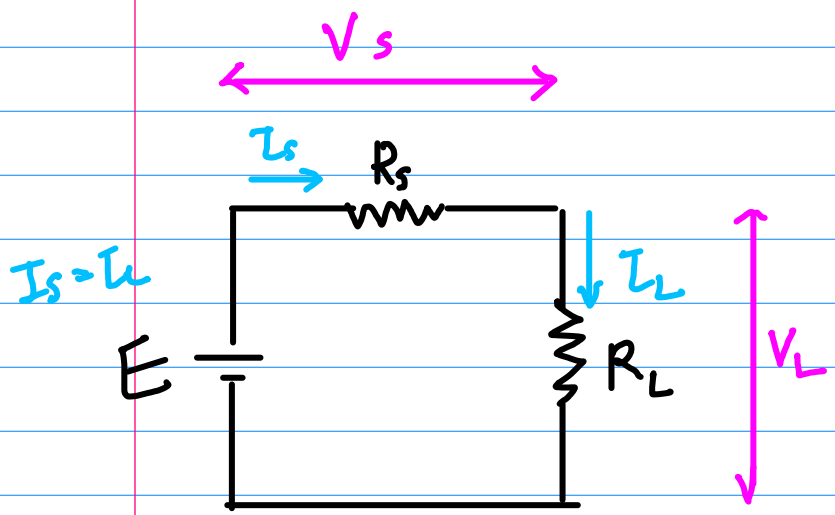
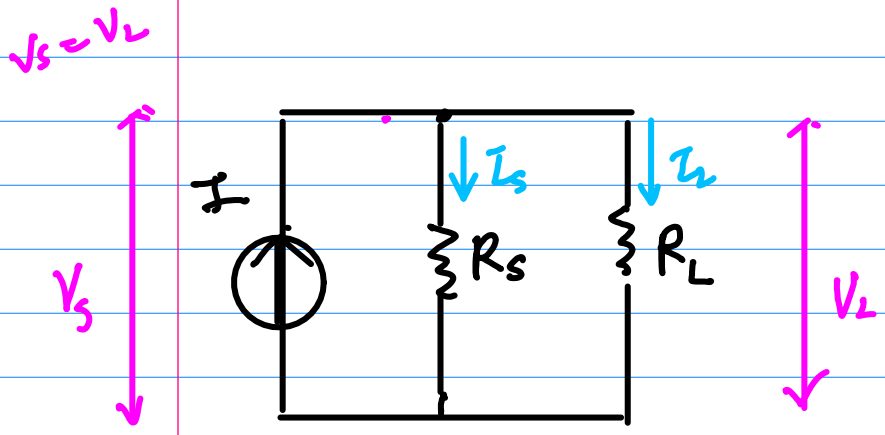
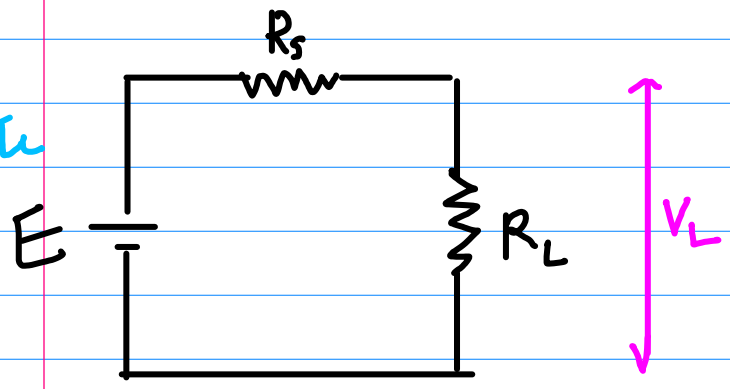
Network Analysis (H1)



