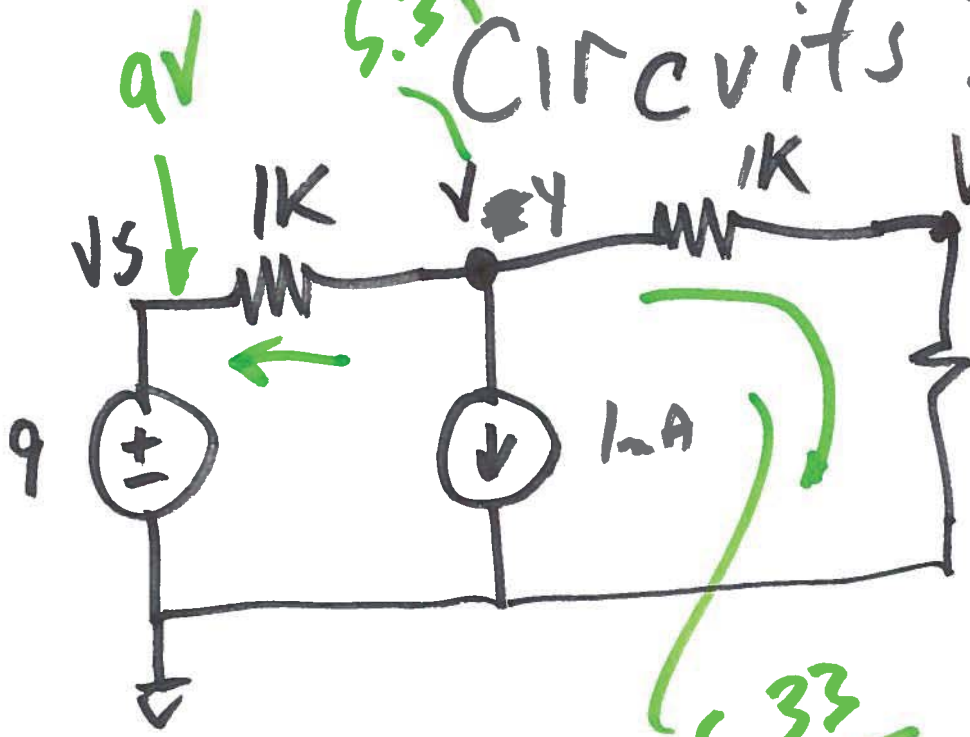
EE 220

Lecture 5

Circuits I



$V_x = V_y \cdot \frac{1}{2}$

$\frac{5.33}{2}$

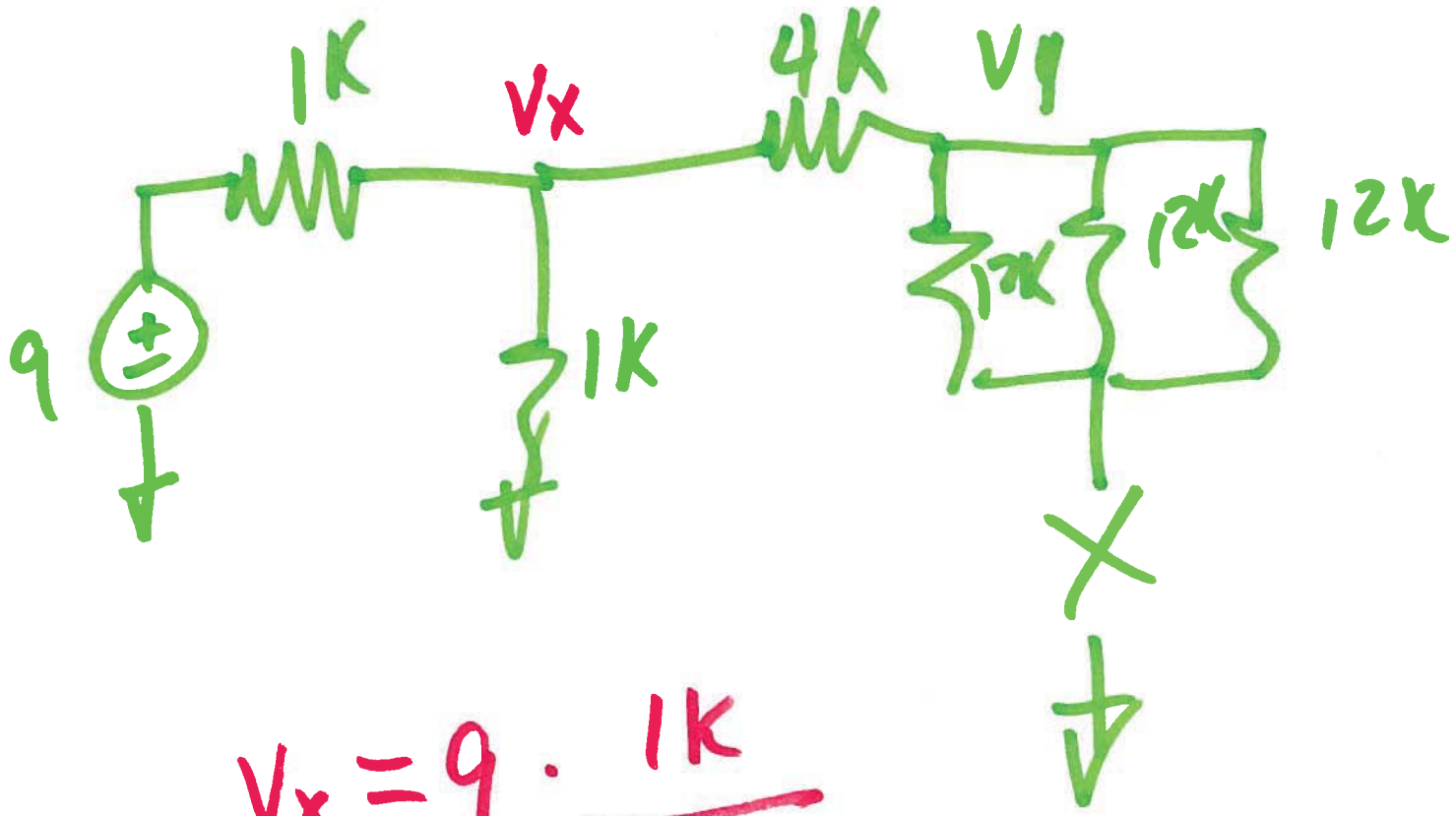
$\frac{V_y - 9}{1K} + 1mA + \frac{V_y}{2K} = 0$

