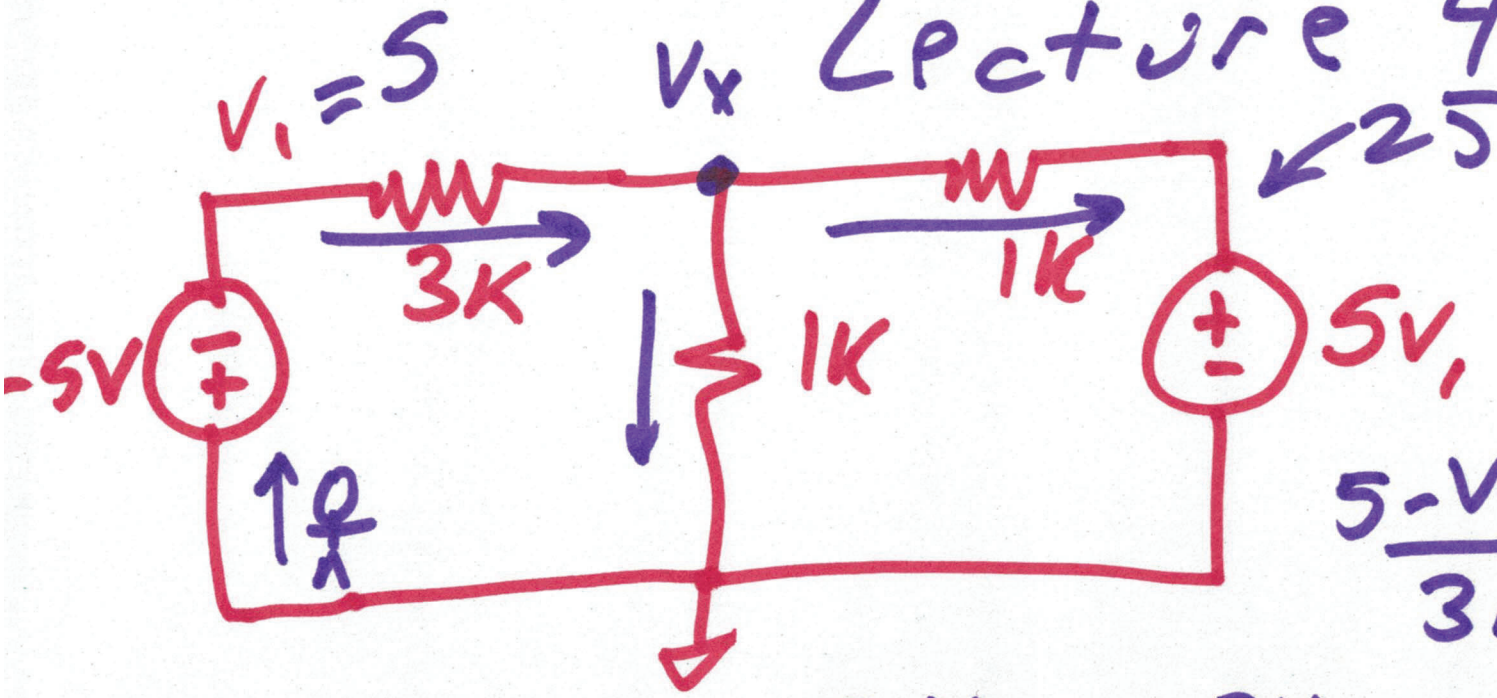
EE 221

Circuits II

February 1, 2021

Lecture 4



$$\frac{5 - V_x}{3k} = \frac{V_x}{1k} + \frac{V_x - 25}{1k}$$

