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

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

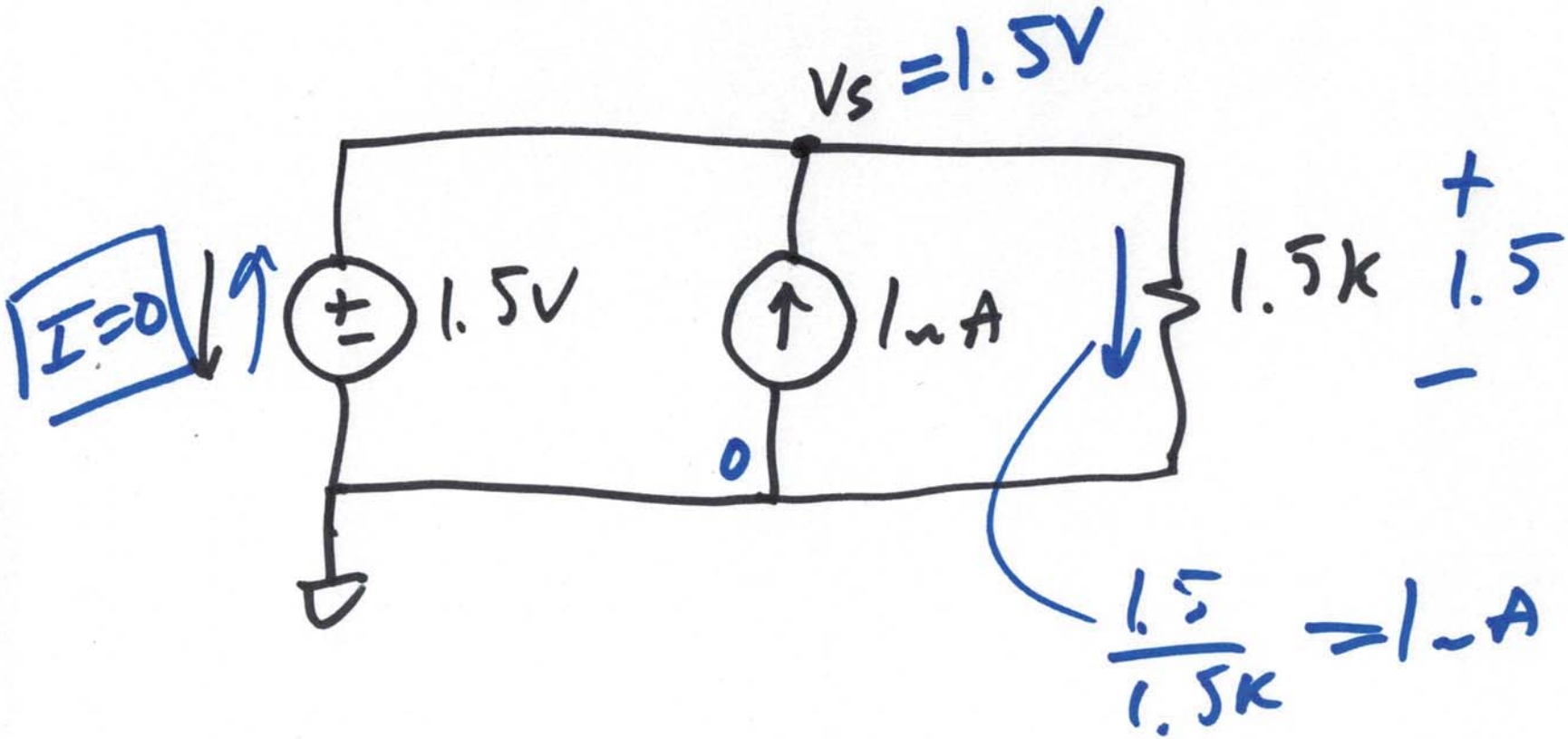