$2(V_y - 9) + 2V + V_y = 0$

$3V_y = 16$

$V_y = 5.33V$

$\frac{5.33}{2K}$



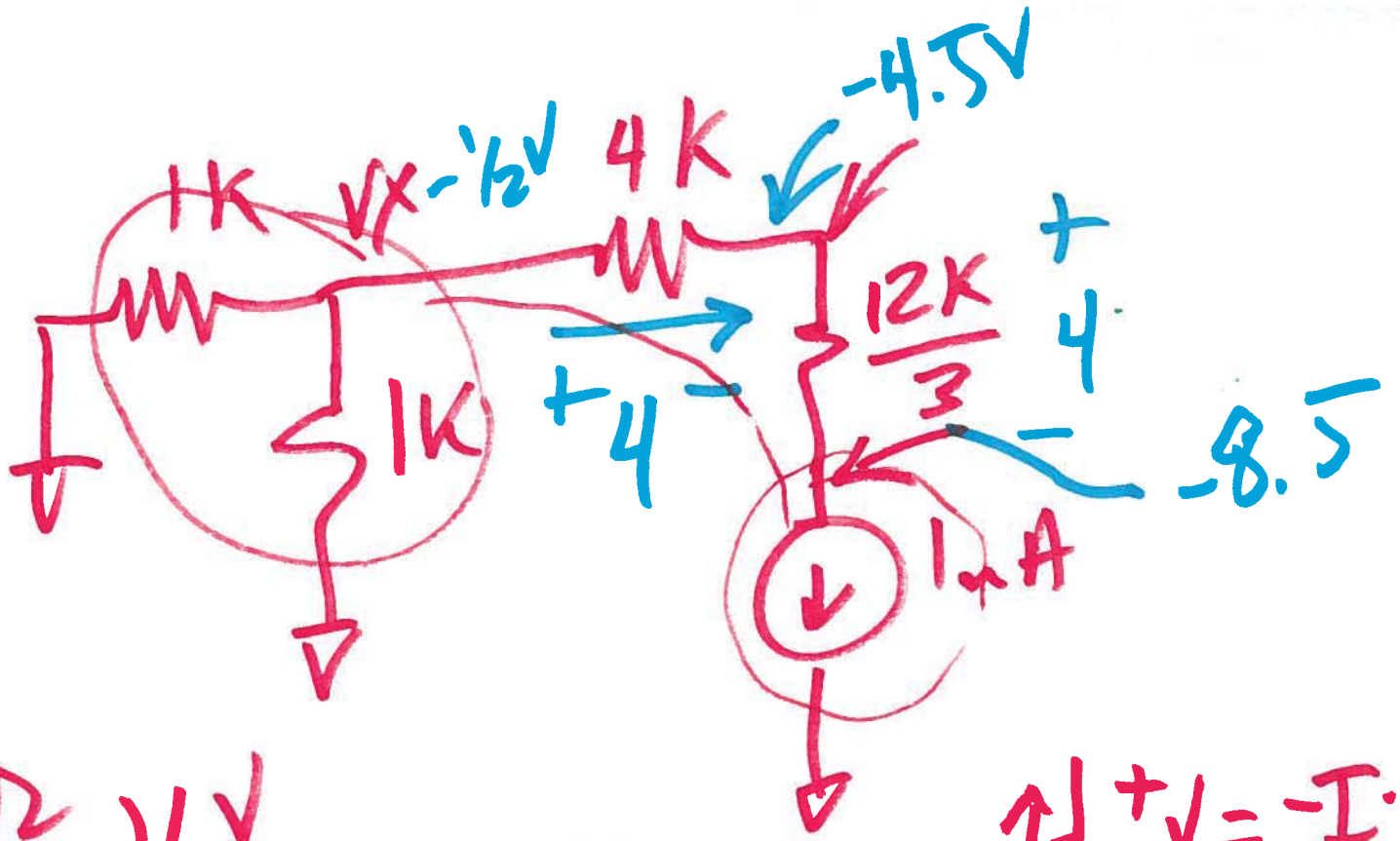
$$V_x = 9 \cdot \frac{1K}{1K + 1K}$$

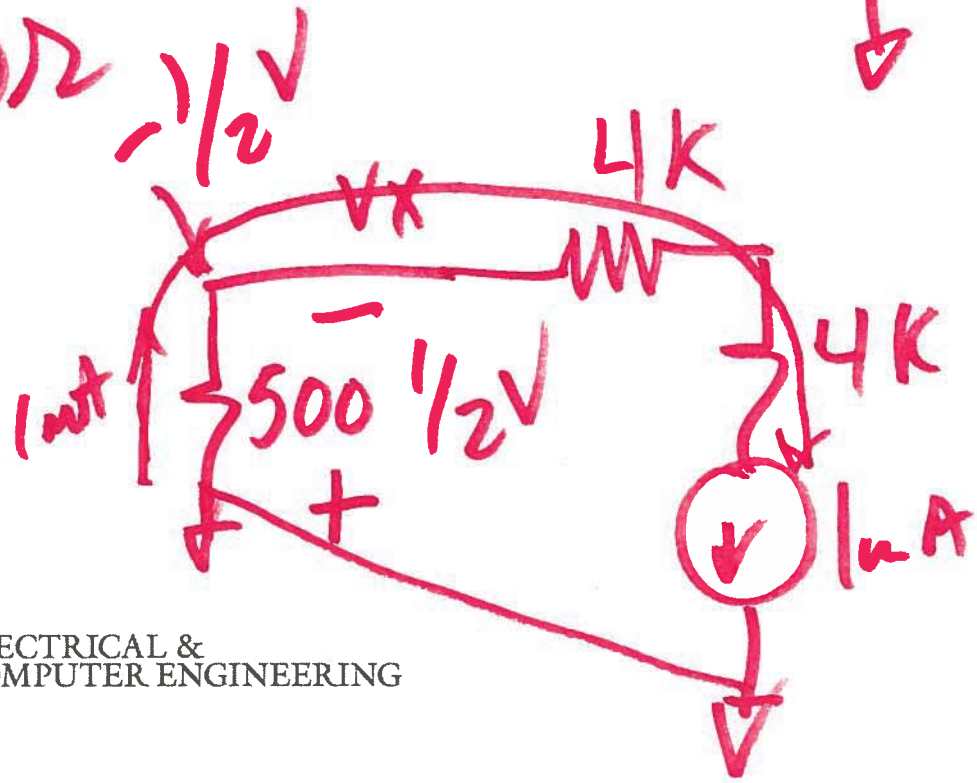
$$= 4.5V$$

$$\frac{1K \cdot 1K}{1K + 1K}$$

