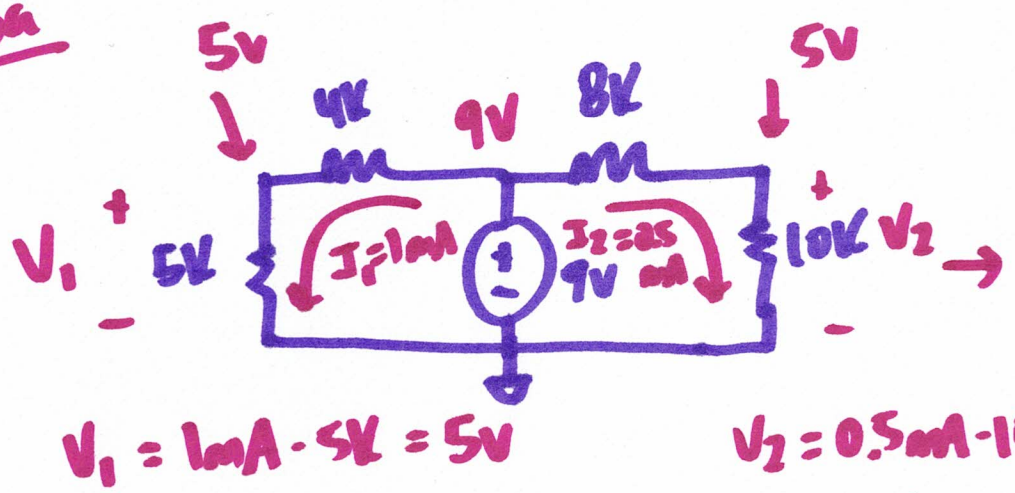
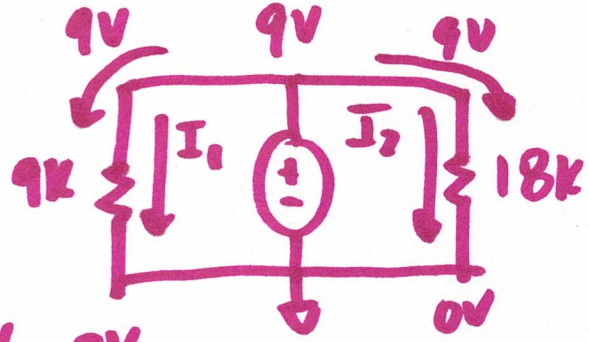
EE 220: Circuits I