-1.5

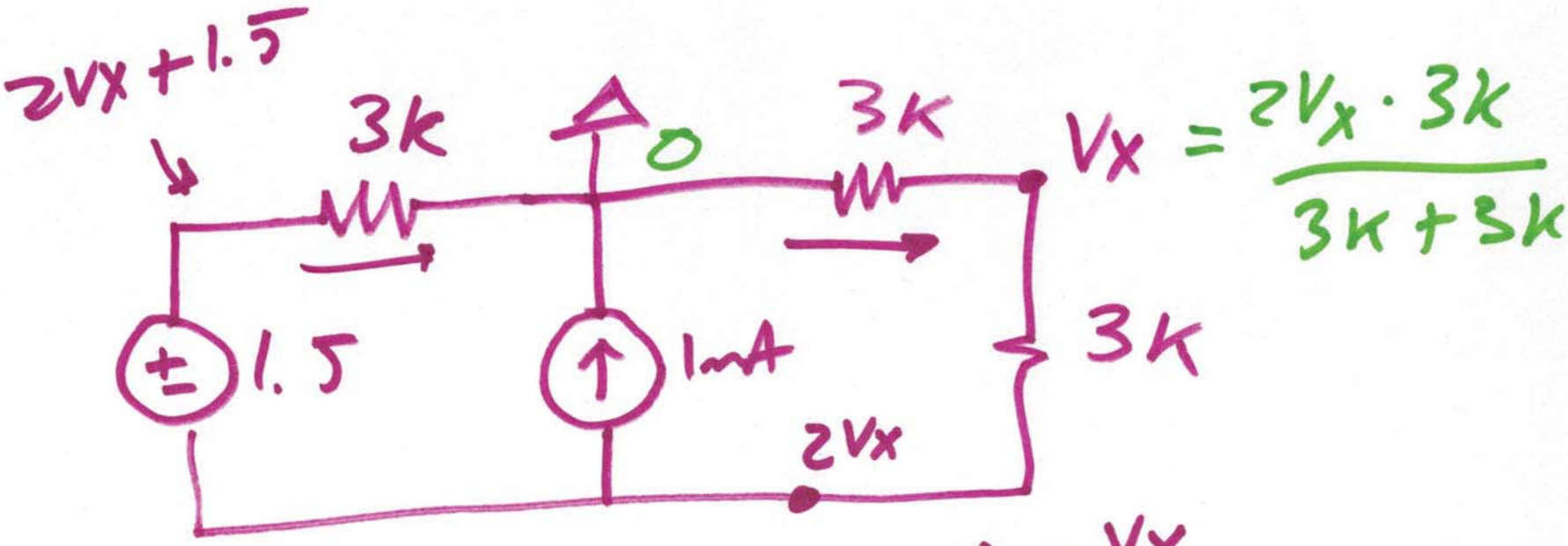
$+ -\frac{1}{2}mA \cdot 2k$

$= -1V$

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

5)