$$\frac{1 \cdot 10^6}{2 \cdot 10^3}$$

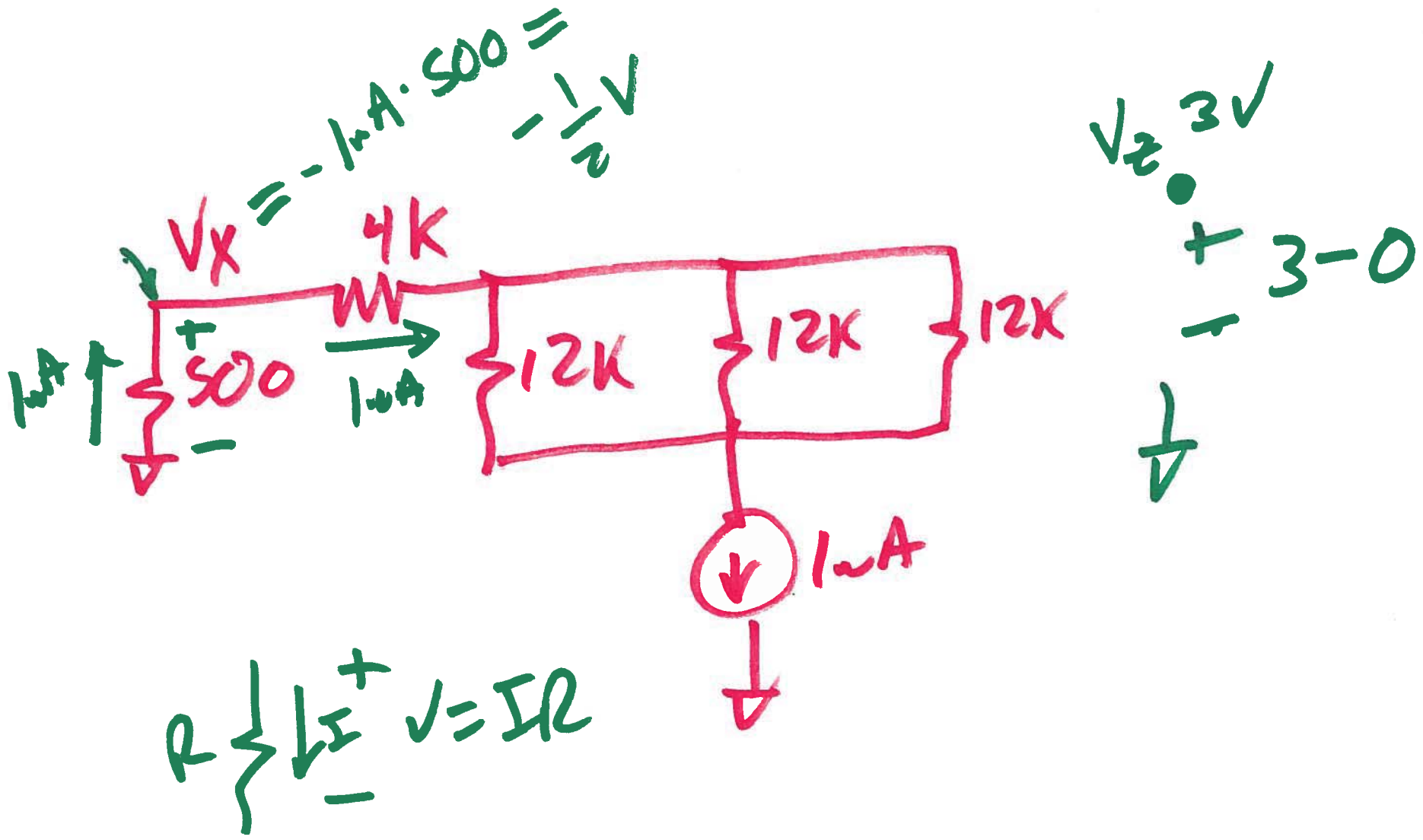
$= 500\Omega$



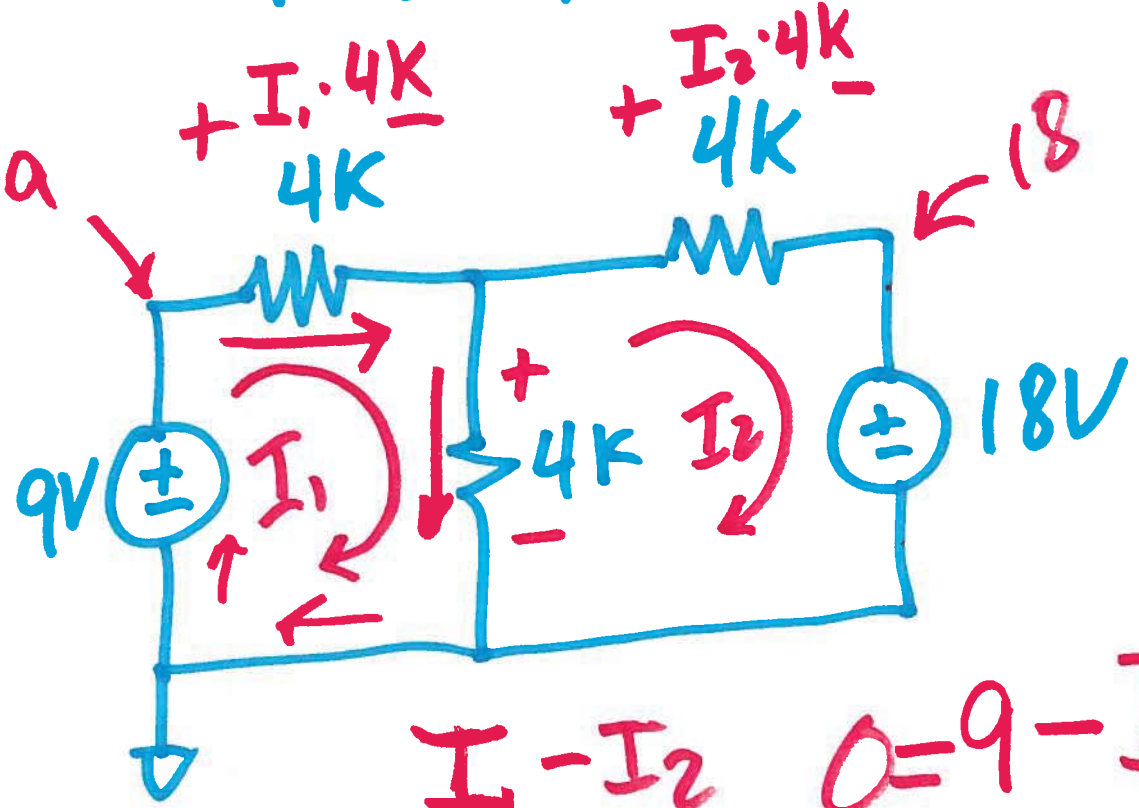


$\uparrow$ $+V = -I \cdot R$

$\downarrow$ $+V = I \cdot R$


$V_X = -1mA \cdot 500 = -\frac{1}{2}V$
