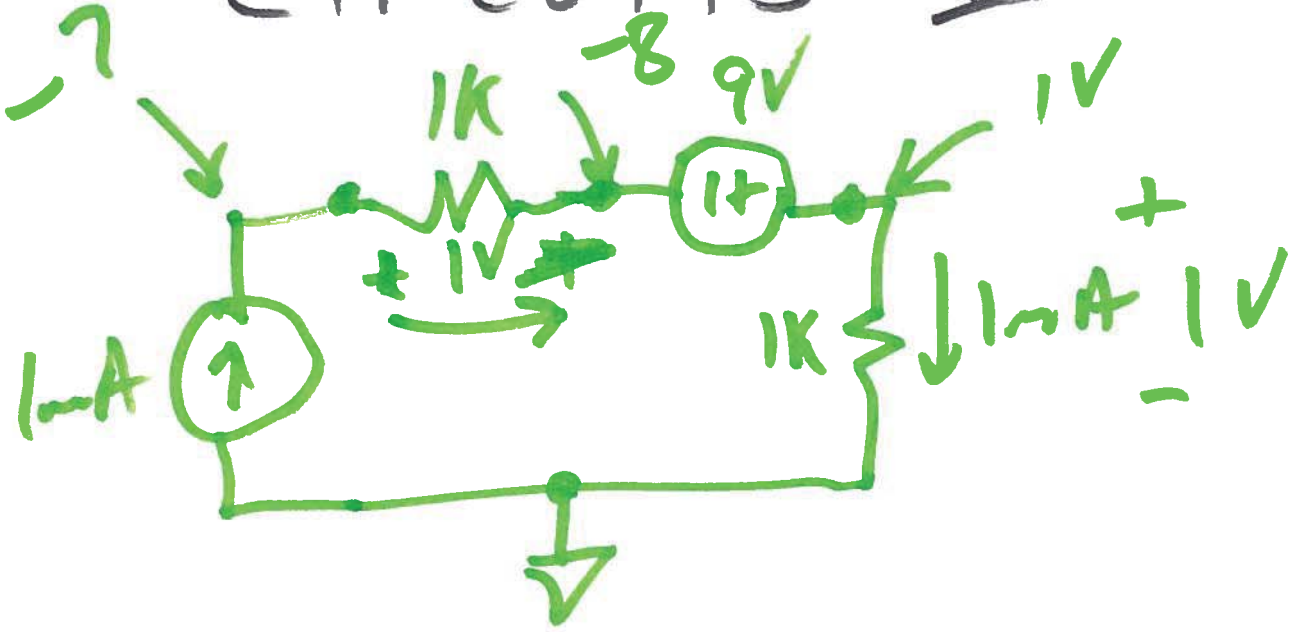