HW2: 3a



$V_1 = 1mA \cdot 5K = 5V$



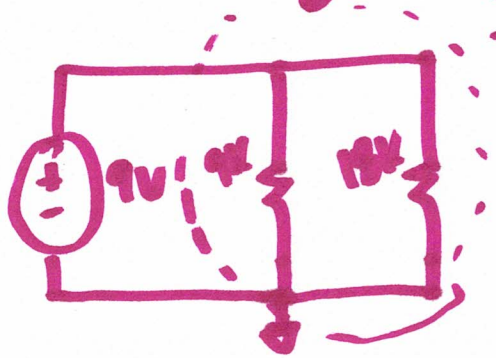
$V_2 = 0.5mA \cdot 10K$

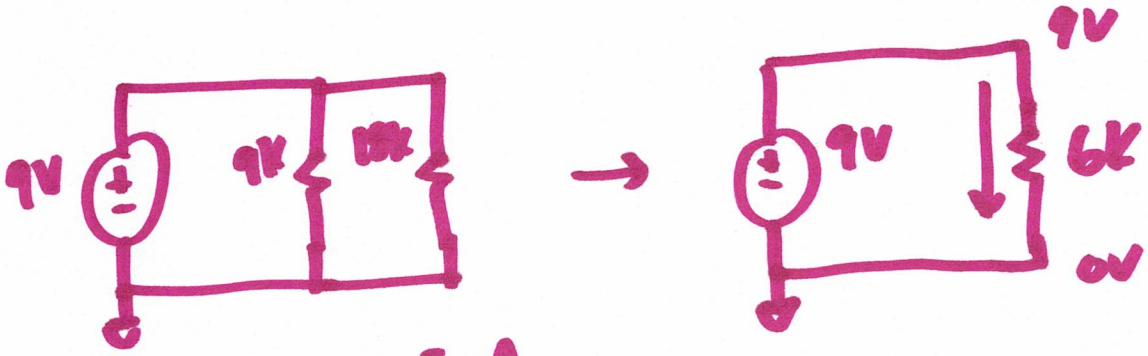
$V_2 = 5V$

0V

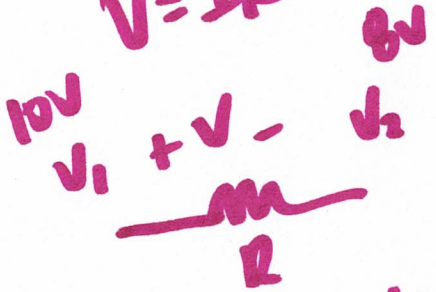
$$I_1 = \frac{9V - 0V}{9K} = 1mA$$

$$I_2 = \frac{9V - 0V}{18K} = 0.5mA$$

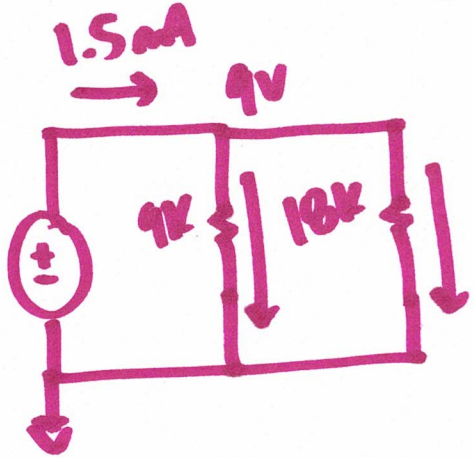




$$V = IR$$



$$\frac{V_1}{R} \qquad \frac{V_2}{R}$$



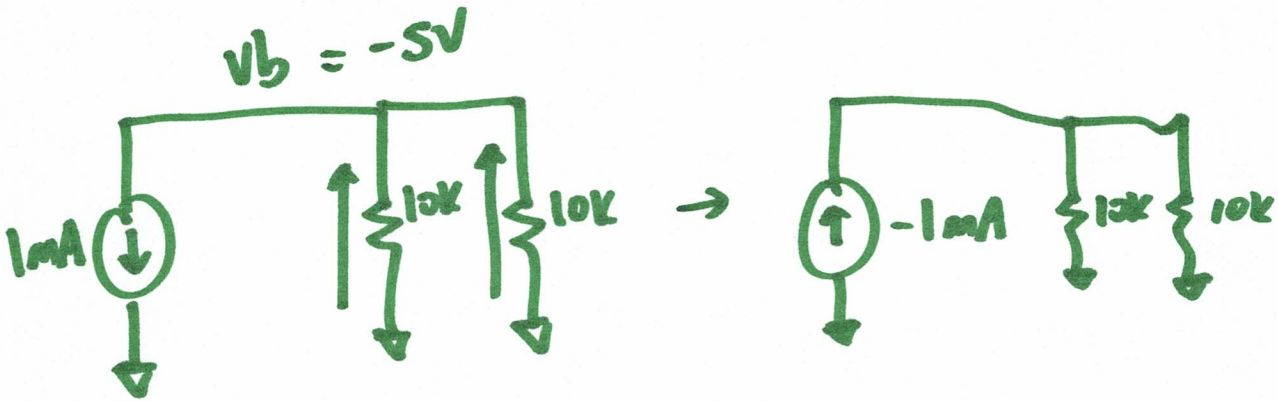
$$\frac{9V - 0V}{6K} = 1.5mA$$

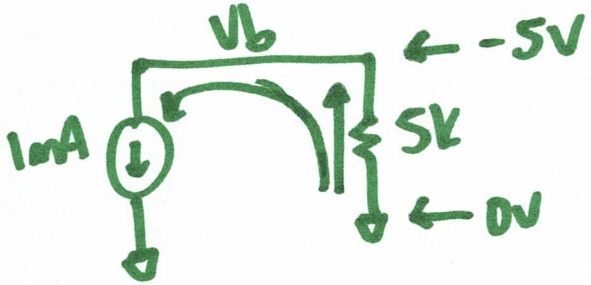
$$\frac{V_2 - V_1}{R} = I$$

$$\frac{V_1 - V_2}{R} = I$$

