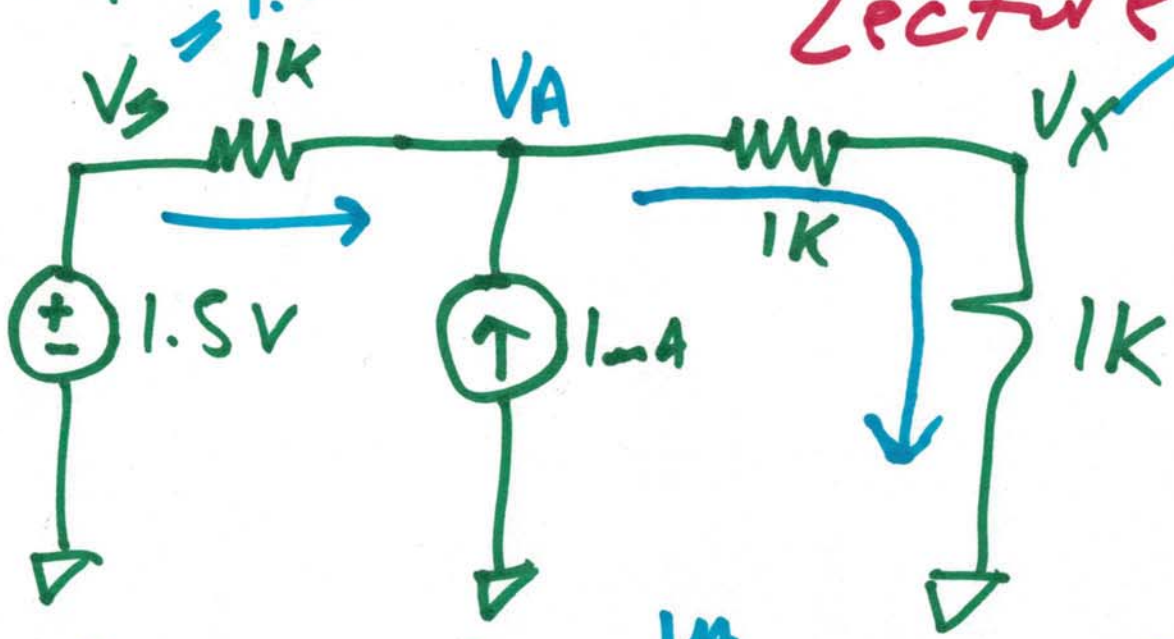
EE 220 circuits 1

Sept. 17, 2018

Lecture 7

find V_X



$$\frac{1.5 - V_A}{1K} + 1mA = \frac{V_A - 0}{2K}$$

$$3 - 2V_A + 2V = V_A$$

$$5V = 3V_A$$

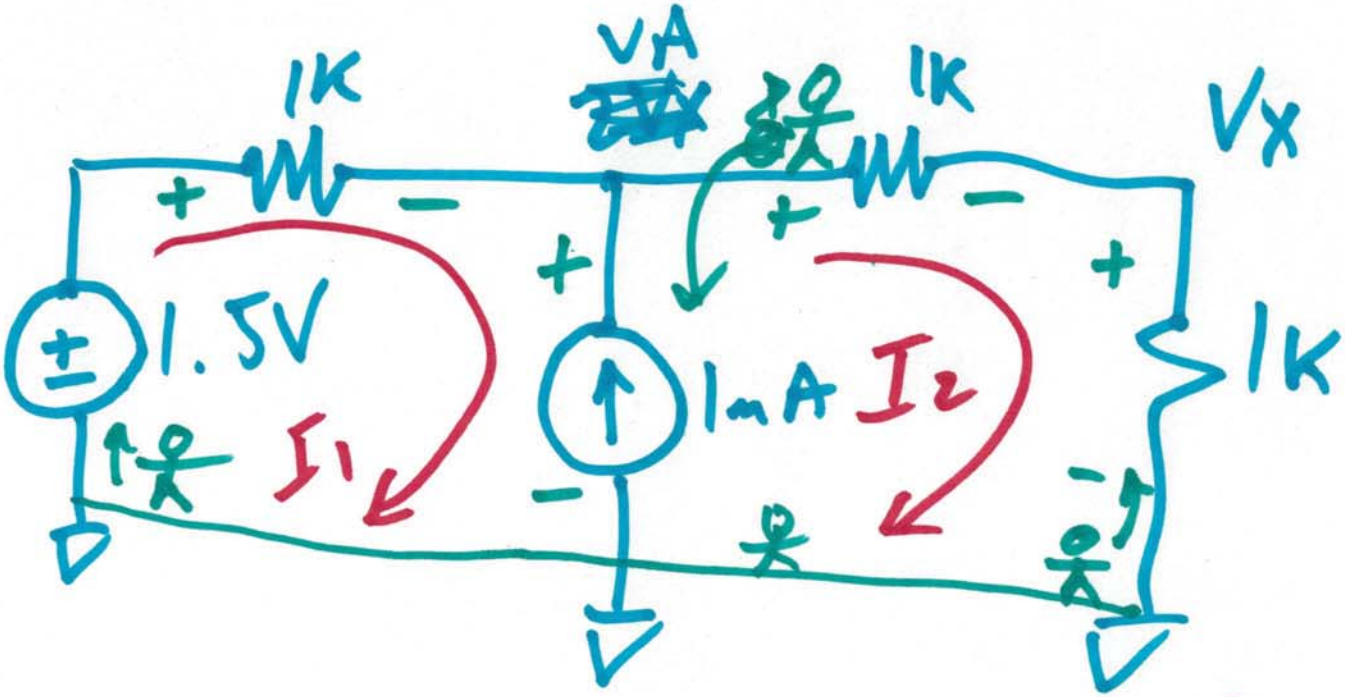