Vs = 1.5V
I = 0
1.5V
1mA
1.5k
+
1.5
−
0
1.5 / 1.5k = 1mA

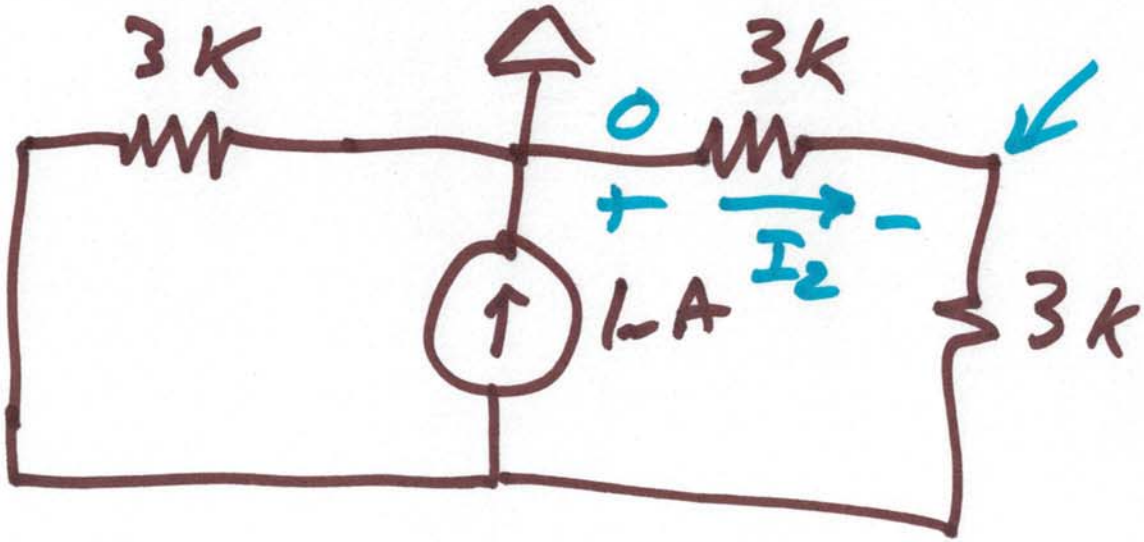


$$\frac{2V_x + 1.5}{3k} + 1mA = \frac{0 - V_x}{3k}$$

$$I = \frac{1.5}{9k}$$

$$V_{x1} = -I \cdot 3k$$