Voltage Divider



Current Divider

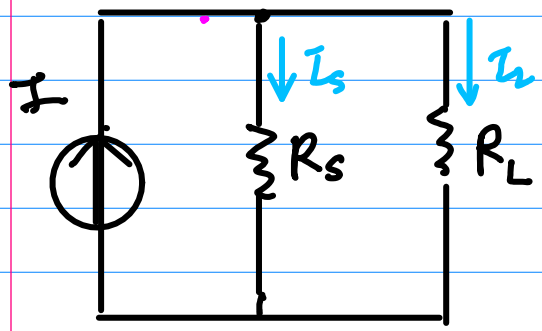


$I_S = I_L$

Voltage Divider

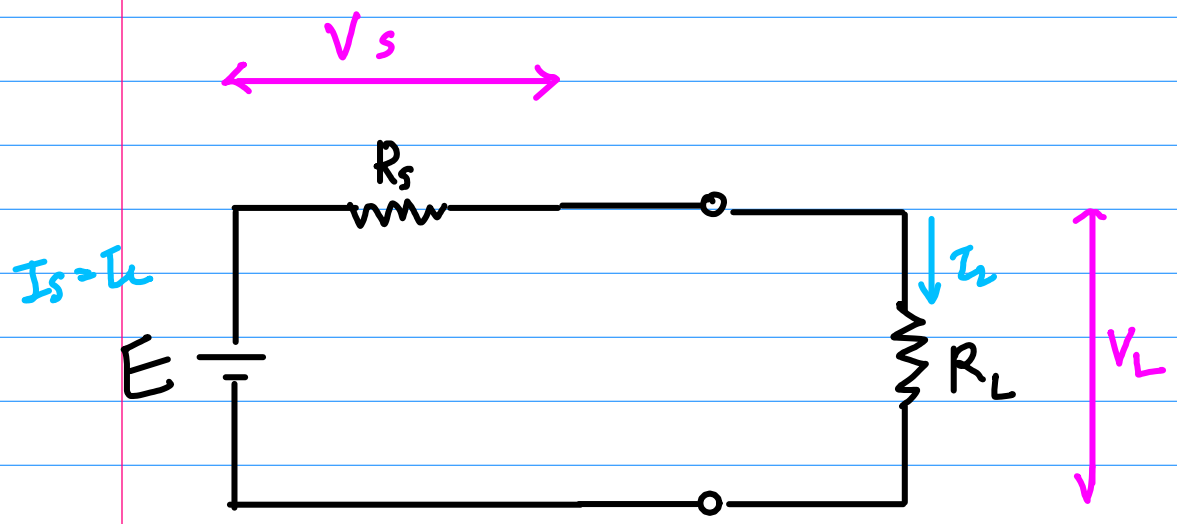
$V_S : V_L = R_S : R_L$

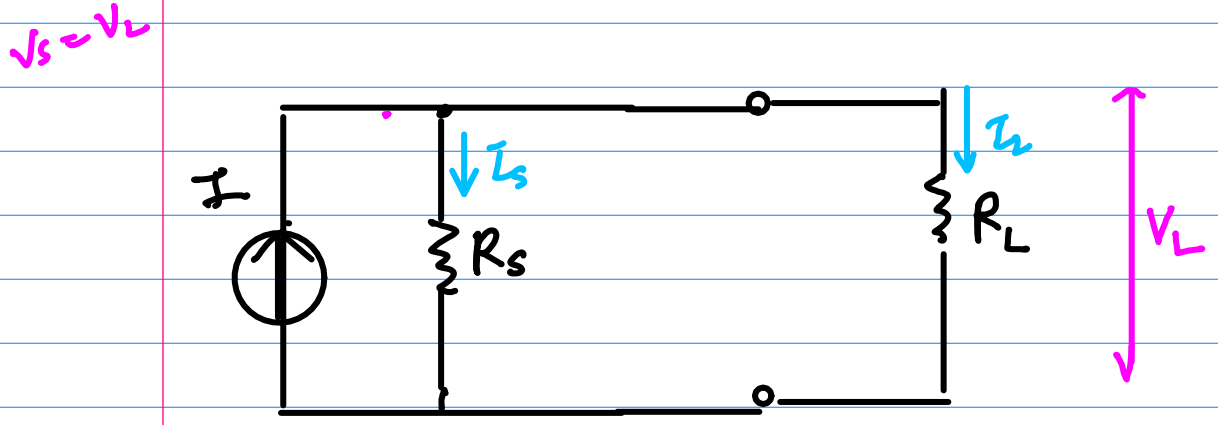
$V_S = V_L$

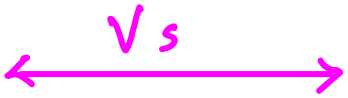


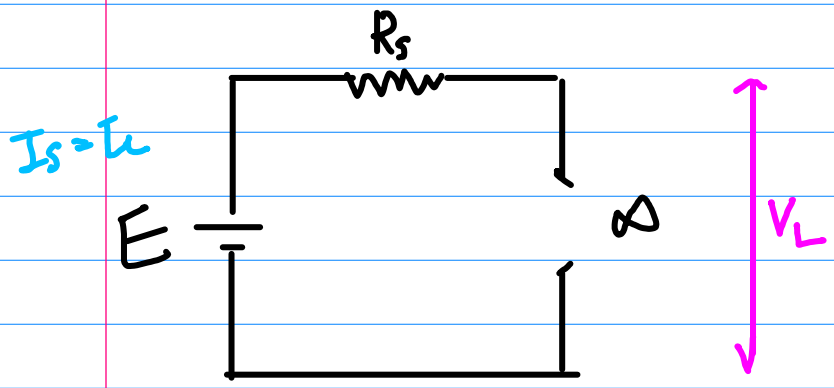
Current Divider

$I_S : I_L = R_L : R_S$


Vs
Rs
Is = IL
E
IL
RL
VL


Vs = VL
I
Is
Rs