$$V_A = \frac{5}{3}V$$

$$V_X = \frac{V_A}{2}$$

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

$$= \frac{V_A - V_X}{1K}$$

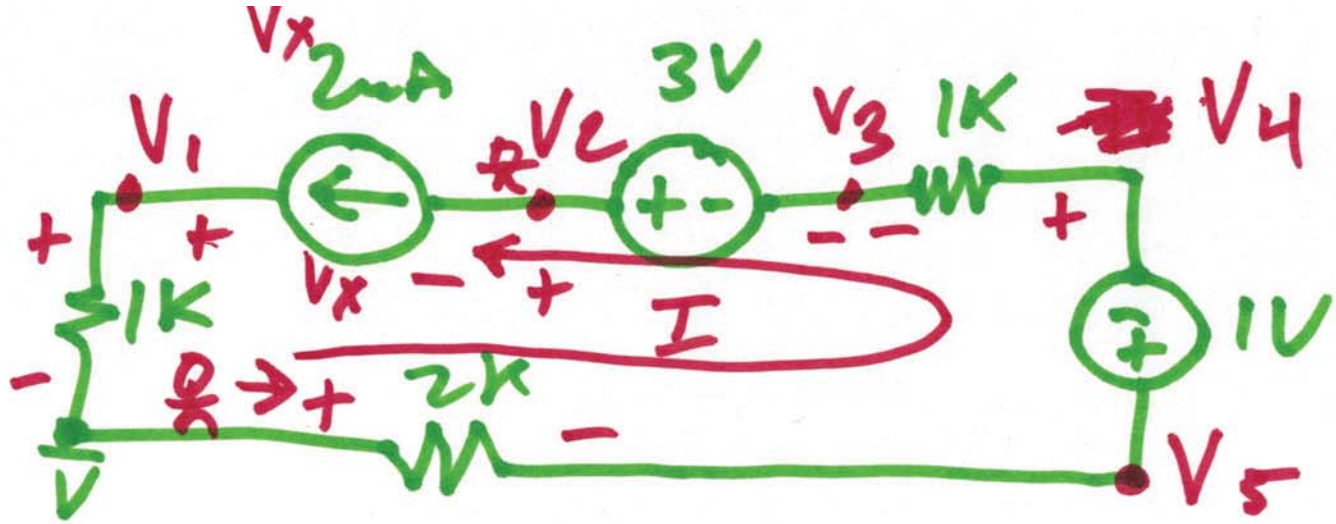
$$V_X = \frac{5V}{6}$$



$$1mA = I_2 - I_1 \quad (1)$$