V_X
4K
500
1mA
1mA
12K
12K
12K
1mA
V_Z 3V
+ 3-0 -
R
+ V -
V=IR

Mesh Analysis



$I_1 - I_2$ $\quad 0 = 9 - I_1 \cdot 4k - (I_1 - I_2) \cdot 4k$

$I_2 = 2I_1 - \frac{9}{4}mA$ $\quad (I_1 - I_2)4k - I_2 4k - 18 = 0$

$2.25mA$

$0 = \frac{9}{4}mA - 2I_1 + I_2$

$$I_1 - 2I_2 - \frac{18}{4K} = 0$$

$$I_1 - 2\left(2I_1 - \frac{9}{4}mA\right) - \frac{18}{4K} = 0$$

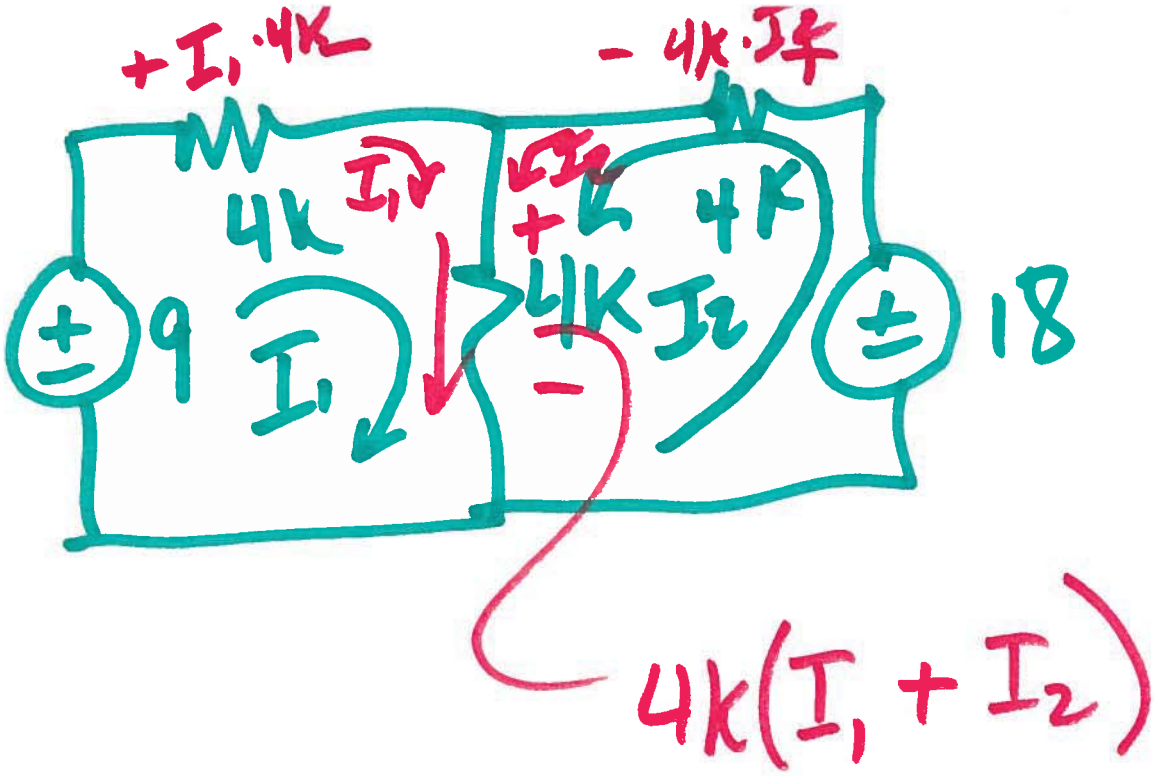
$$I_1 - 4I_1 + \cancel{\frac{18}{4}} - \cancel{\frac{18}{4K}} = 0$$