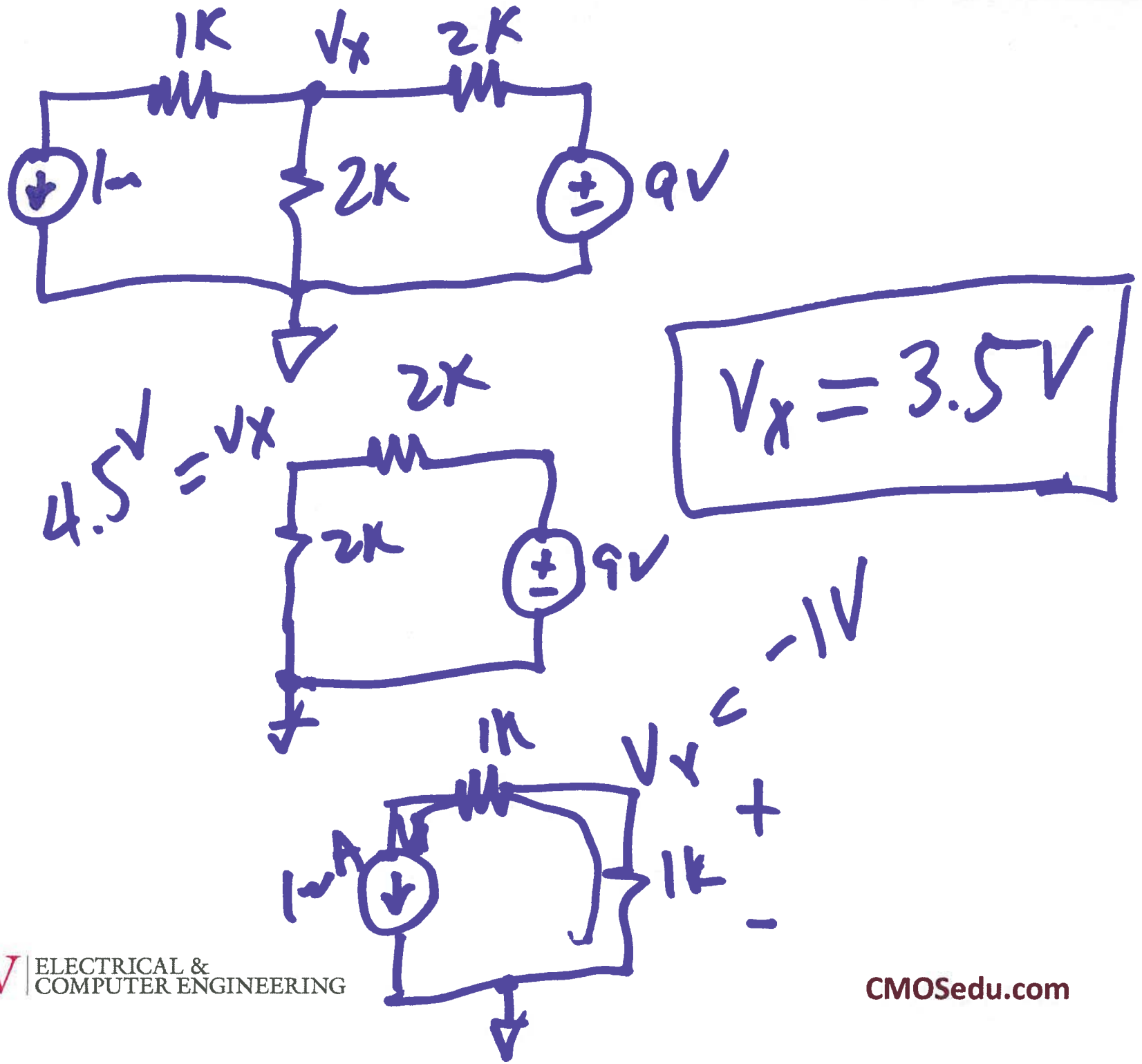
EE 220