$$1.5 - 1K I_1 - V_A = 0 \quad (2)$$

$$1K I_2 + 1K I_2 - V_A = 0 \quad (3)$$



$V_5 - V_4 = 1$

$V_2 - V_3 = 3$

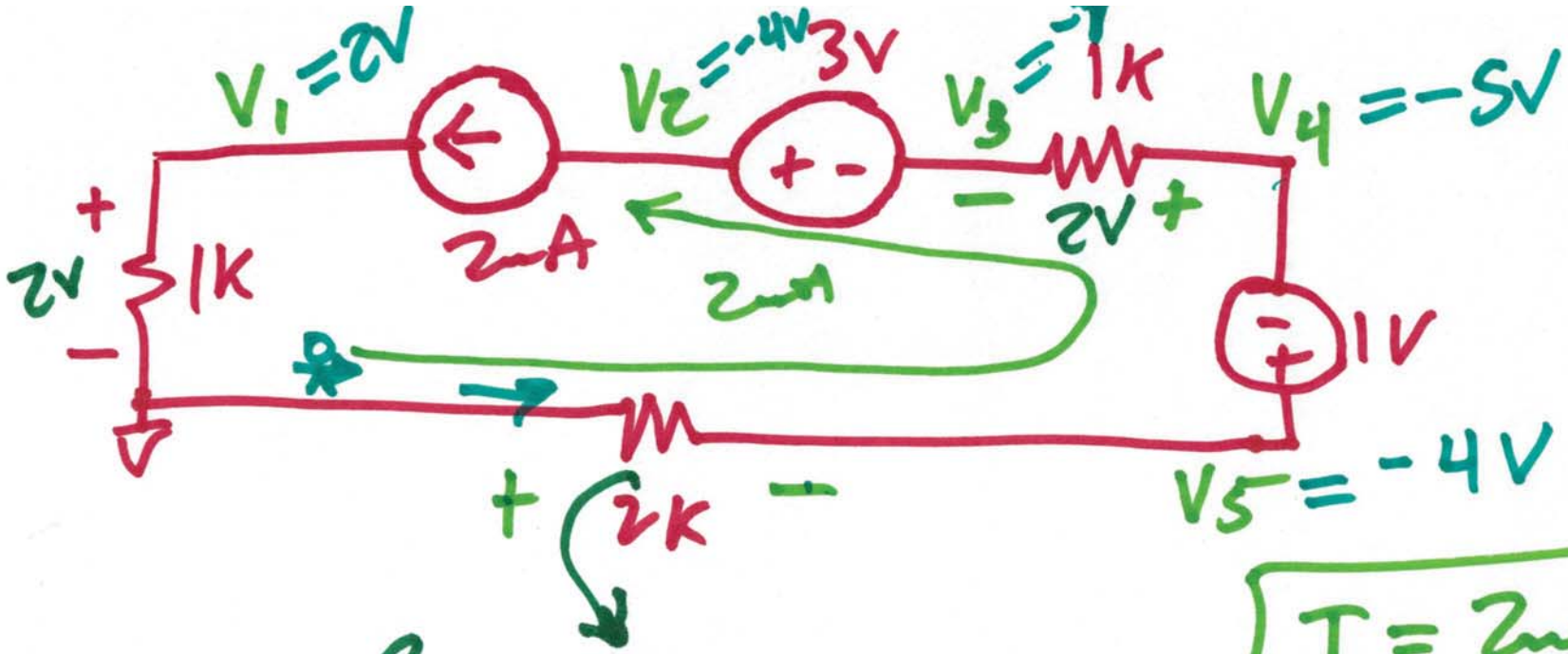
$$-2K \cdot I - 1V - 1k \cdot I + 3V + (V_1 - V_2) - 1K \cdot I = 0$$