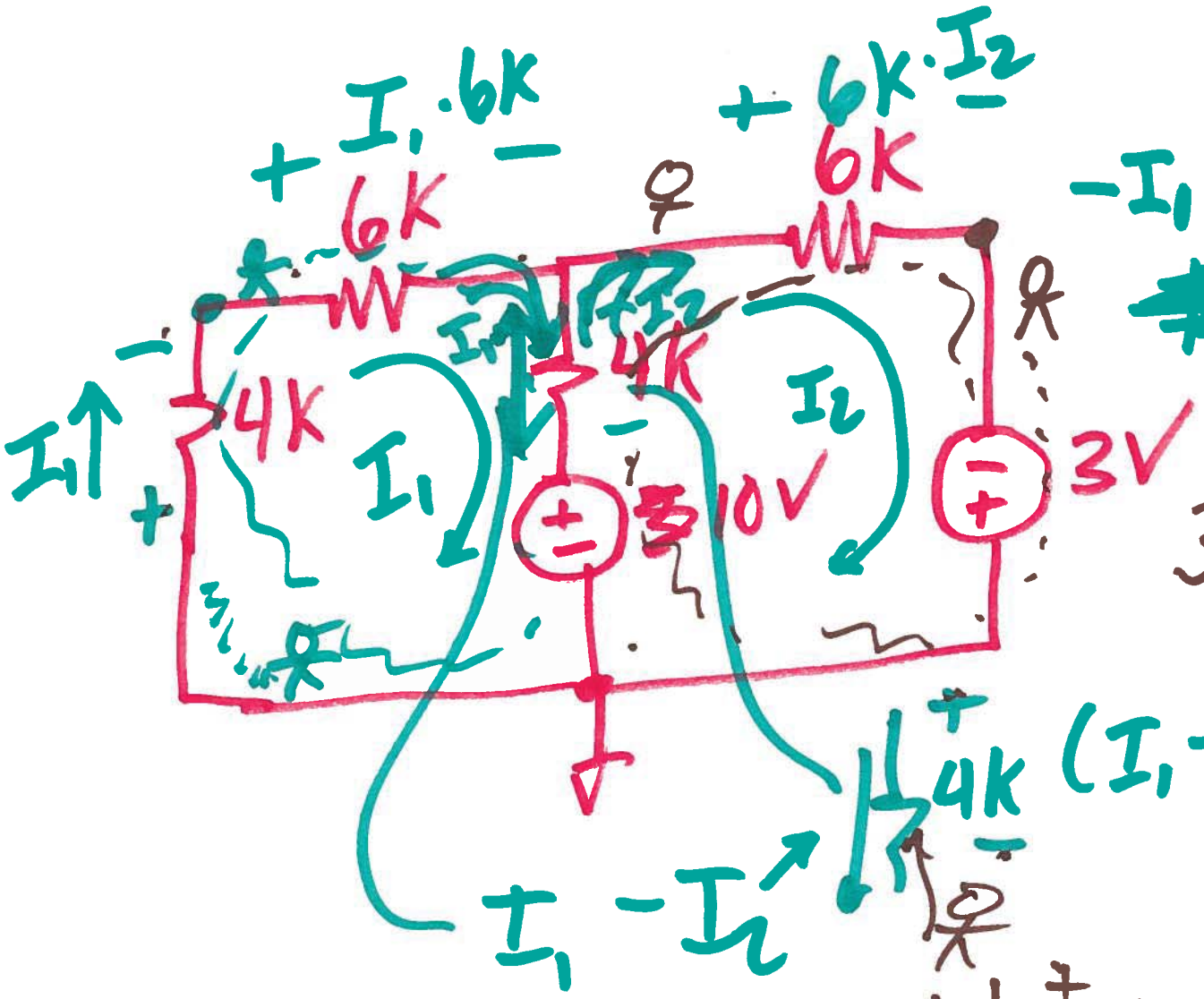
$$-3I_1 = 0$$

$$\boxed{I_1 = 0}$$

$$I_2 = 2I_1 - 2.25mA$$

$$\boxed{I_2 = -2.25mA}$$


+I1·4K
-4K·I2
4K
I1
+
4K
I2
9
I1
-
18
4K(I1 + I2)