$$5 - V_x = 3V_x + 3V_x - 75$$

$$80 = 7V_x \qquad V_x = \frac{80}{7} V$$

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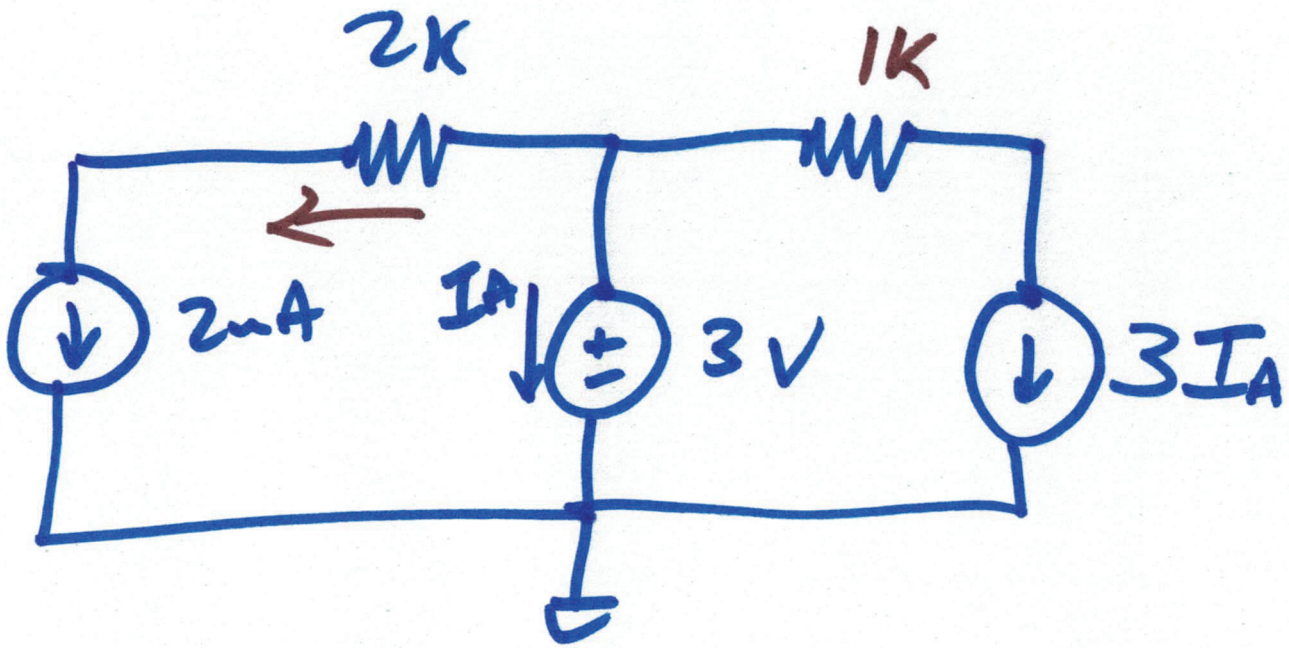
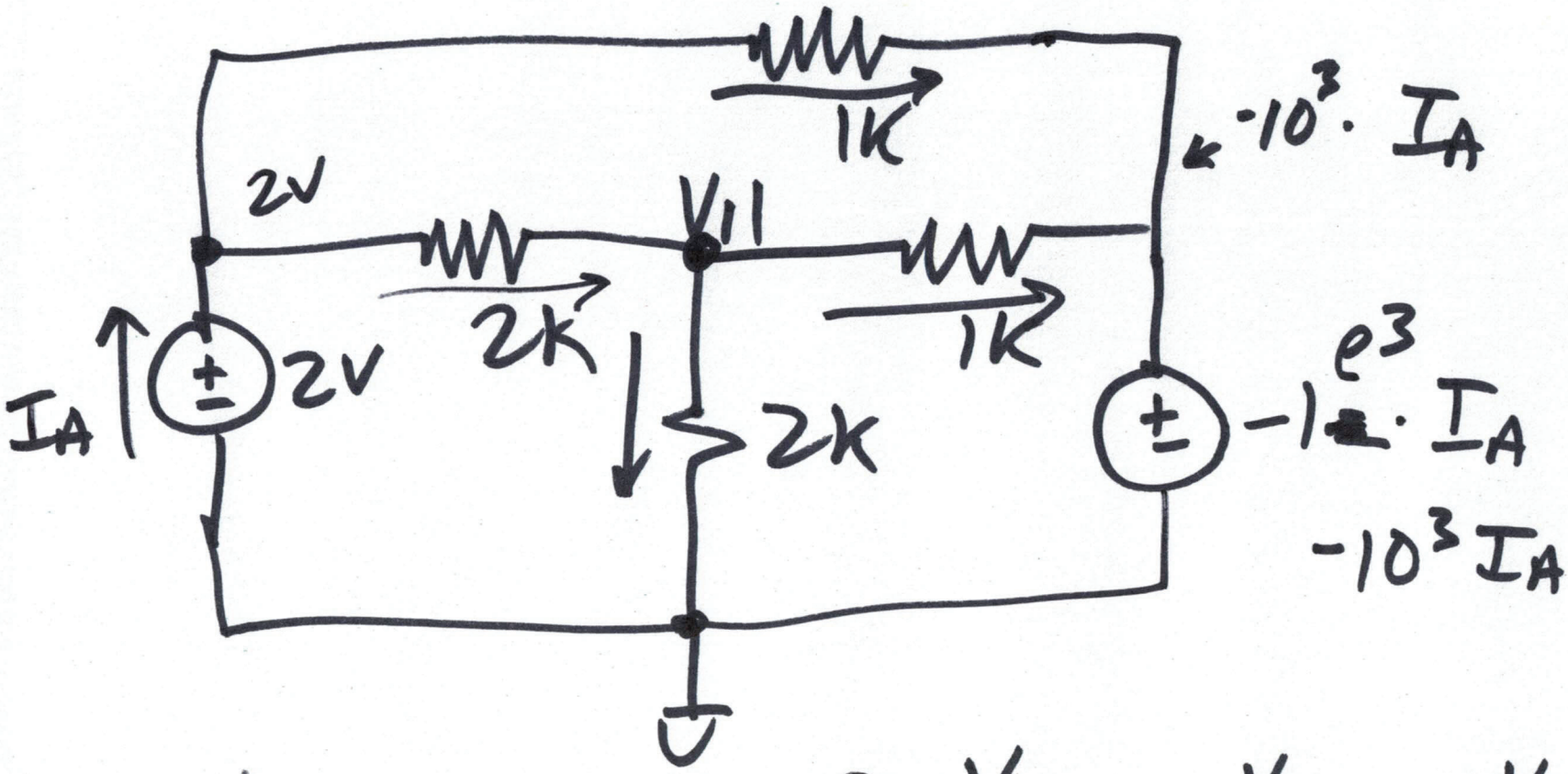
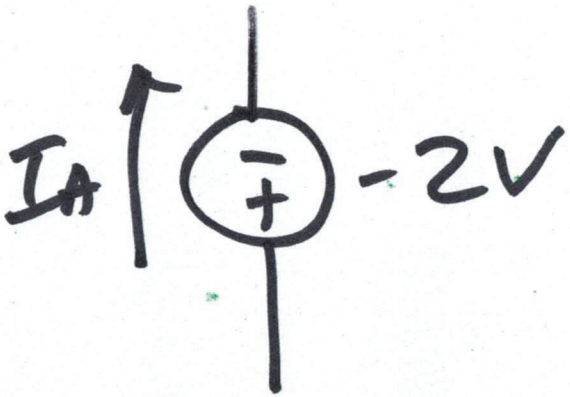