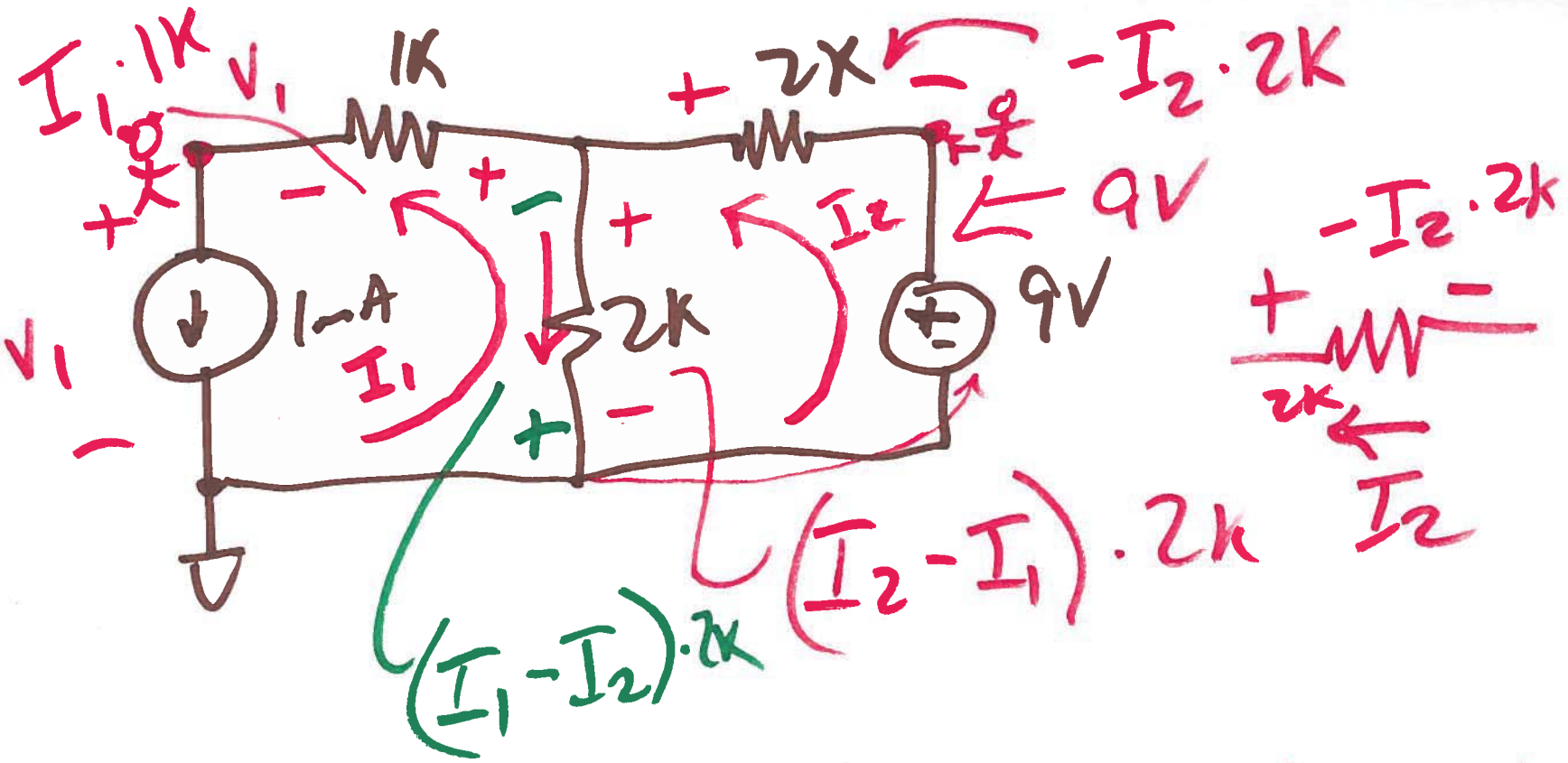
Lecture 6

1 − (−8) = 9

circuits I



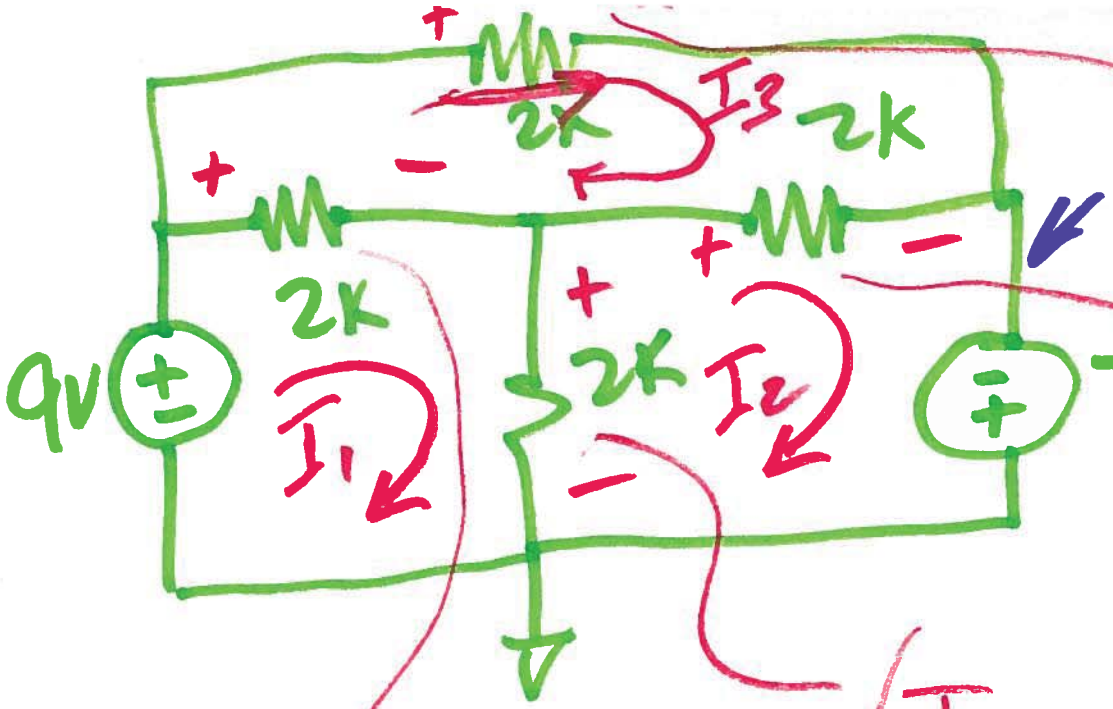

1K
Vx
2K
1m
2K
9V
4.5V = Vx
2K
2K
9V
Vx = 3.5V
1K
Vx = -1V
+
1K
-



$$-V_1 + (I_2 - I_1)2K - I_1 \cdot 1K = 0$$

$$-(-I_2 \cdot 2K) - (I_2 - I_1) \cdot 2K + 9 = 0$$

$$I_1 = 1mA$$



$2k \cdot I_3$

$(I_2 - I_3)2k$

$(I_1 - I_2)2k$

$I_1 \cdot 2k$

$(I_1 - I_3)2k$

$0 = 9 - (I_1 - I_3)2k - (I_1 - I_2)2k$

$0 = -7 + (I_2 - I_3)2k - (I_1 - I_2)2k$

$0 = (I_1 - I_3)2k - I_3 \cdot 2k + (I_2 - I_3)2k$

$$0 = 9 - 4kI_1 + 2kI_2 + 2kI_3$$

$$0 = -7 - 2kI_1 + 4kI_2 - 2kI_3$$

$$0 = 0 + 2kI_1 + 2kI_2 - 6kI_3$$

$$I_3 = \frac{1}{3}I_1 + \frac{1}{3}I_2$$

$=0$

$-7 - 2kI_1$

$+4kI_2$

$-\frac{2}{3}kI_1 - \frac{2}{3}kI_2$

$$0 = 9 - 4kI_1 + 2kI_2 + \frac{2}{3}kI_1 + \frac{2}{3}kI_2$$

$$0 = 9 - 3\tfrac{1}{3}kI_1 + 2\tfrac{2}{3}kI_2$$

$$0 = -7 - 2\tfrac{2}{3}kI_1 + 3\tfrac{1}{3}kI_2$$

5)