IL
RL
VL



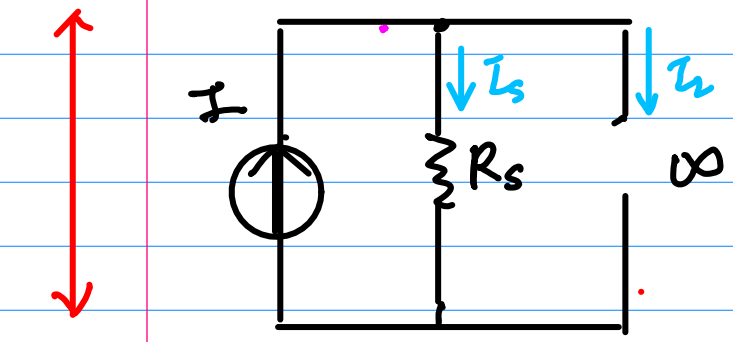


Voltage Divider

$V_S : V_L = R_S : \infty$

$V_L = E$

$V_S = V_L$

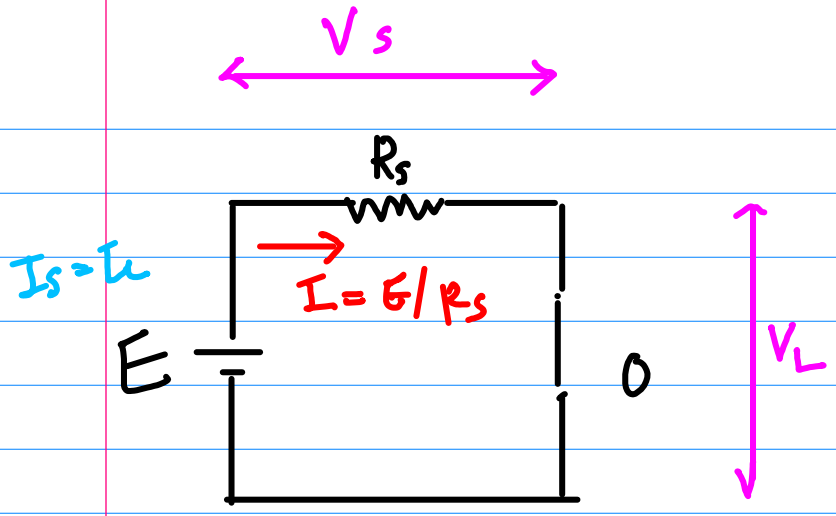


Current Divider

$I_S : I_L = \infty : R_S$

$I_S = I$

$V = I \cdot R_S$



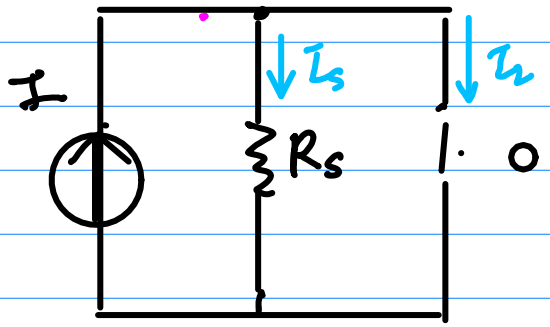
Voltage Divider

$V_S : V_L = R_S : 0$

$\| \quad \| \quad \| \quad 0$

E

$V_S = V_L$

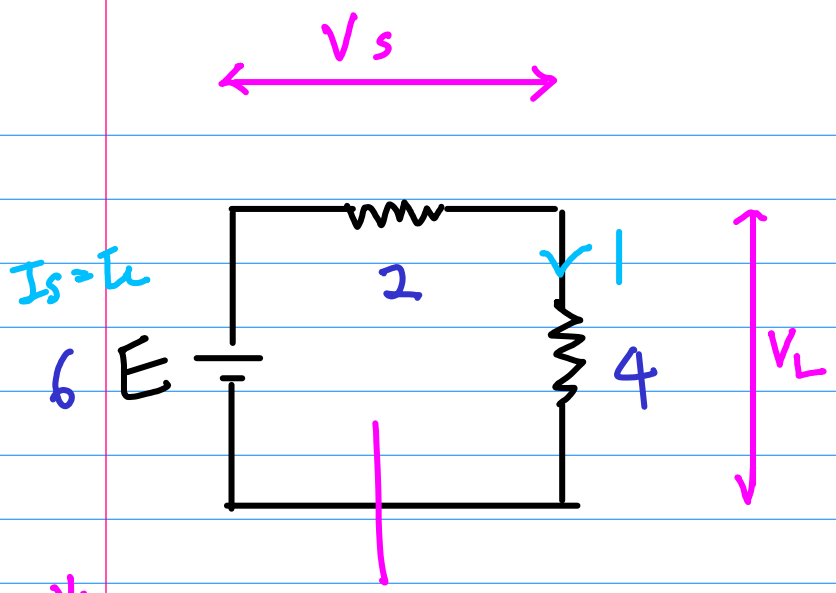