$$2\text{mA} + I_A + 3I_A = 0$$

$$4I_A = -2\text{mA}$$

$$I_A = -\frac{1}{2}\text{mA} = -500\mu\text{A}$$





$$\frac{2 - V_{11}}{2k} = \frac{V_{11}}{2k} + \frac{V_{11} - (-10^3 I_A)}{1k}$$

$$I_A = \frac{2 - V_{11}}{2k} + \frac{2 - (-10^3 I_A)}{1k}$$

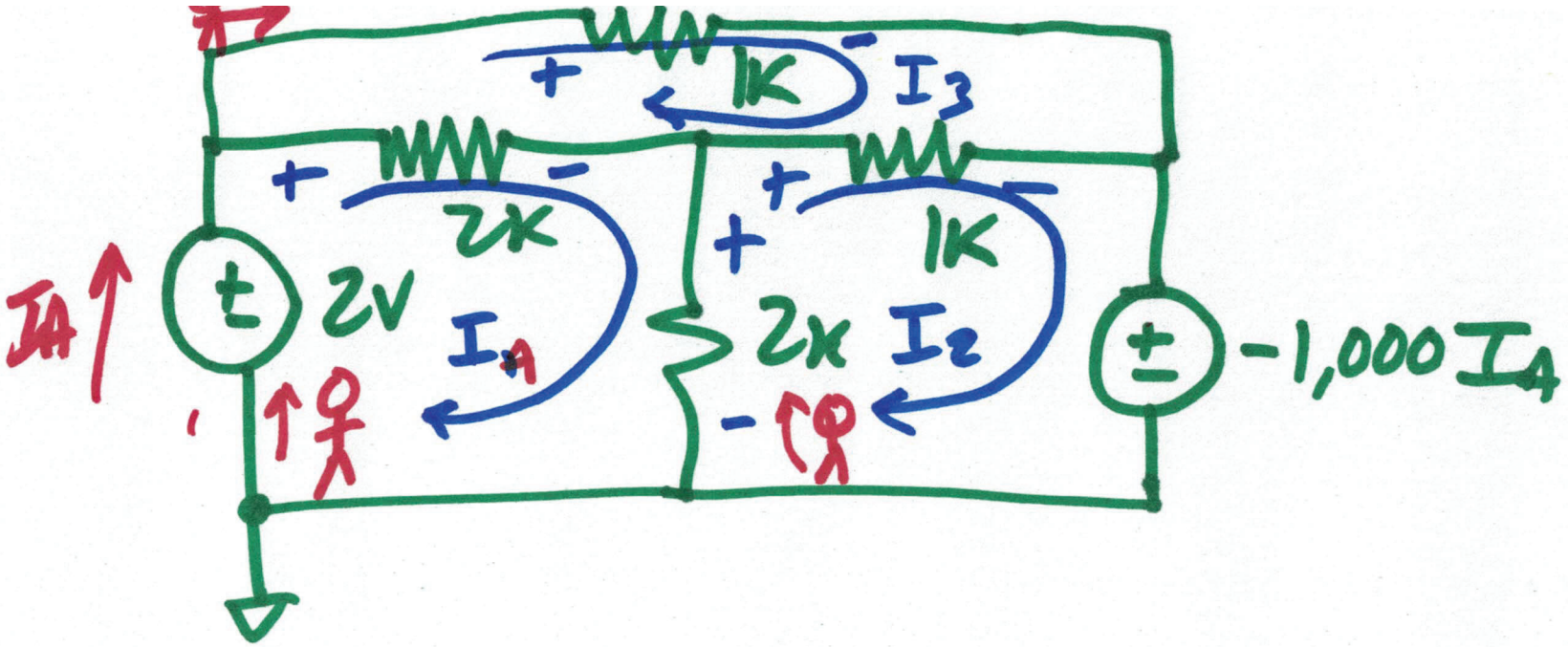
$$2 - V_{11} = V_{11} + 2V_{11} + 2{,}000 I_A$$