V_x

$I = 2mA$

V_1, V_2, V_3, V_4, I

V_5



$I = 2mA$

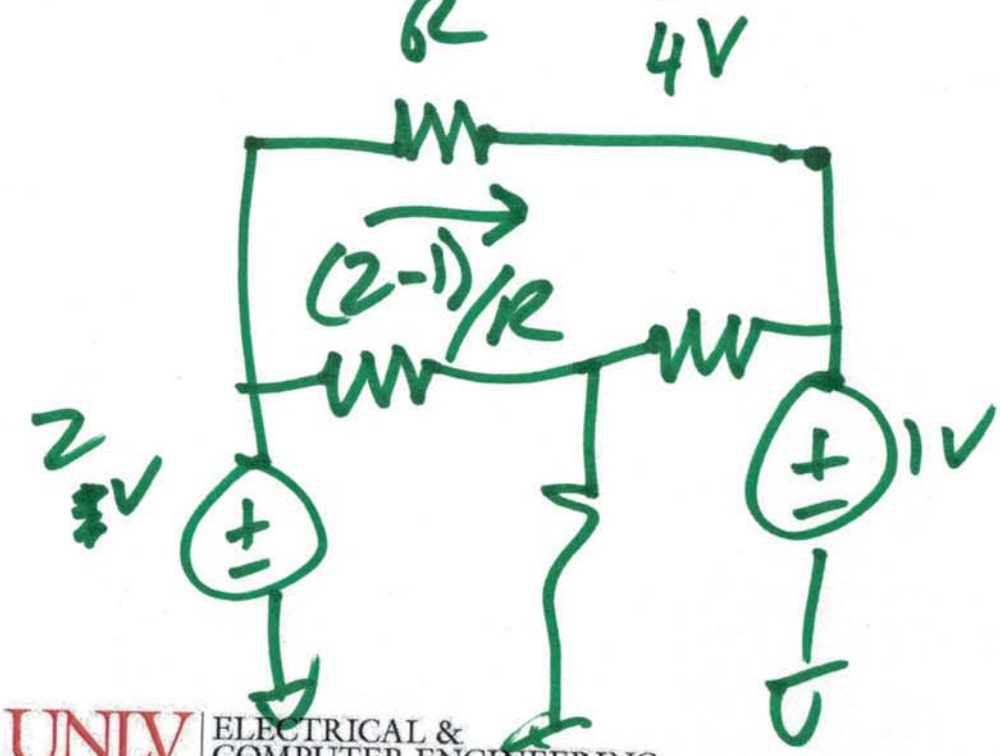