Current Divider

$I_S : I_L = 0 : R_S$

$\uparrow \quad \| \quad \| \quad I$

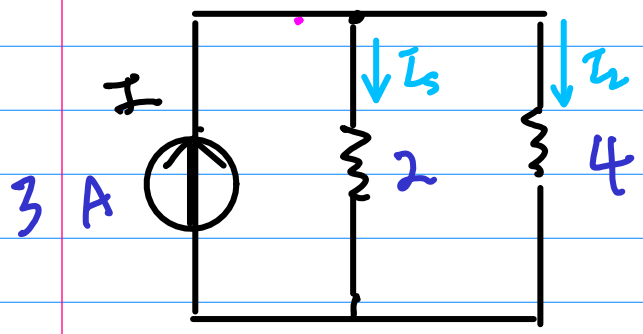
0



Voltage Divider

$V_S : V_L = 2 : 4$

6V 之 2V, 4V

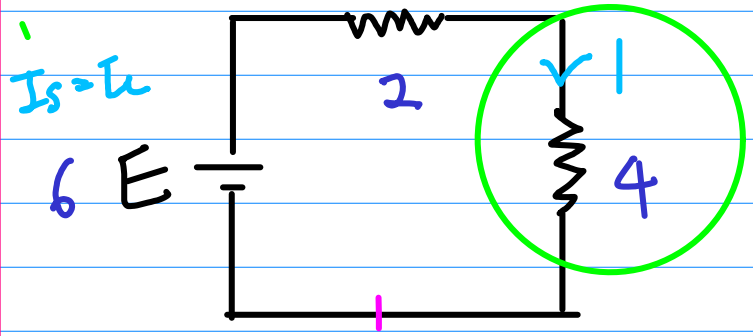


Current Divider

$I_S : I_L = 4 : 2$

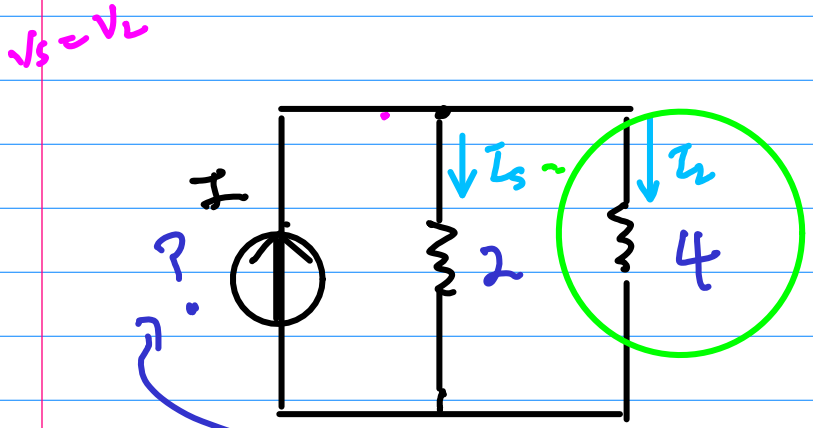
1A 之 $\frac{2}{3}$A, $\frac{1}{3}$A

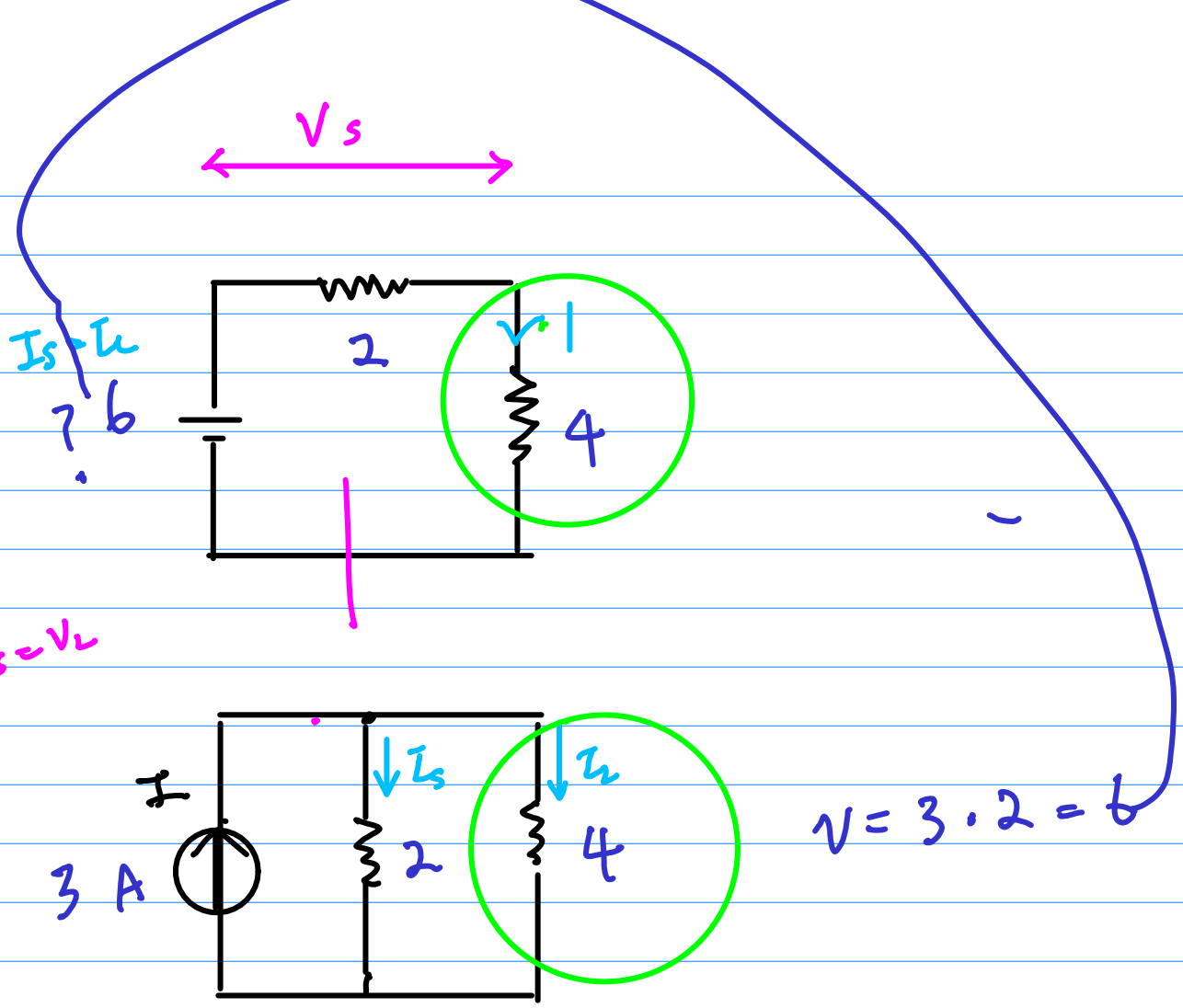