$$2000 I_A = 2 - V_{11} + R_4 + 2000 I_A$$

$$\boxed{V_{11} = 6\,V}$$

$$-4 = 6 + 12 + 2{,}000 I_A$$

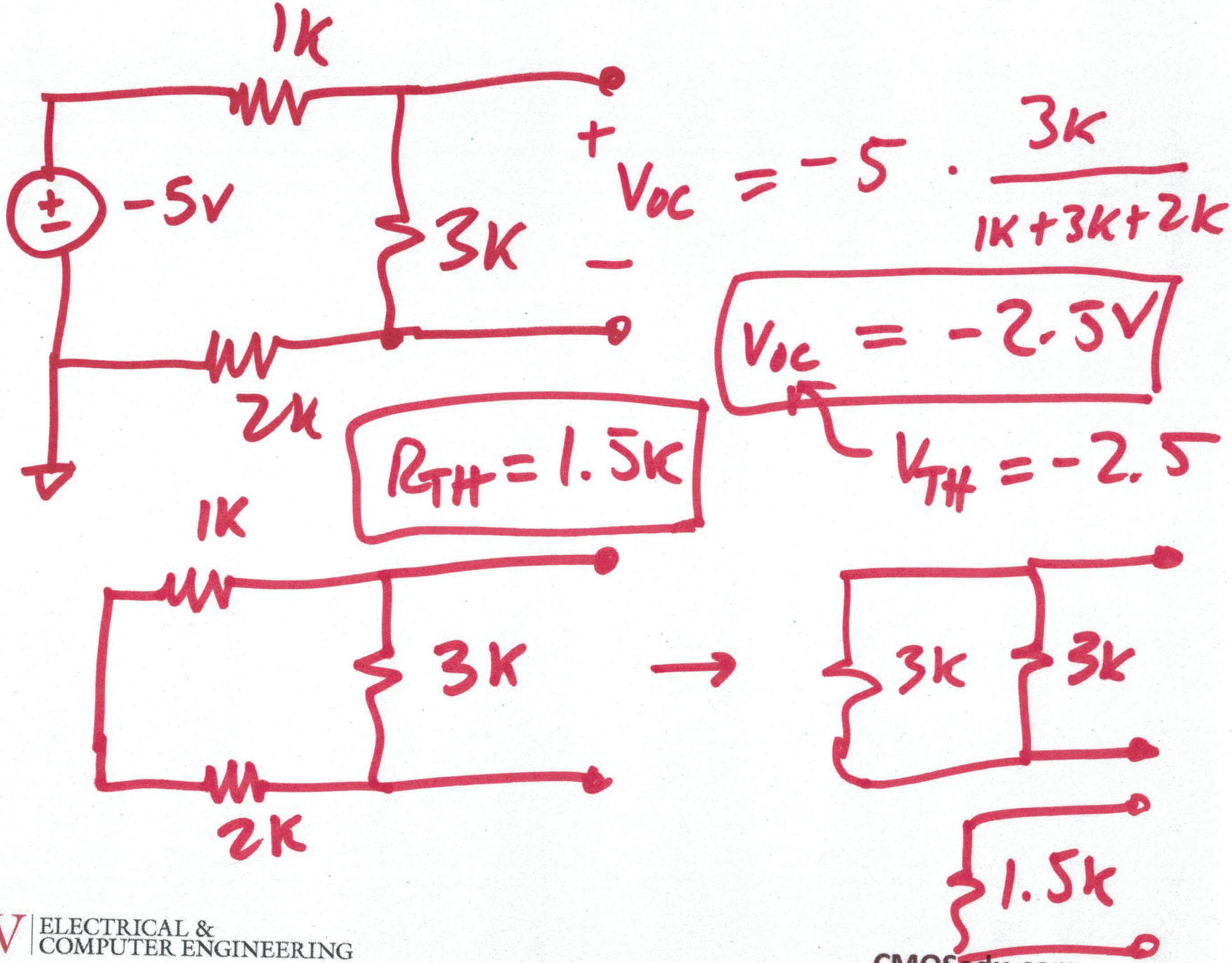
$$\frac{-22}{2{,}000} = \boxed{I_A = -11\,mA}$$