$V_1 = 2V$

$V_2 = -4V$

$V_3 = -7V$

$V_4 = -5V$

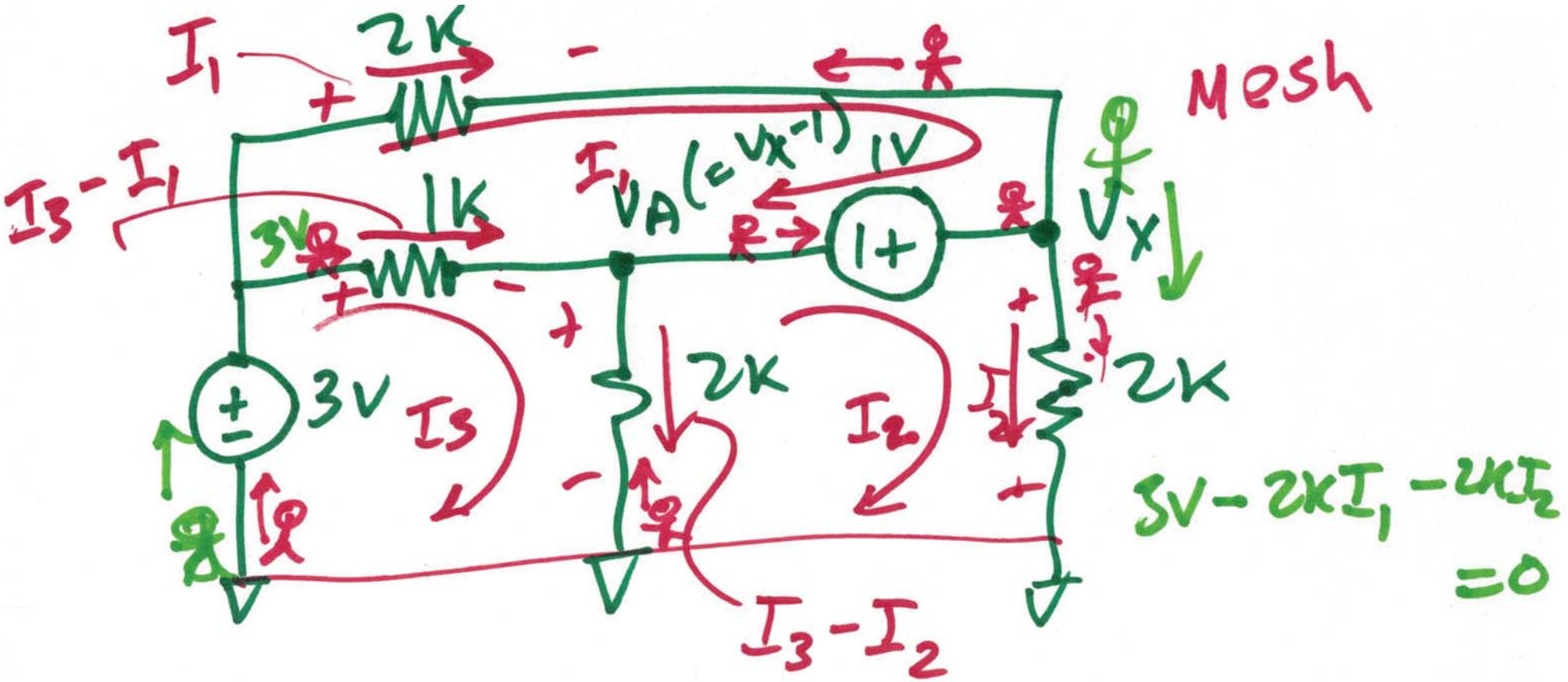
$V_5 = -4V$