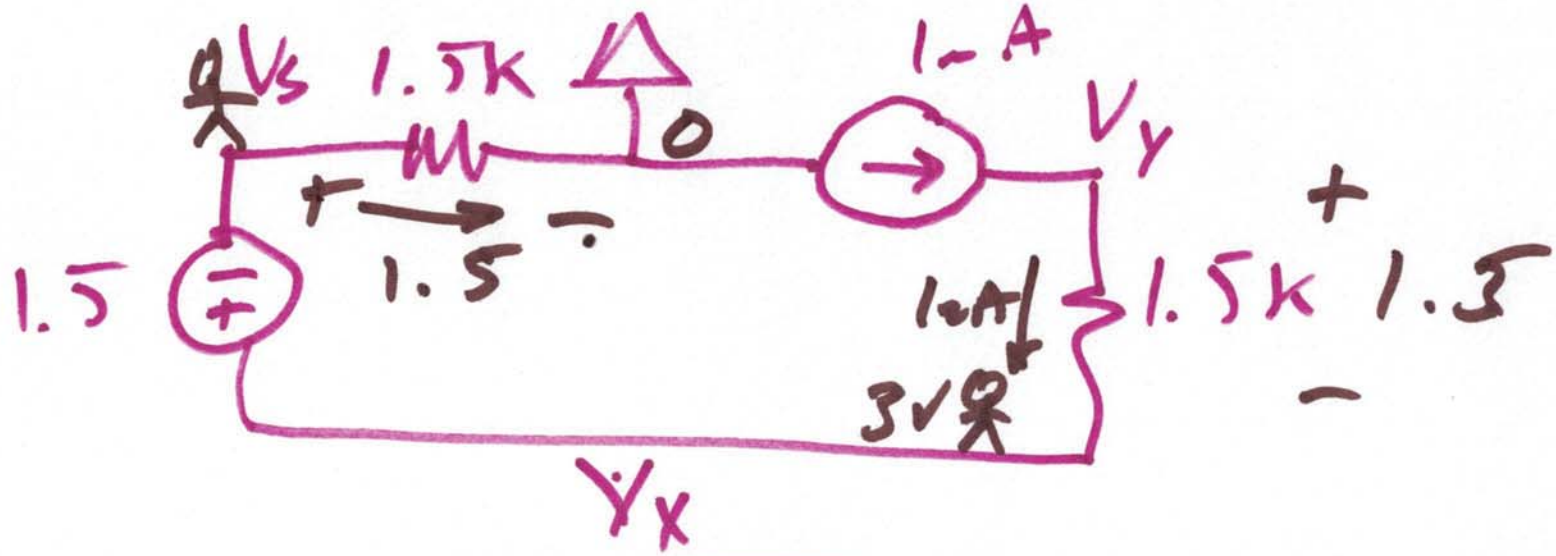
$$V_{x1} = -\frac{1}{2} V$$



$$I_2 = 1mA \cdot \frac{3K}{3K + 6K} = \frac{1}{3}mA$$

$$V_x = -\frac{1}{2} + (-1) = \boxed{-1.5V = V_x}$$

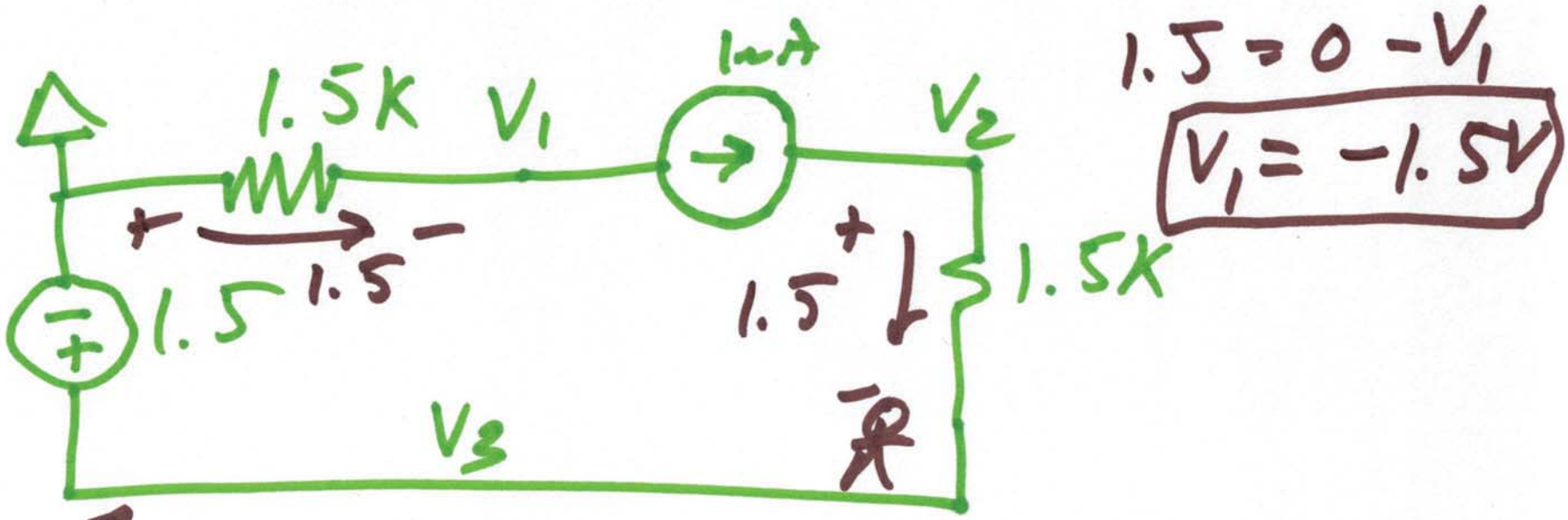
8)