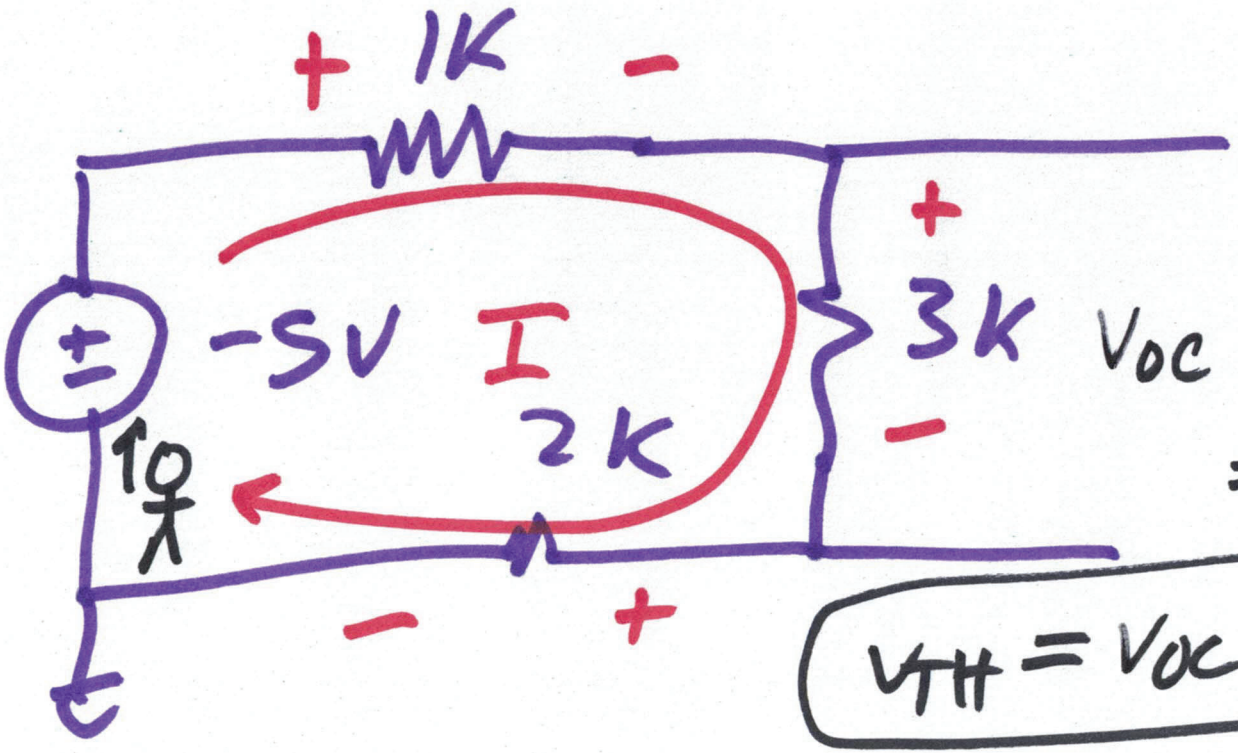


$$2 - 2k(I_A - I_3) - 2k(I_A - I_2) = 0$$

$$0 = +2k(I_A - I_2) - 1k(I_2 - I_3) - (-10^3 I_A)$$

$$-1k(I_3) + 10^3 I_A + 2V = 0$$


1K
-5V
3K
2K
+
V_{OC}
−
$V_{OC} = -5 \cdot \frac{3K}{1K+3K+2K}$
$V_{OC} = -2.5V$
$V_{TH} = -2.5$
$R_{TH} = 1.5K$
1K
3K
2K
3K
3K
1.5K