3A 之 2A, 1A

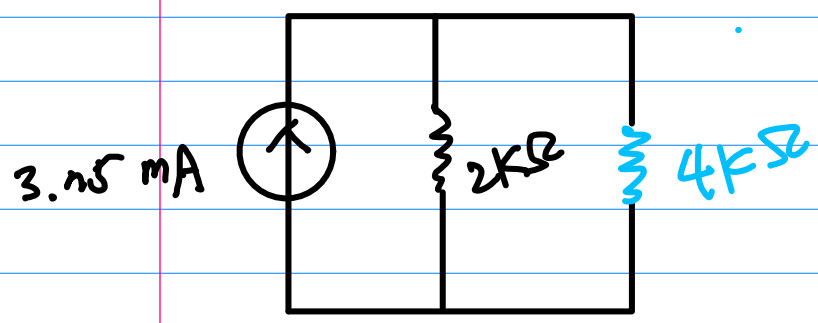


$6 = I \cdot 2$

$I = 3$

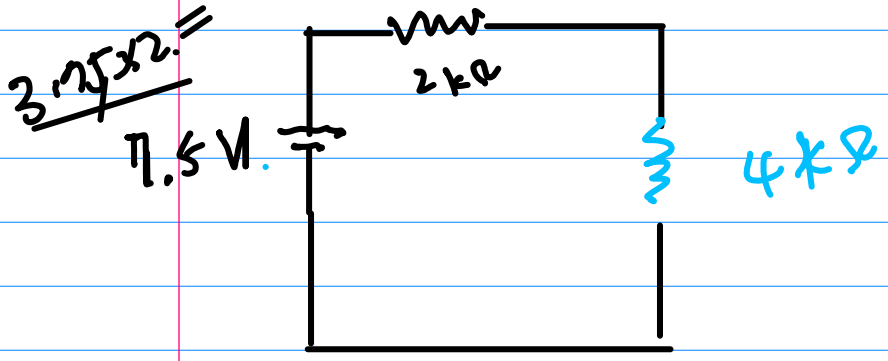



Vs
Is=IL
2
4
Vs=VL
I
3 A
Is
IL
2
4
V=3·2=6



$I_L = 3.75 \times \frac{1}{3}$

$V_L = \frac{4}{3} \times 3.75$



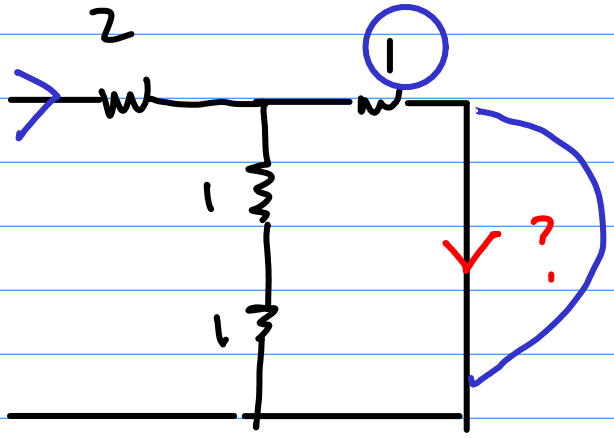
$V_L = 7.5 \times \frac{2}{3}$

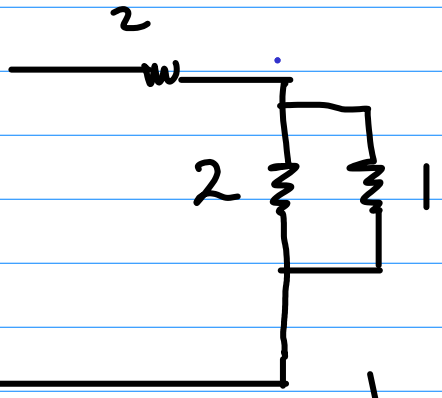
$I_L = 7.5 \times \frac{2}{3} \times \frac{1}{4}$