UNLV | ELECTRICAL & COMPUTER ENGINEERING

CMOSedu.com

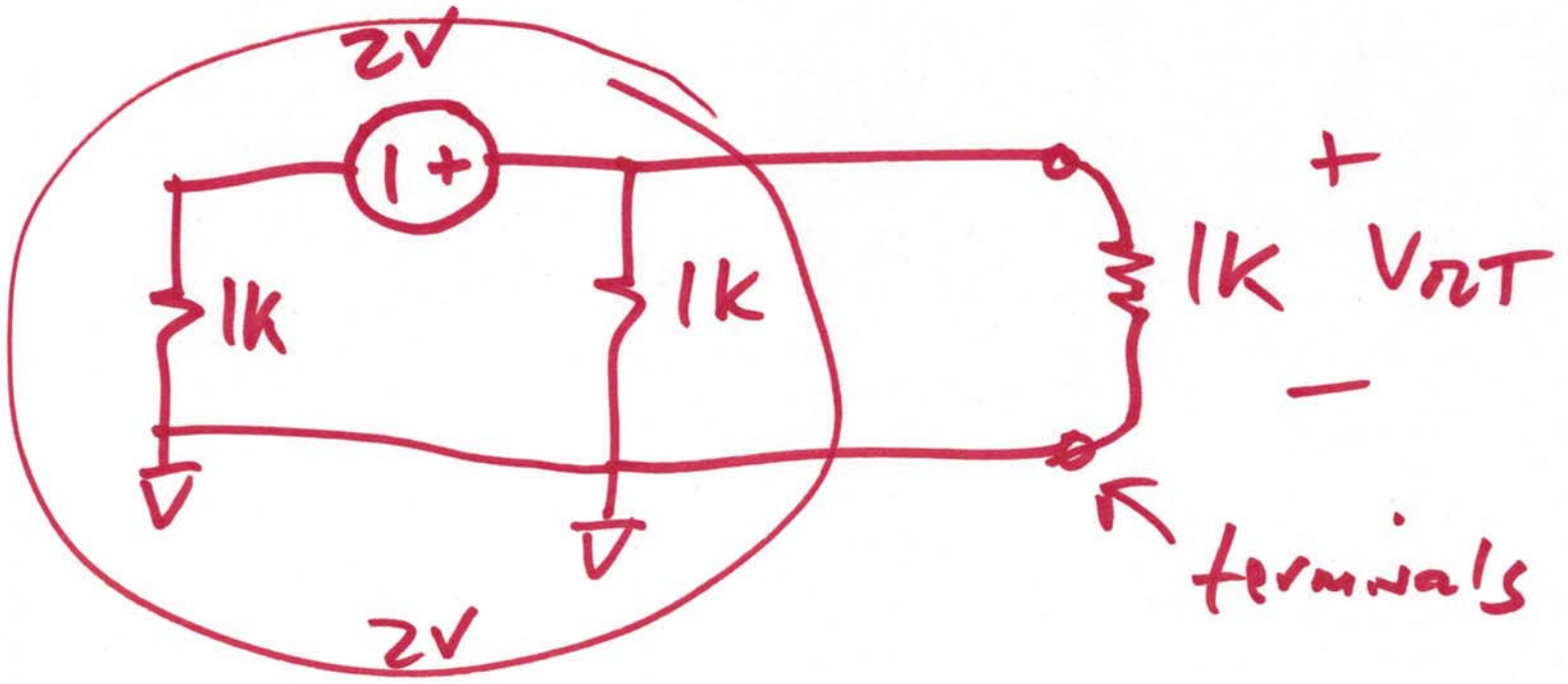
4)