$$+ \frac{9V - 0V}{1K}$$

HW2: 2b

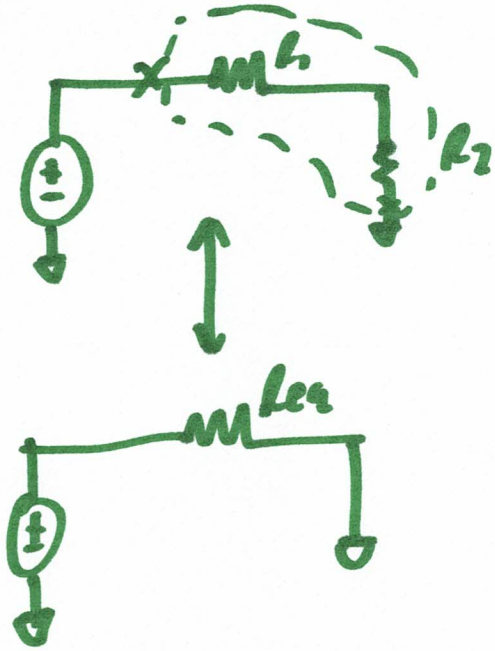


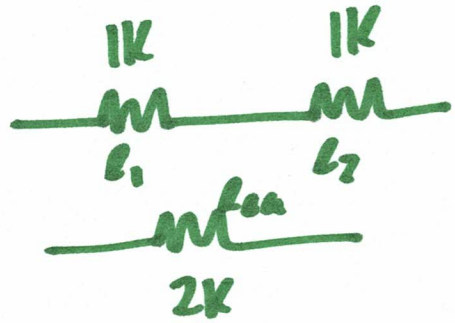


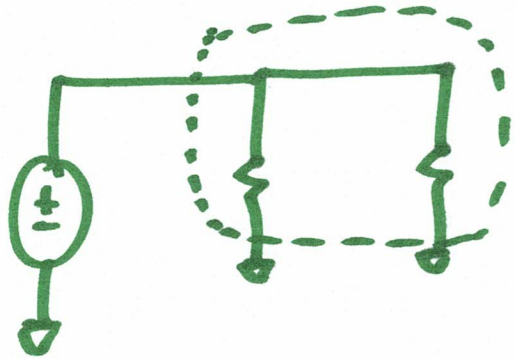
$V = IR$

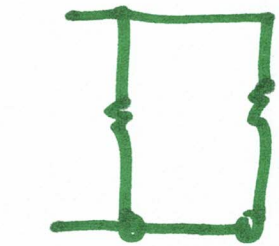
$V = 1mA \cdot 5K$

$V = 5V$


R_1
R_2
R_{eq}


1K
1K
R_1
R_2
R_{eq}
2K



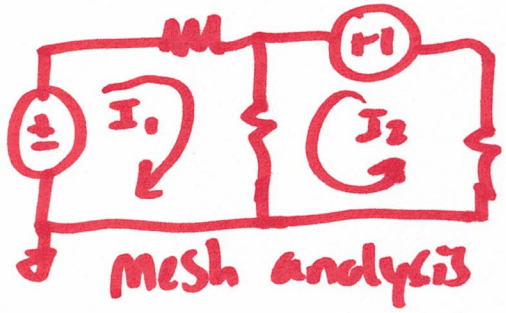


KCL & KVL

* Sum of all currents out of a node = 0

↓

Kirchhoff's Current Law

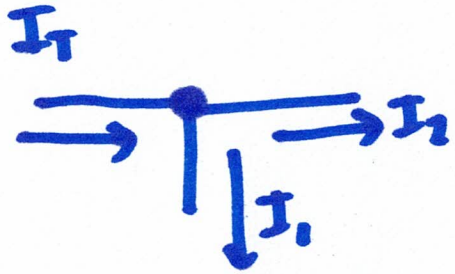


mesh analysis

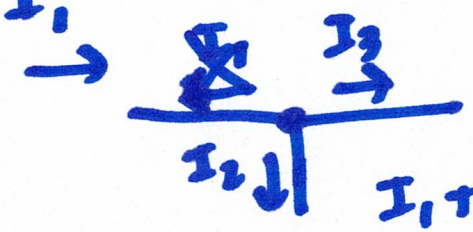
↓

Kirchhoff's Voltage Law (KVL)