$$0 = 27 - 10K I_1 + 8K I_2$$

$$\left(0 = -21 - 8K I_1 + 10K I_2\right)\frac{8}{10}$$

$$0 = \frac{-168}{10} - \frac{64K}{10} I_1 + 8K I_2$$

$$0 = 27 + \frac{168}{10} - \left(10K + \frac{64K}{10}\right) I_1$$

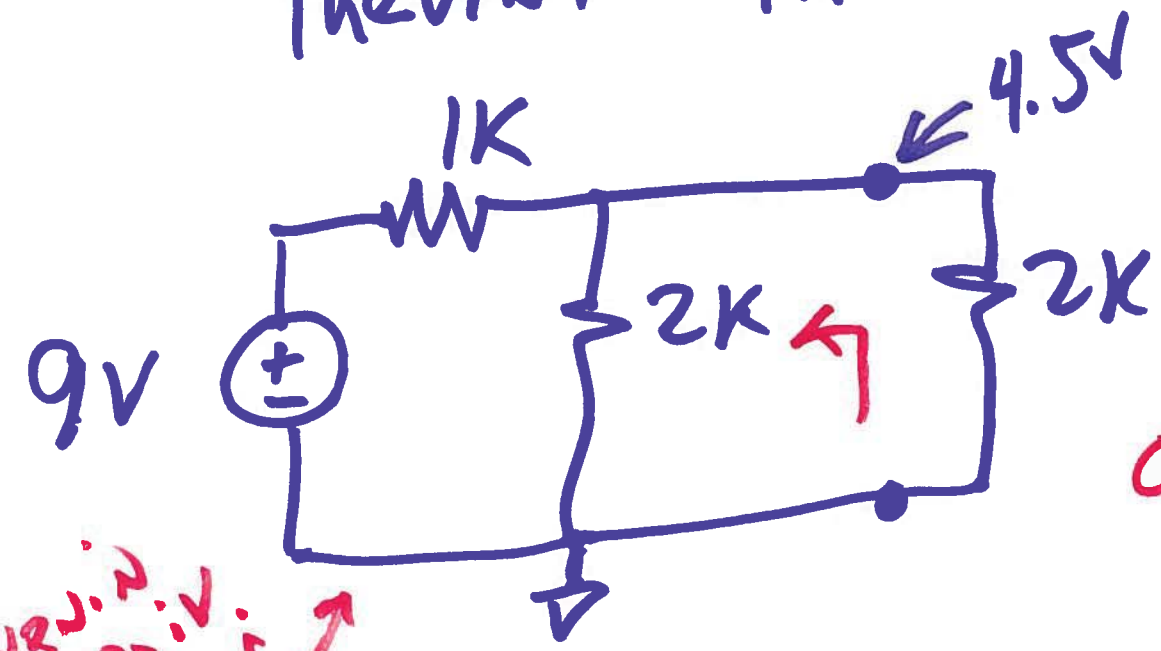
$$0 = 43.8 - 3.6K I_1$$

$$I_1 = \frac{43.8}{3.6} - A$$

27
16.8
43.8

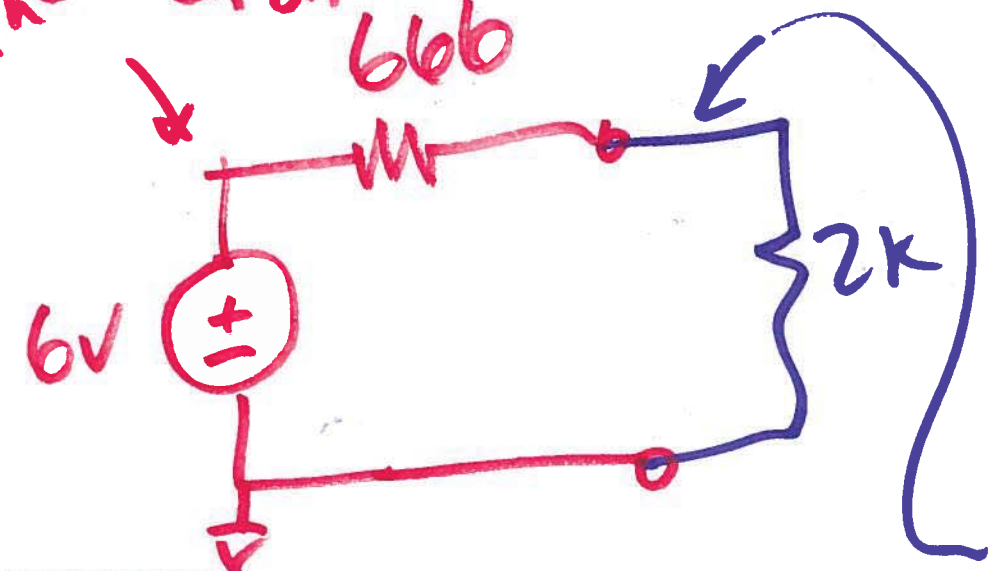
6)