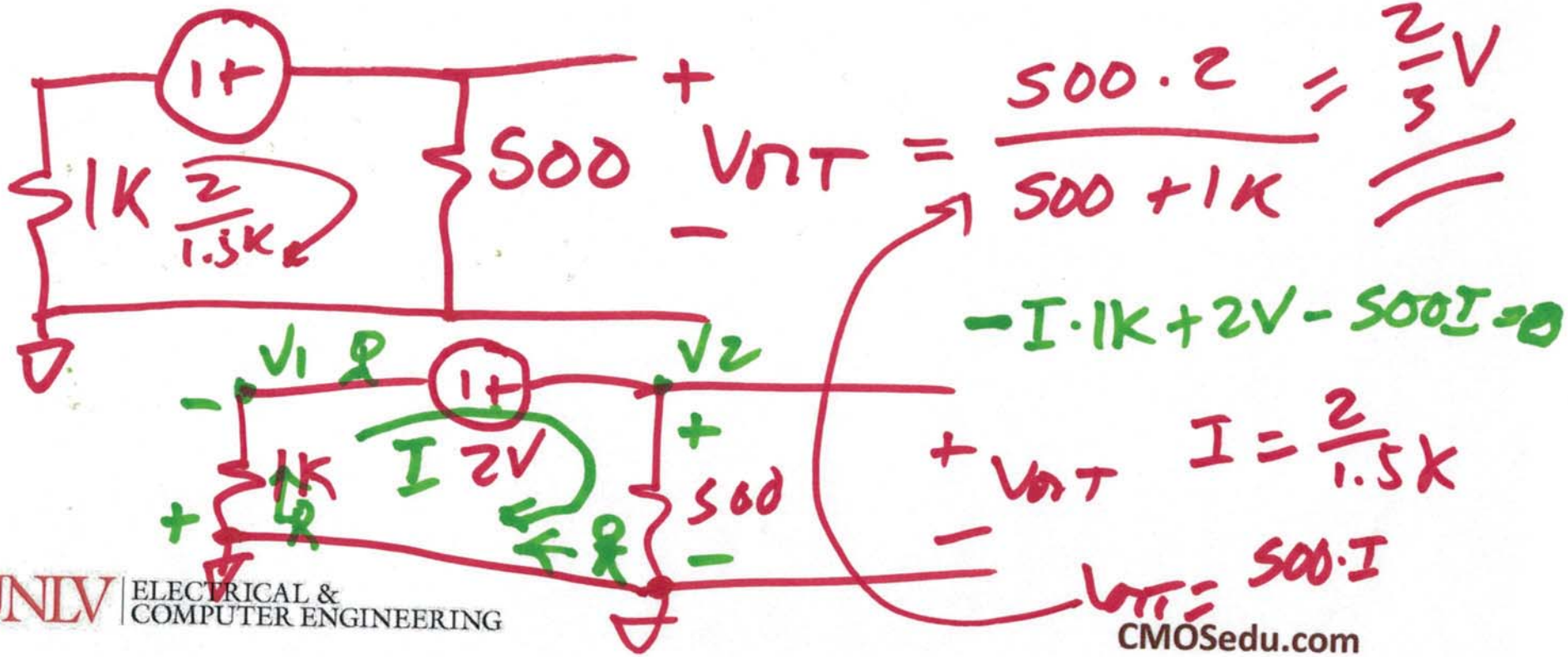


$$3V - 1k(I_3 - I_1) - 2k(I_3 - I_2) = 0$$

$$-2k(I_2) + 2k(I_3 - I_2) + 1V = 0$$

$$2kI_1 - 1k(I_3 - I_1) + 1V = 0$$

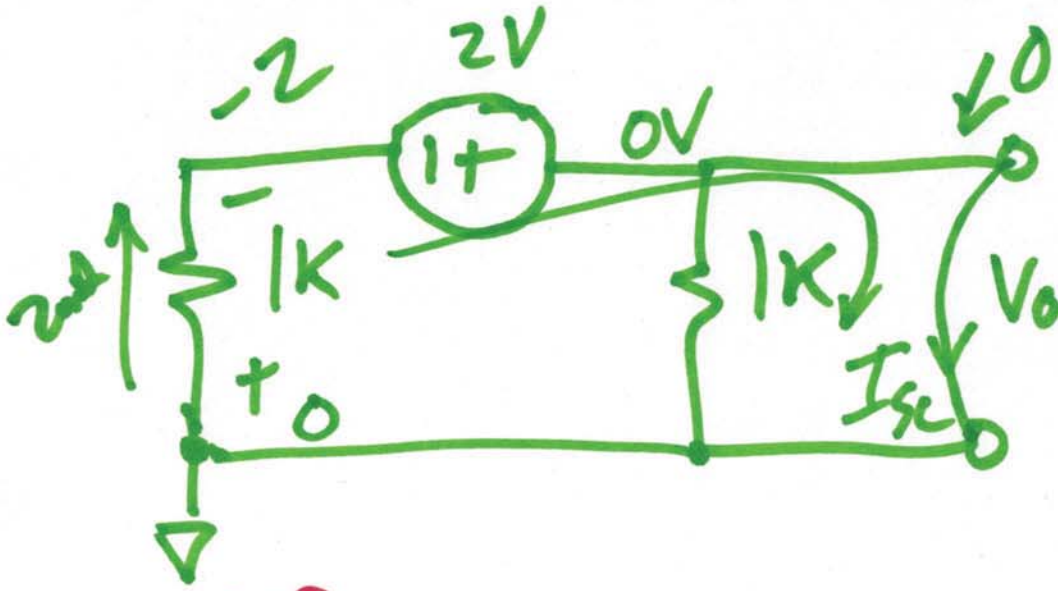




b)

UNLV | ELECTRICAL & COMPUTER ENGINEERING

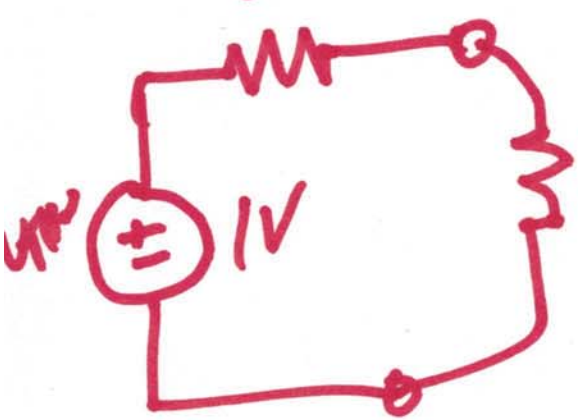
CMOSedu.com



$V_{oc} = 1V = V_{THN}$

$R_{THN} = 500\Omega$

$I_{sc} = 2mA$

