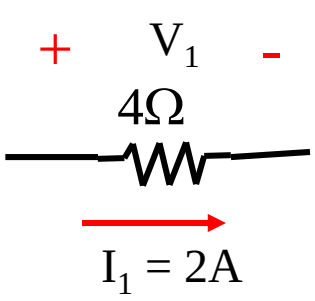
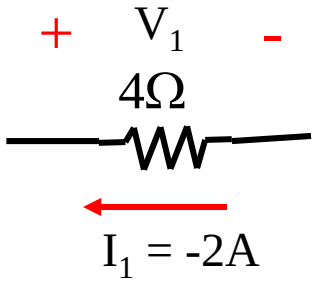


$$V_1 = +I_1 R$$

$$V_1 = +(2A)(4\Omega)$$

$$V_1 = +8v$$



$$V_1 = -I_1 R$$

$$V_1 = -(-2A)(4\Omega)$$

$$V_1 = +8v$$

$$\mathbf{V_1 = +I_1 R}$$

Kirchhoff's Current Law (KCL)

$\Sigma I = 0$ ***OR*** $\sum I_{in} = \sum I_{out}$

-- at any nodes

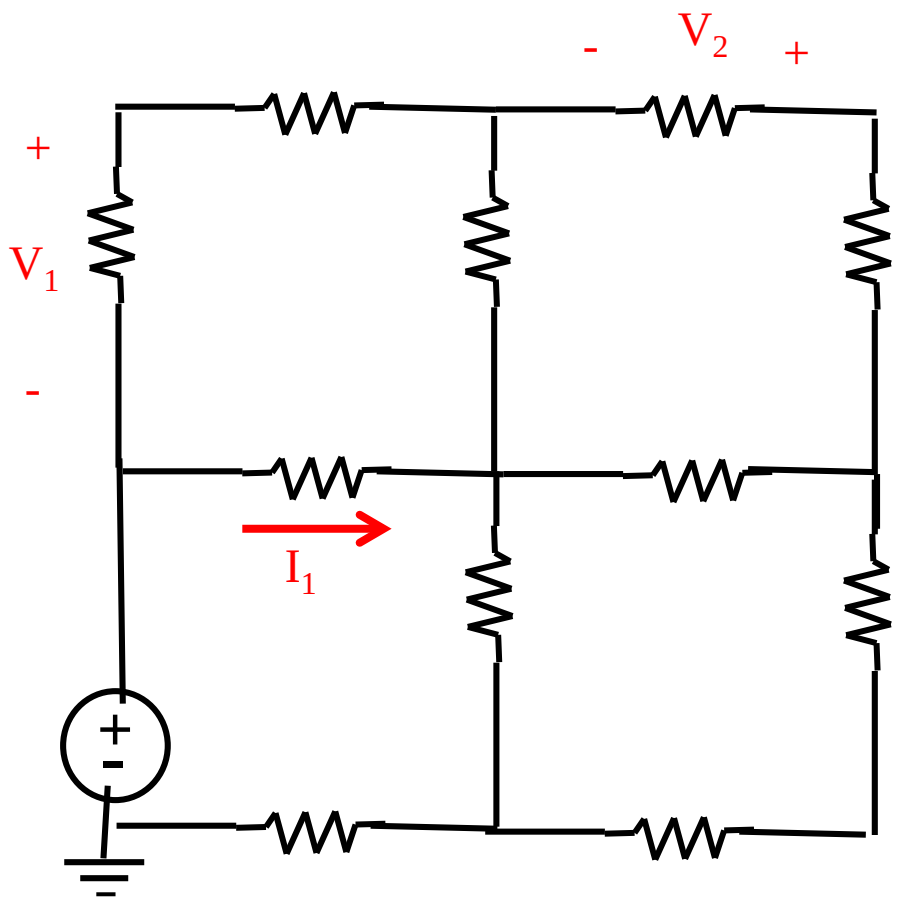
-- conservation of charge

Kirchhoff's Voltage Law (KVL)