$V_s = 1.5V$

$V_x = 3V$

$V_y = 4.5V$

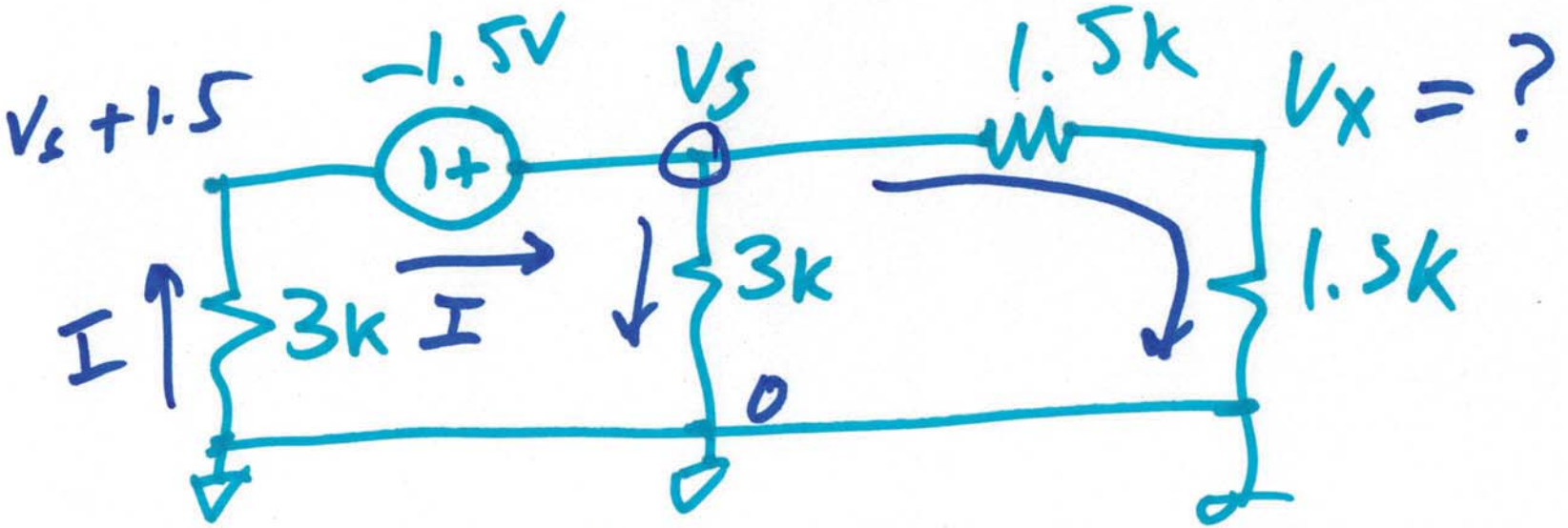


$1.5 = 0 - V_1$

$V_1 = -1.5V$

$V_3 = 1.5V$

$V_2 = 3V$