$= 3.75 \times \frac{2}{3} \times \frac{1}{4}$

5.625

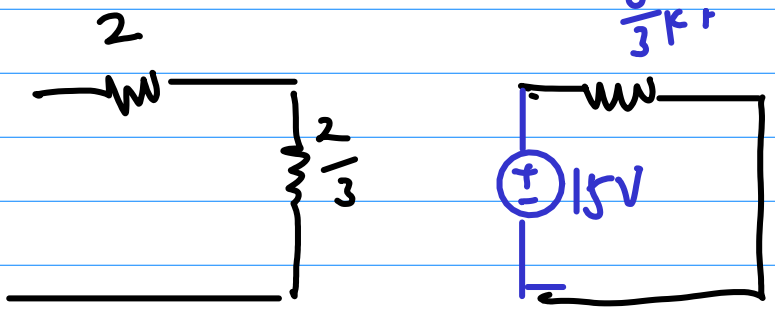
15V − 5.625 × 2





$$\frac{1}{\frac{1}{2}+\frac{1}{1}} = \frac{1}{\frac{3}{2}}$$

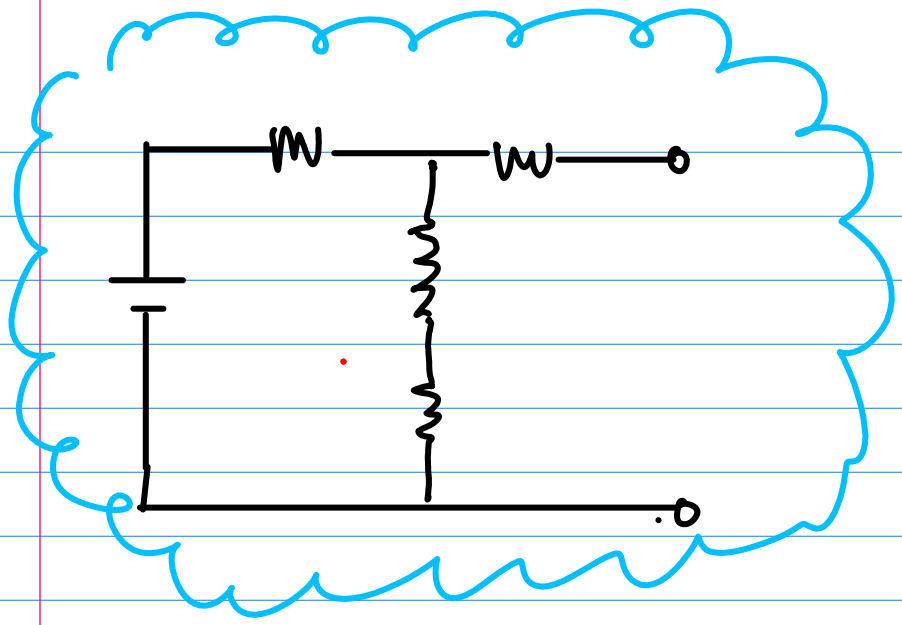
$$= \frac{2}{3}$$

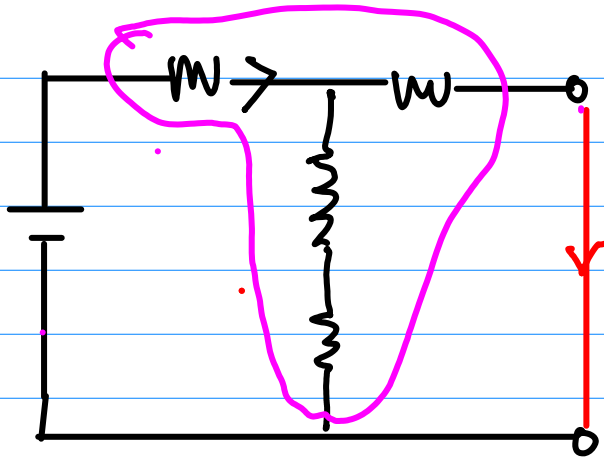


$$2 + \frac{2}{3} = \frac{8}{3}$$

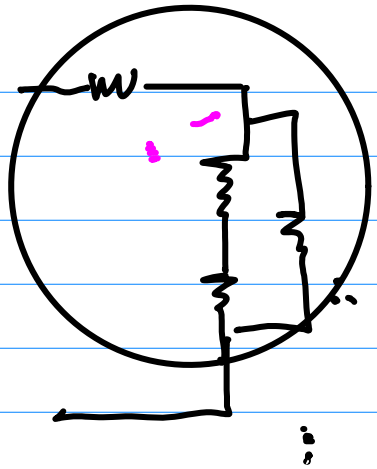
$$I = \frac{V}{R} = 15 \times \frac{3}{8}$$