* Sum of all voltage drops in a loop = 0



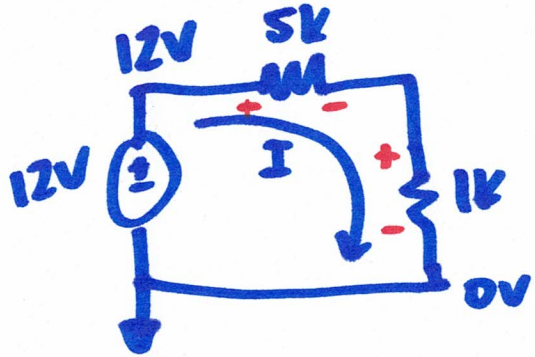
$I_T = I_1 + I_2$

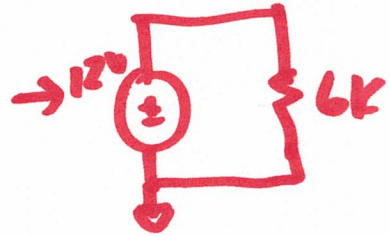


$I_1 + I_2 + I_3 = 0$

$I_2 + I_3 - I_1 = 0$

$I_2 + I_3 = I_1$



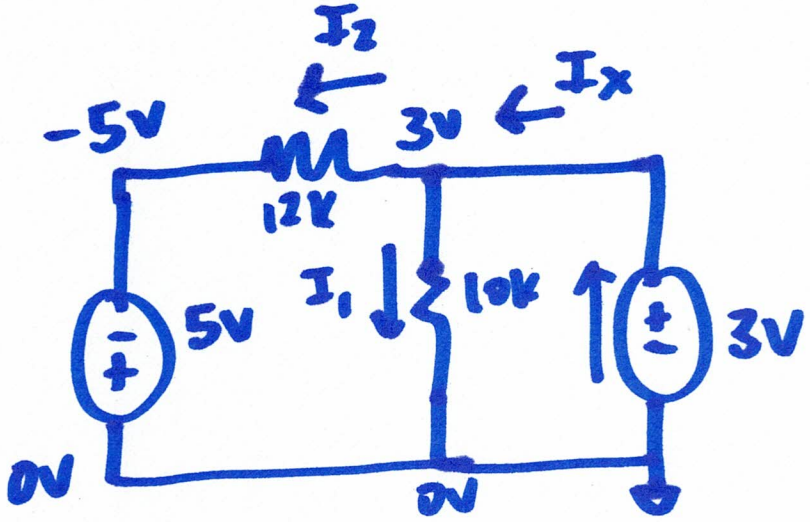


$+12V - 5K \cdot I - 1K \cdot I = 0$

$12V - 6K \cdot I = 0$

$\frac{12V}{6K} = \frac{6K \cdot I}{6K} \rightarrow$ **$I = 2mA$**

HW3 : 1f

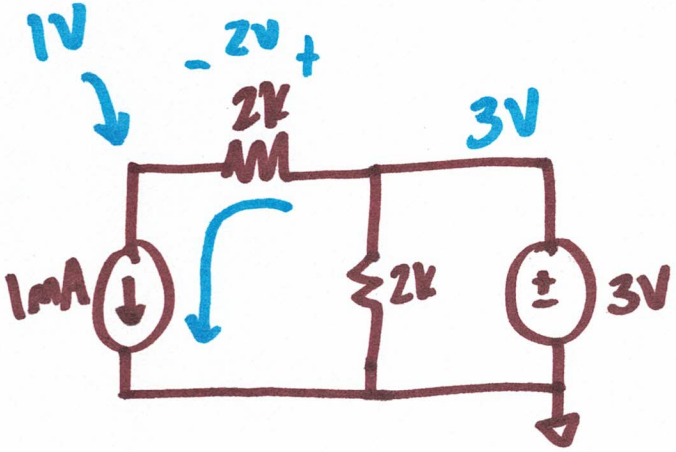


$$I_1 = \frac{3V - 0V}{10K} = 0.3mA = 300\mu A$$

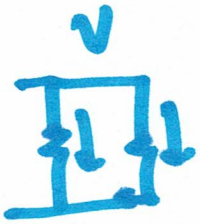
$$I_2 = \frac{3V - (-5V)}{12K} = \frac{8V}{12K} = 0.666mA$$

$$I_1 + I_2 = I_x = 0.66mA + 0.3mA$$

$$\boxed{I_x = 0.96mA}$$



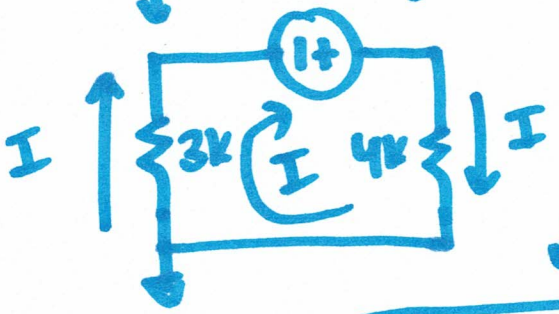
$2k \cdot 1mA = 2V$



$\frac{4.57}{4k} = \boxed{I = 1.14mA}$

$V_2 = -3.43V$

$V_1 = 4.57V$



$V_1 = -0.\cancel{25}V_1 + 8V$
$\cancel{+0.75V_1}$

$V_1 + 0.75V_1 = 8V$

$V_1(1 + 0.75) = 8$

$V_1 = \frac{8}{1.75}$

$\boxed{V_1 = 4.57V}$

$\boxed{V_1 = V_2 + 8V}$

$I = \frac{0 - V_2}{3k}$

$\frac{V_1}{4k} = I$

$\boxed{\frac{-V_2}{3k} = \frac{V_1}{4k}}$ (3k, 3k)

$4.57V = V_2 + 8V$

$\boxed{V_2 = -3.43V}$

$(-1)V_2 = 0.75V_1(-1)$

$V_2 = -0.75V_1$

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