$-I_1 \cdot 6k - (I_1 - I_2) \cdot 4k$

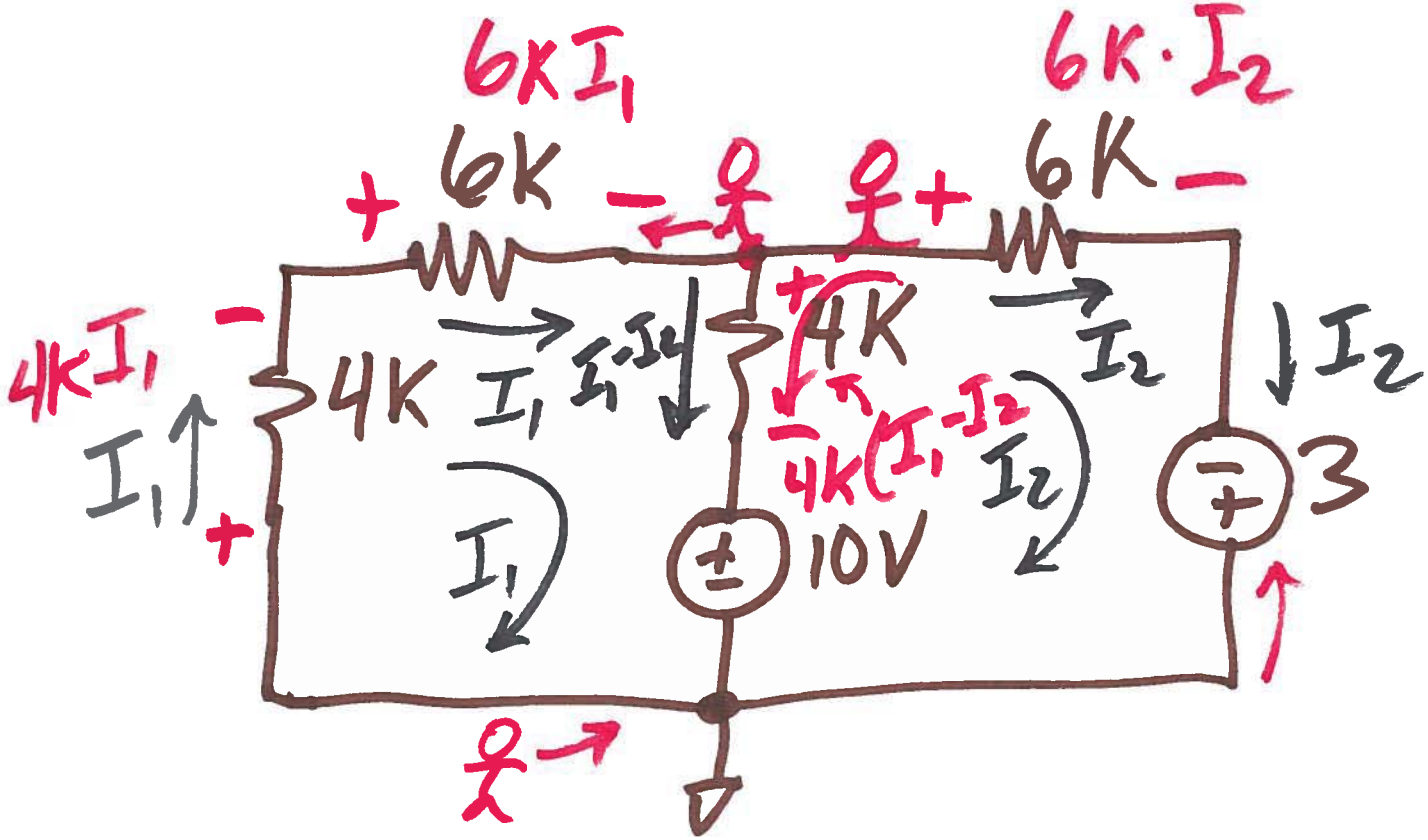
$-10V - I_1 \cdot 4k$

$= 0$

$3 + 10 + (I_1 - I_2) 4k$

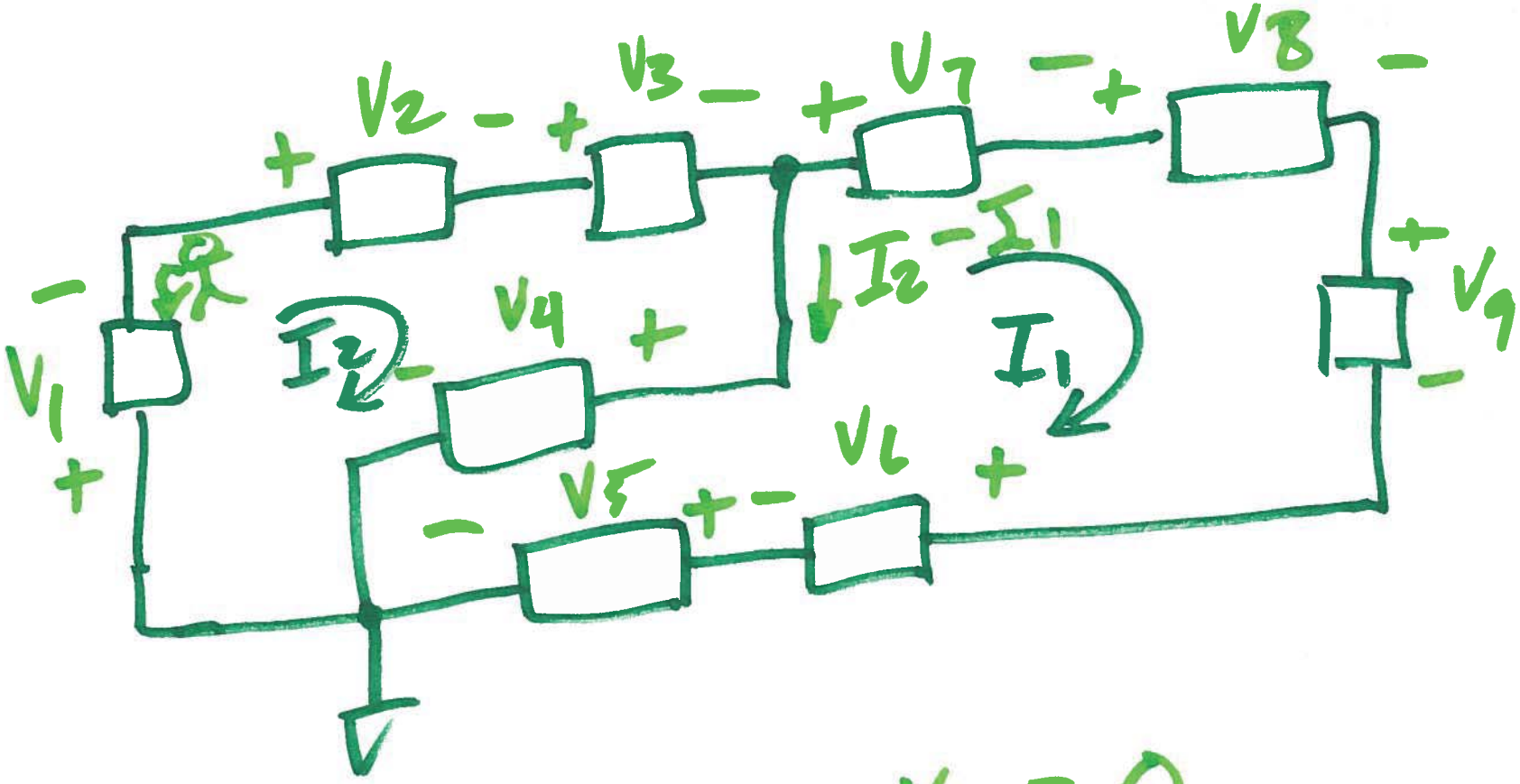
$-6k I_2 = 0$

$(I_1 - I_2) \cdot 4k$



$$6K I_1 + 4k I_1 + 10 + 4k(I_1 - I_2) = 0$$

$$-4k(I_1 - I_2) - 10 - 3 + 6K I_2 = 0$$



$$V_1 + V_4 + V_3 + V_2 = 0$$

$$V_1 + V_5 + V_6 + V_9 + V_8 + V_7 + V_3 + V_2 = 0$$