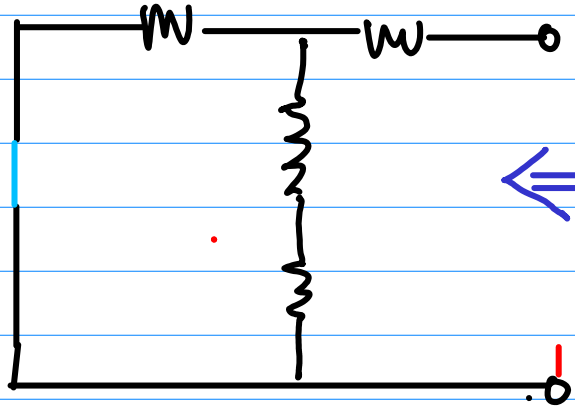
$$= \frac{45}{8} = 5$$



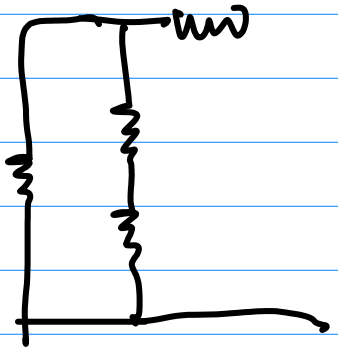


3.75mA

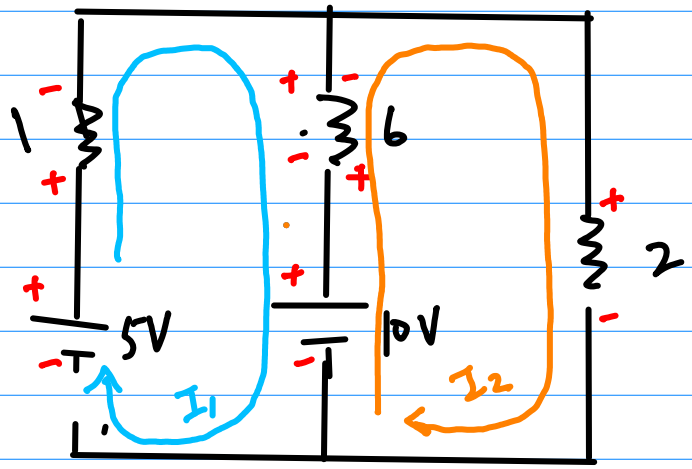


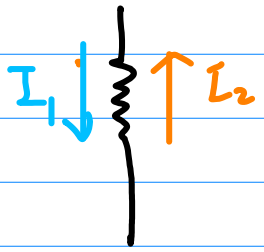


2kΩ



Mesh analysis



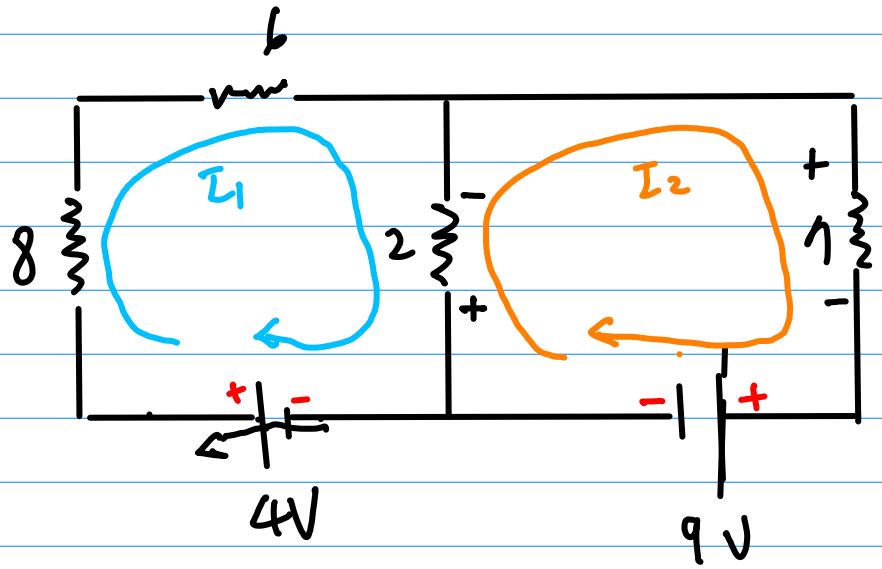


$$5 - 1(I_1) - 6(I_1 - I_2) - 10 = 0$$

$$10 - 6(I_2 - I_1) - 2(I_2) = 0$$

$$-7I_1 + 6I_2 = 5$$

$$6I_1 - 8I_2 = -10$$

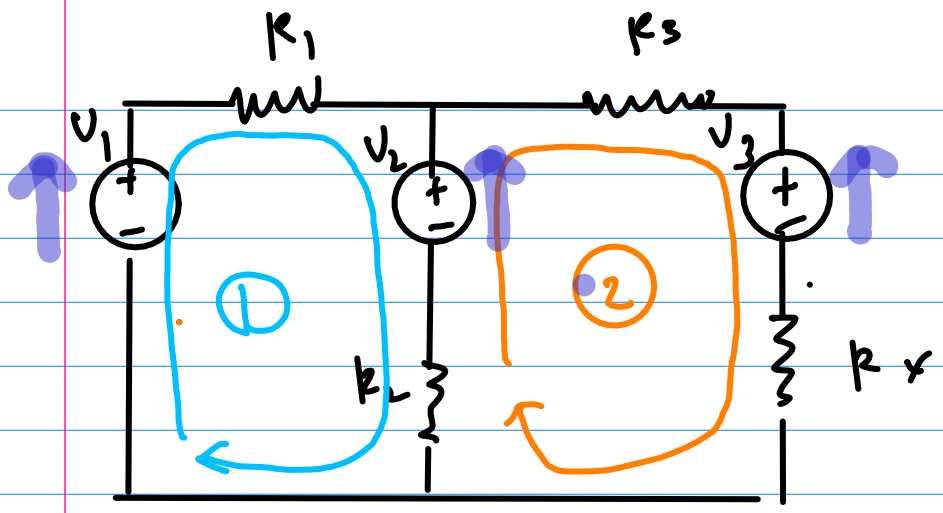


$$4 - 8(I_1) - 6(I_1) - 2(I_1 - I_2) = 0$$

$$-16I_1 + 2I_2 = -4$$

$$(-9) - 2(I_2 - I_1) - 1(I_2) = 0$$

$$2I_1 - 9I_2 = 9$$

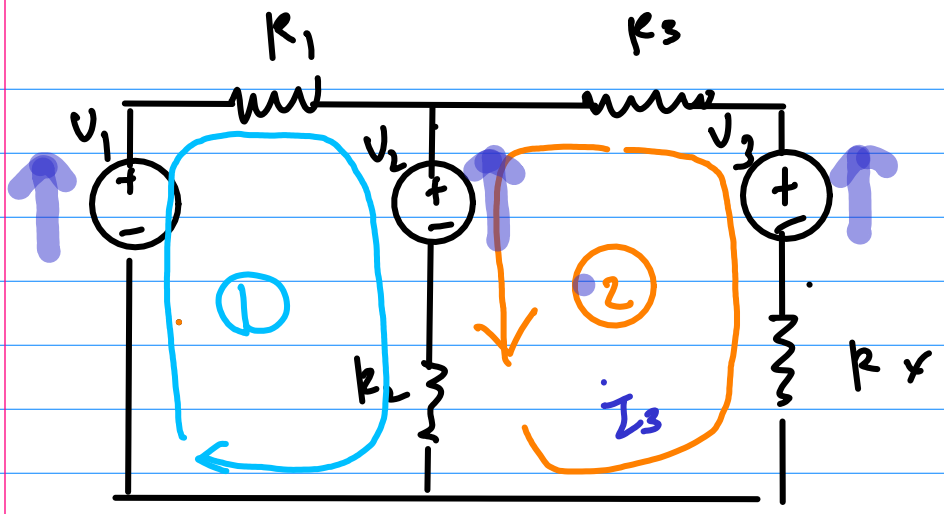


$$V_1 - R_1(I_1) - V_2 - R_2(I_1 - I_2) = 0$$

$$V_2 - R_3(I_2) - V_3 - R_x(I_2) - R_2(I_2 - I_1) = 0$$

$$V_2 - V_3 - (R_2 + R_3 + R_x)I_2 + R_2 I_1 = 0$$

$$-V_2 + V_3 + (R_2 + R_3 + R_x)I_2 - R_2 I_1 = 0$$

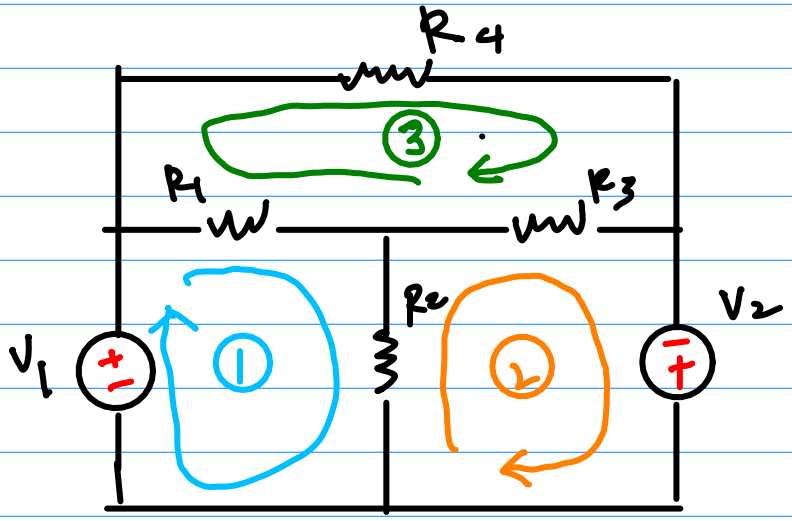


$$-V_2 - R_2(I_3 + I_1) - R_x(I_3) + V_3 - R_3(I_3) = 0$$