Thevinin's Theorem



open circuit voltage

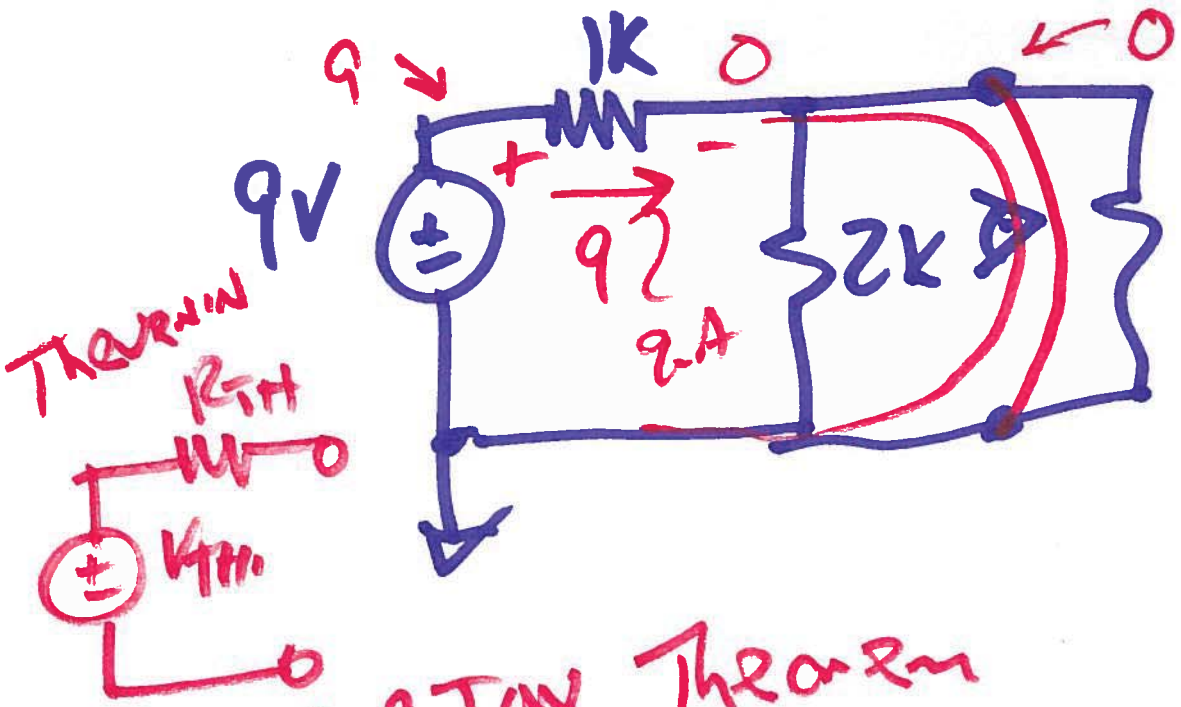
thevenin eqiv. of



$V_{OC} = 6V = V_{TH}$

$R_{TH} = 666\Omega$

$6V * \frac{2K}{2K+666} = \frac{12}{2666} = 4.5$



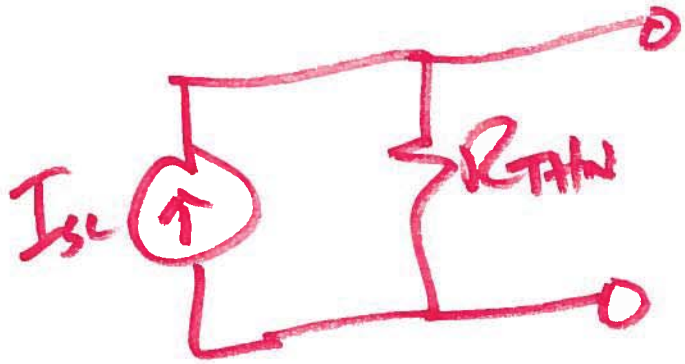
$V_{oc} = V_{TH} = 6V$

$I_{sc} = \frac{9}{1K} = 9mA$

$R_{TH} = \frac{V_{oc}}{I_{sc}} = \frac{6}{9mA}$

$= 666\Omega$