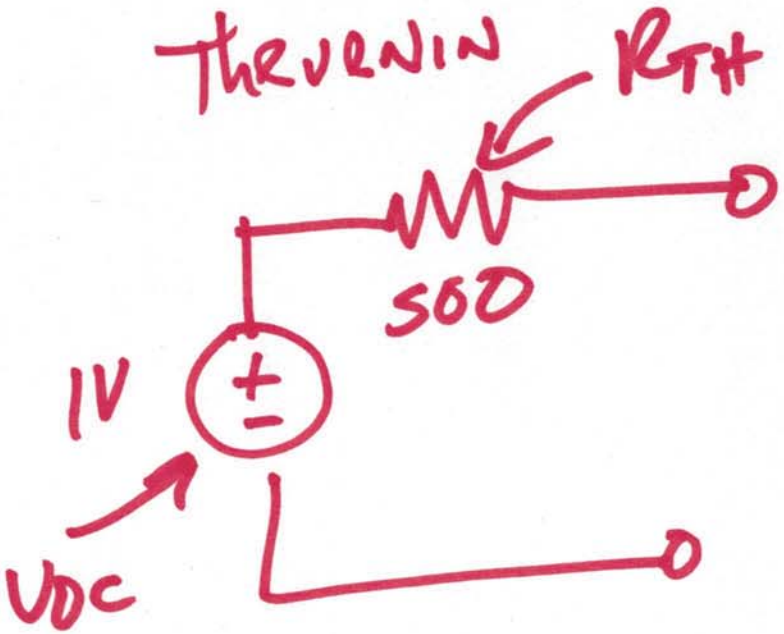


$V_{OUT} = \frac{2}{3} V$

$R_{THN} = \frac{1V}{2mA} = \frac{V_{oc}}{I_{sc}}$

$= 500\Omega$

Thevenin equivalent circuit



$\frac{2}{3}V$

$= 2mA \cdot 333\Omega$

$= .666V$

$V_{OT} = 2mA \cdot 1k \,||\, 500$

$\frac{1{,}000 \cdot 500}{1{,}000 + 500}$

$\frac{500{,}000}{1{,}500}$ $\frac{1000}{3}$

$= 333\Omega$

NORTON