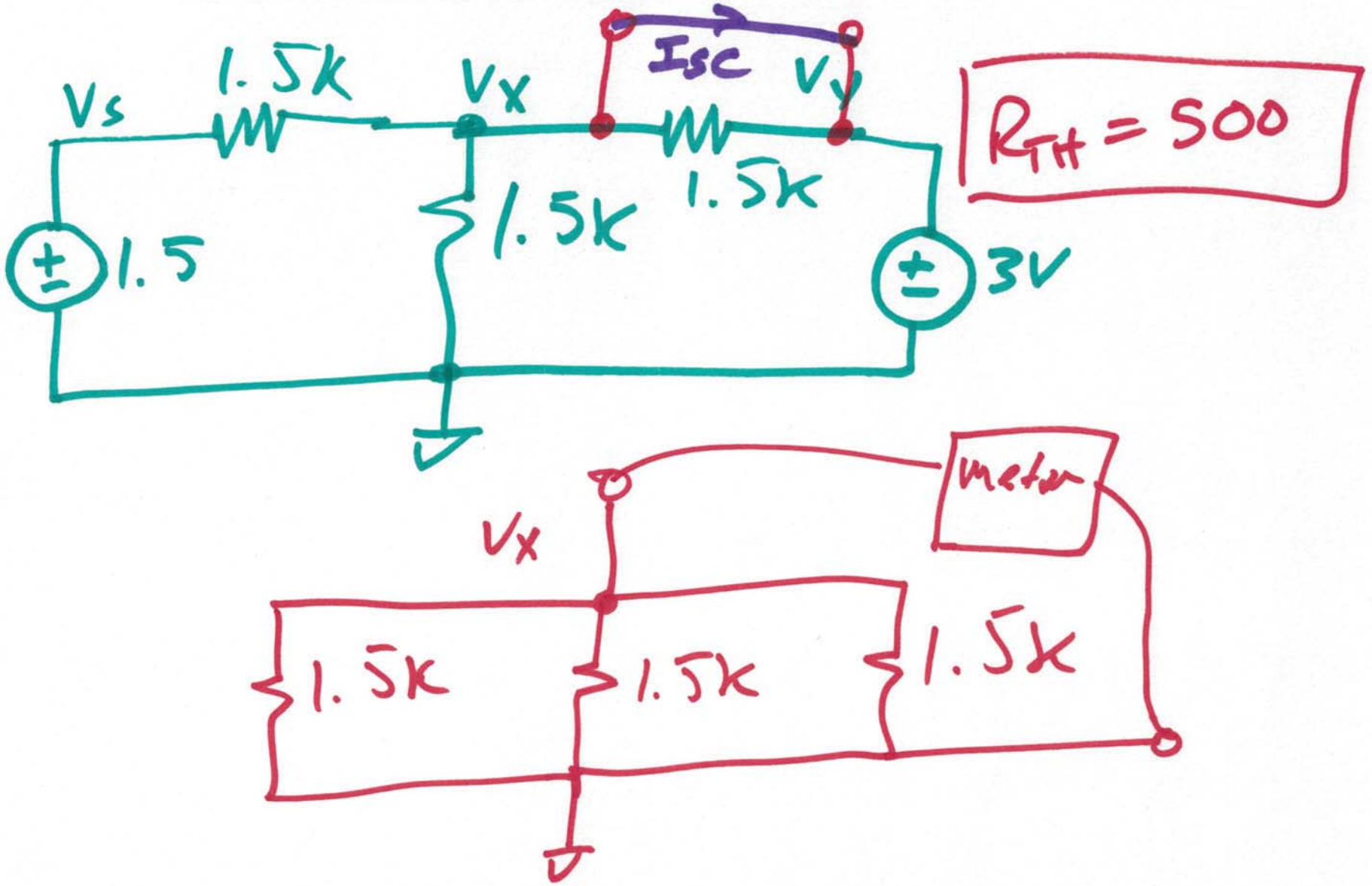


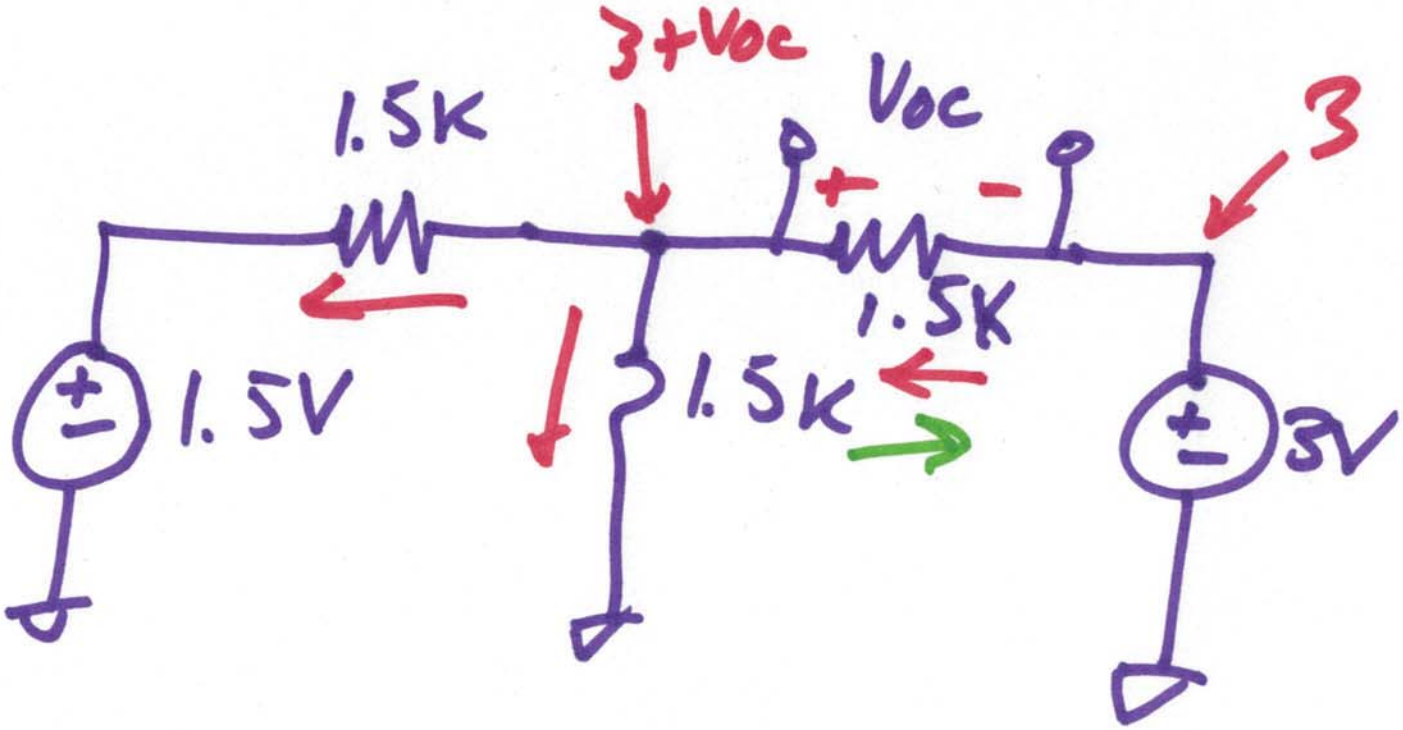
$$\frac{0-(V_s+1.5)}{3k} = \frac{V_s}{3k} + \frac{V_s}{3k}$$