$\Sigma V = 0$

-- at any closed loop

-- conservation of energy



$V_1 = ?$

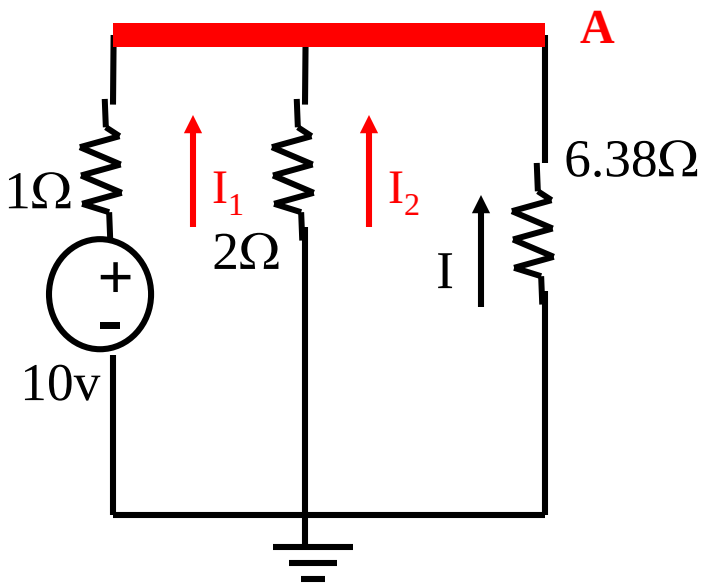
$V_2 = ?$

$I_1 = ?$

$$V = IR$$
$$\sum I = 0$$
$$\sum V = 0$$

Nodal Analysis (using KCL)

$$\sum I = 0$$

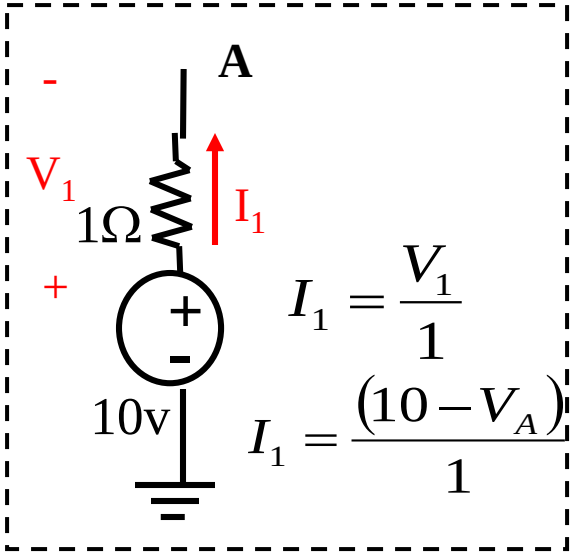


$$I_1 + I_2 + I = 0$$

$$\frac{(10 - \mathbf{V_A})}{1} + \frac{(0 - \mathbf{V_A})}{2} + \frac{(0 - \mathbf{V_A})}{6.38} = 0$$