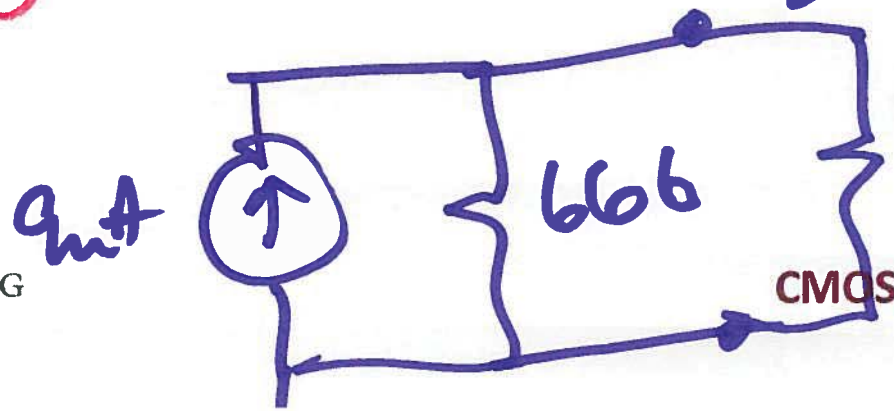
NORTON THEOREM



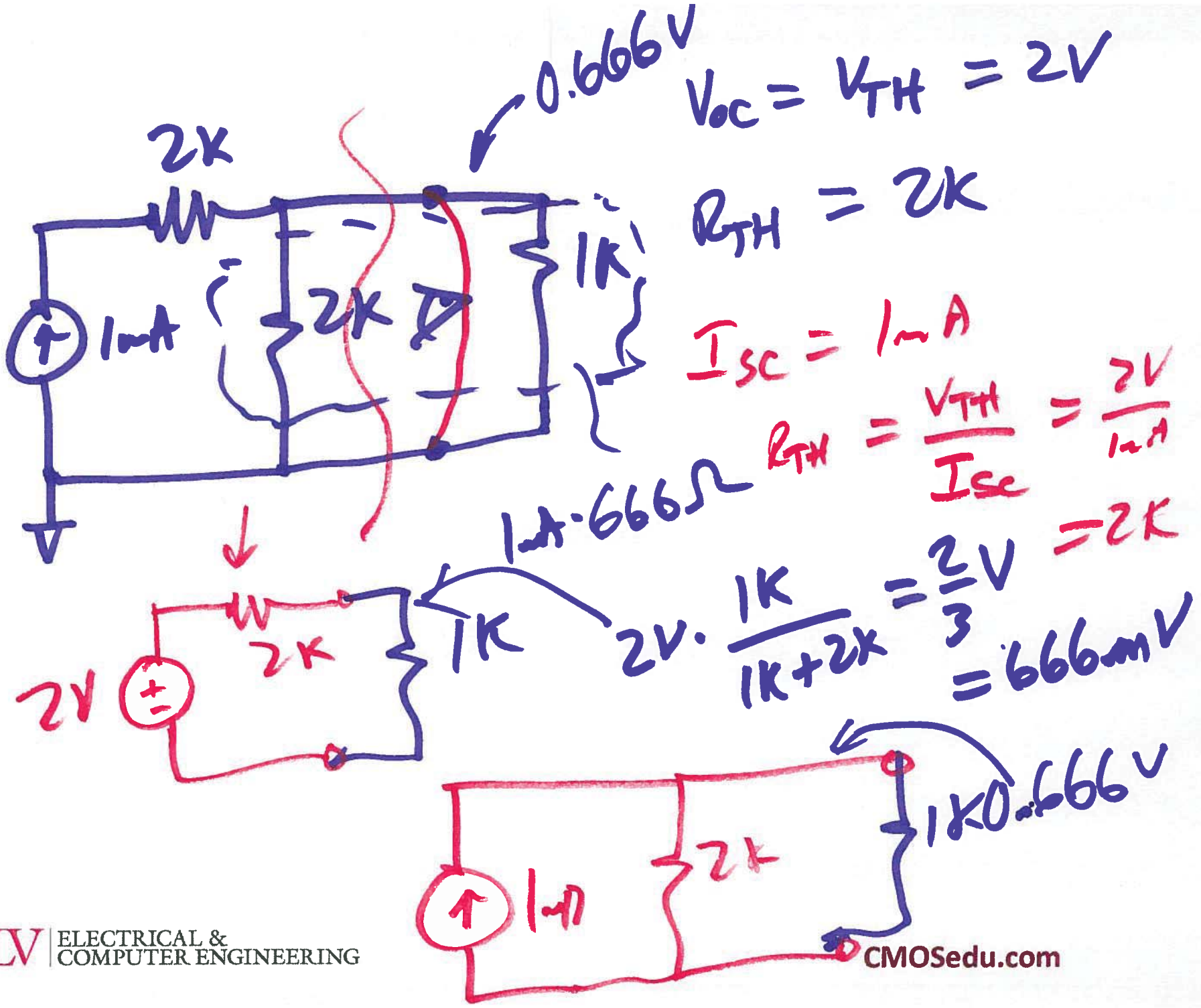
$R_{THN} \cdot I_{sc} = V_{TH}$

$= 9mA \cdot (666 \| 2k)$

$= 4.5V$



8)


0.666V
$V_{OC} = V_{TH} = 2V$
2K
1K
1mA
2K
$R_{TH} = 2K$
$I_{SC} = 1mA$
$R_{TH} = \frac{V_{TH}}{I_{SC}} = \frac{2V}{1mA} = 2K$
1mA·666Ω
2V
2K
1K
$2V \cdot \frac{1K}{1K+2K} = \frac{2}{3}V$
$= 666mV$
1K
0.666V
2K
1mA