$$-V_2 + V_3 - (R_2 + R_3 + R_x) I_3 - R_2 I_1 = 0$$

$$-V_2 + V_3 + (R_2 + R_3 + R_x) I_2 - R_2 I_1 = 0$$

예제 3.8 p86 2번 3.19

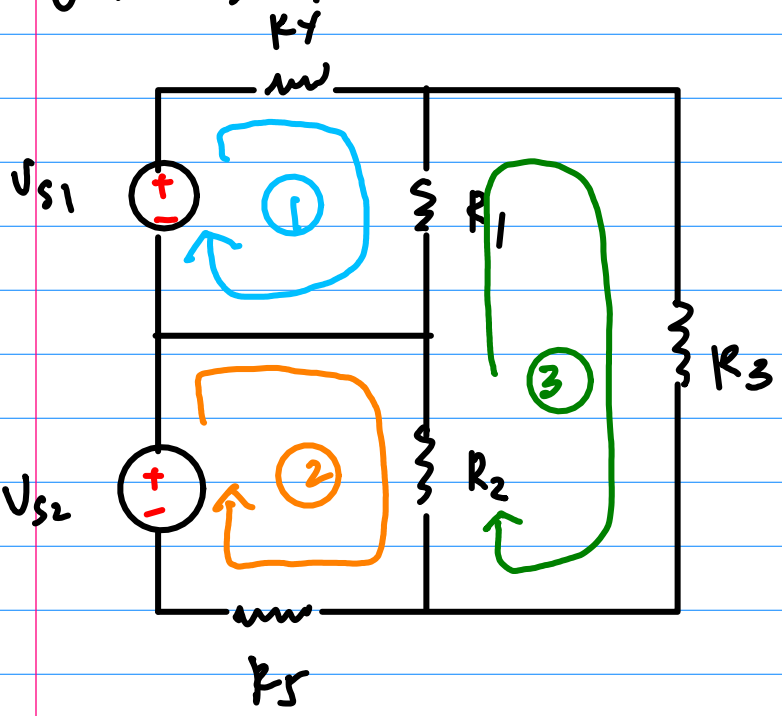


① $V_1 - R_1(I_1 - I_3) - R_2(I_1 - I_2) = 0$

② $-R_2(I_2 - I_1) - R_3(I_2 - I_3) + V_2 = 0$

③ $-R_1(I_3 - I_1) - R_4(I_3\ \ ) - R_3(I_3 - I_2) = 0$

Ejemplo 3.9



① $+V_{S1} - R_4(I_1) - R_1(I_1 - I_3) = 0$

② $V_{S2} - R_2(I_2 - I_3) - R_5(I_2) = 0$

③ $-R_1(I_3 - I_1) - R_3(I_3) - R_2(I_3 - I_2) = 0$

P85 계속.

$$15\,i_1 - 10\,i_2 = 1$$
$$-10\,i_1 + 20\,i_2 = 8$$

$$\begin{bmatrix} 15 & -10 \\ -10 & 0 \end{bmatrix}\begin{bmatrix} i_1 \\ i_2 \end{bmatrix} = \begin{bmatrix} 1 \\ 8 \end{bmatrix}$$

$$\begin{vmatrix} 15 & -10 \\ -10 & 20 \end{vmatrix} = +300 - (100) = 200$$

$$\begin{vmatrix} 1 & -10 \\ 8 & 20 \end{vmatrix} = 20 + 80 = 100 \qquad \frac{100}{200}$$

$$\begin{vmatrix} 15 & 1 \\ -10 & 8 \end{vmatrix} = 120 + 10 = 130 \qquad \frac{130}{200}$$