$V_{OC} = 3k \cdot I$

$= 3k \cdot \frac{-5}{6k}$

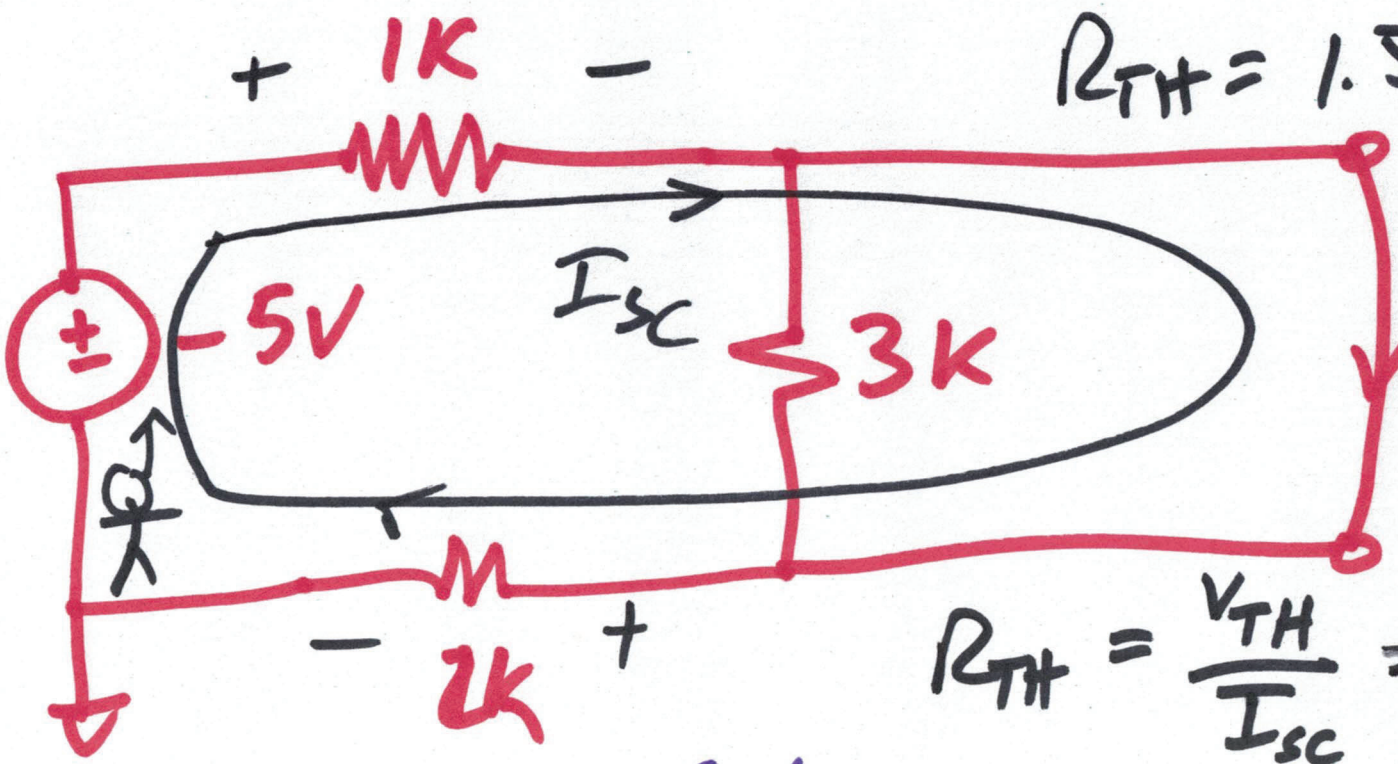
$V_{TH} = V_{OC} = -2.5V$

$+(-5V) - 1kI - 3kI - 2kI = 0$

$6kI = -5$

$I = \frac{-5}{6k}$

7)



$R_{TH} = 1.5\,k$

$$R_{TH} = \frac{V_{TH}}{I_{SC}} = \frac{+2.5V}{\frac{5}{3k}}$$

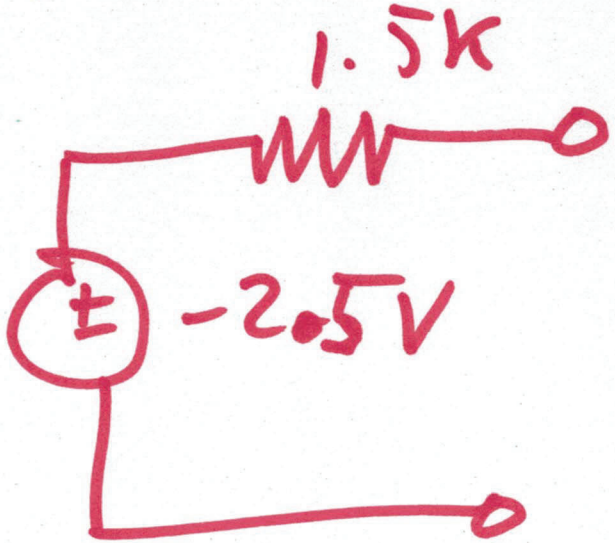
$$I_{SC} = \frac{-5V}{3k}$$

$$R_{TH} = \frac{3k}{2} = 1.5k$$

$$+(-5V) - 1k\,I_{SC} - 2k\,I_{SC} = 0$$

b)

THEVENIN



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