$$-1.5 = 3V_s, \quad \boxed{V_s = -\frac{1}{2}V}$$

$$I = \frac{0-(V_s+1.5)}{3k} = \frac{V_s}{3k}$$

$$\boxed{I = \frac{-1}{3k} = -\frac{1}{3}mA}$$


Vs
1.5k
Vx
Isc
Vy
1.5k
1.5k
1.5k
1.5
3V
$R_{TH} = 500$
Vx
meter
1.5k
1.5k
1.5k



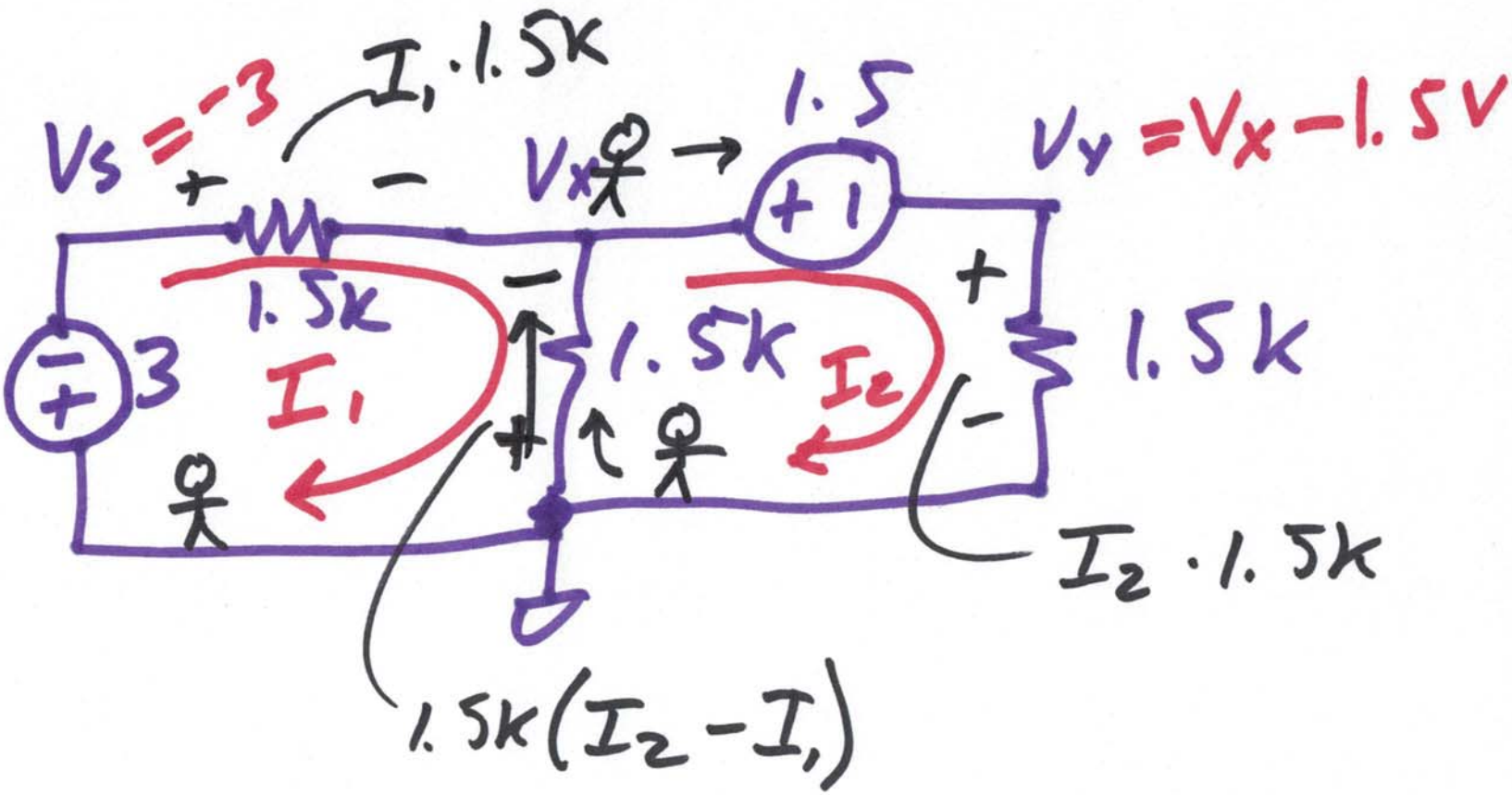
$$\frac{3+V_{oc}-1.5}{1.5K}+\frac{3+V_{oc}}{1.5K}=\frac{-V_{oc}}{1.5K}$$

$$+\frac{V_{oc}}{1.5K}=0$$

$$V_{TH}=V_{oc}$$

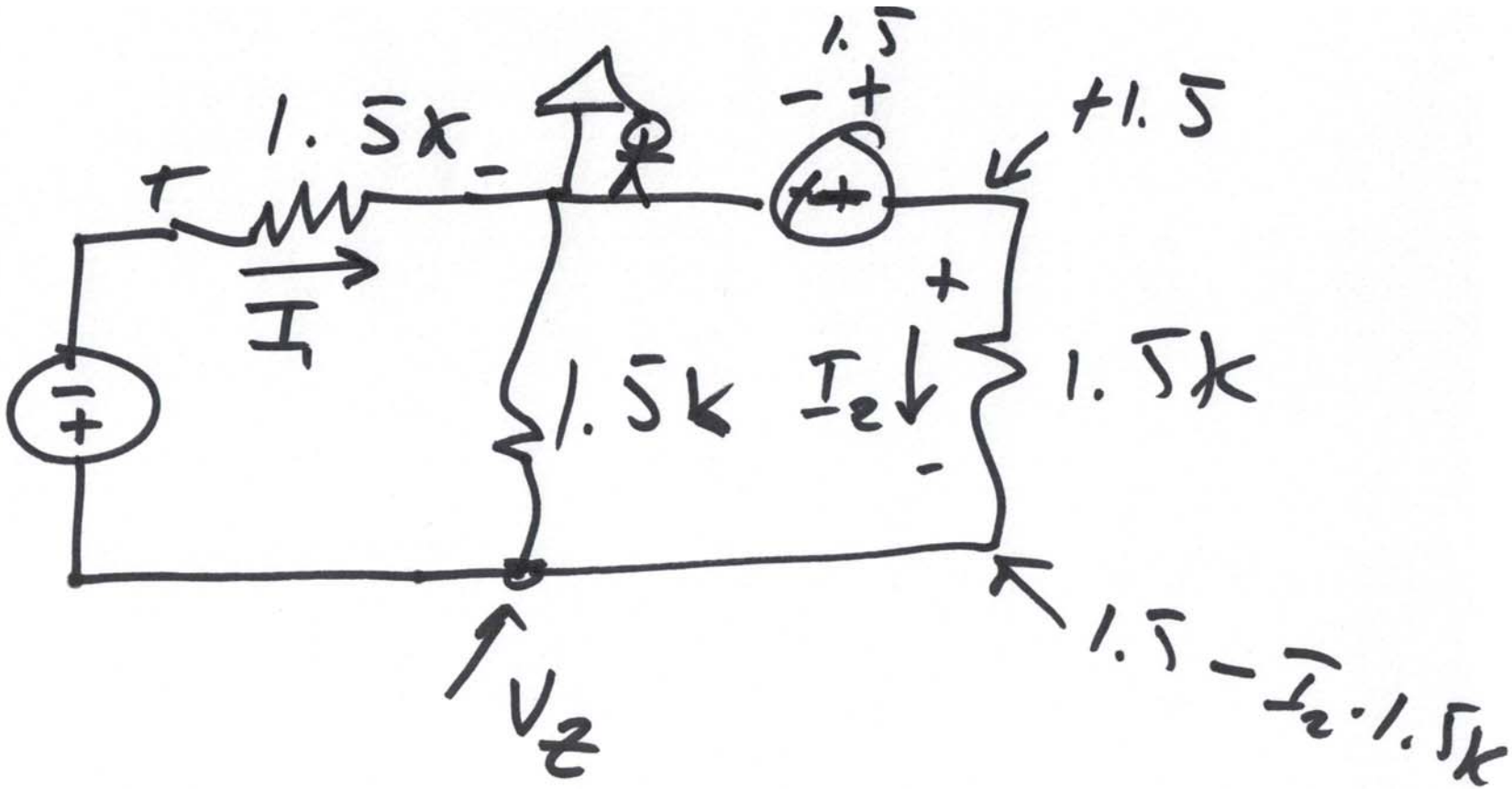
$$3V_{oc}=-4.5$$

$$V_{oc}=V_{TH}=-1.5V=V_{TH}$$



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

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


1.5
+1.5
1.5k
I
1.5k
I_2
1.5k
V_2
$1.5 - I_2 \cdot 1.5k$