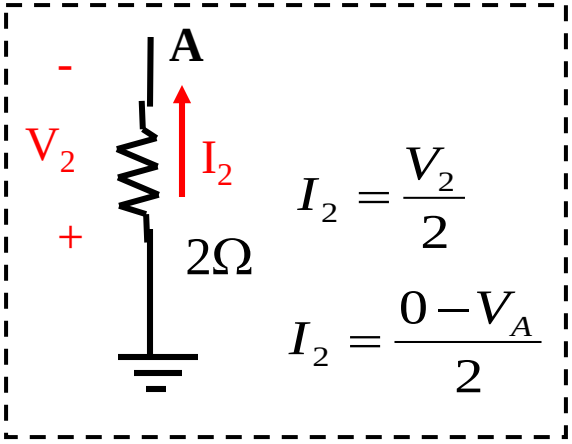
$$V_A = 6.04v$$

$$I = -0.947A$$



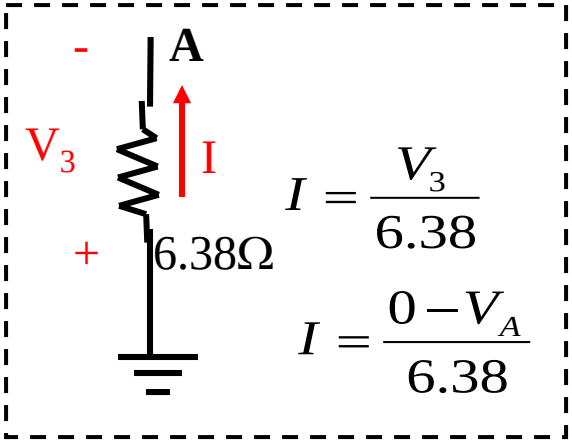
$$I_1 = \frac{V_1}{1}$$

$$I_1 = \frac{(10 - V_A)}{1}$$



$$I_2 = \frac{V_2}{2}$$

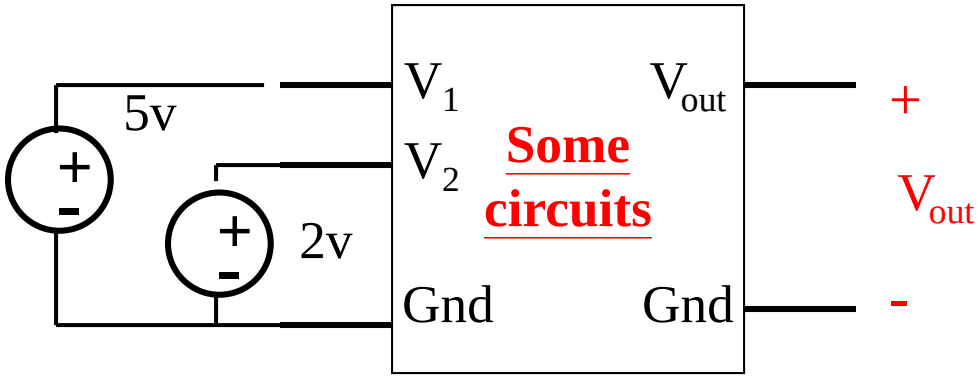
$$I_2 = \frac{0 - V_A}{2}$$



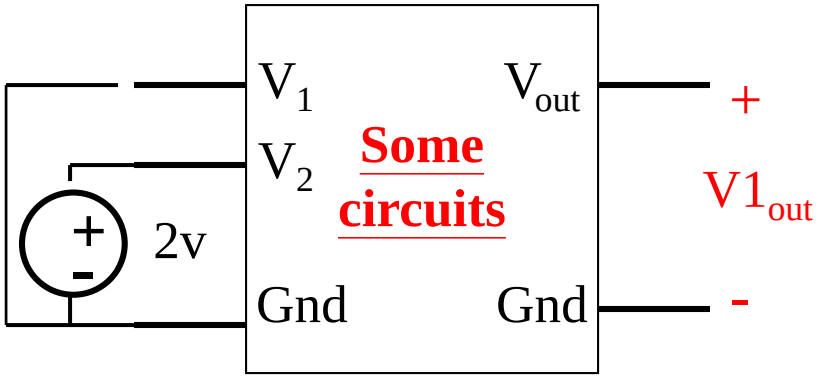
$$I = \frac{V_3}{6.38}$$

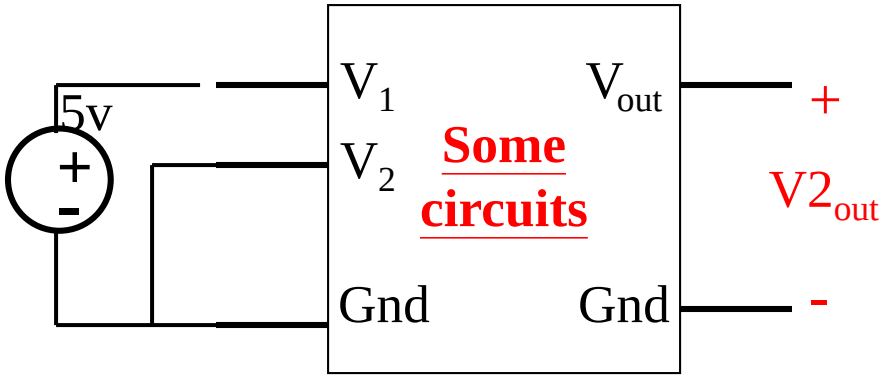
$$I = \frac{0 - V_A}{6.38}$$

Superposition



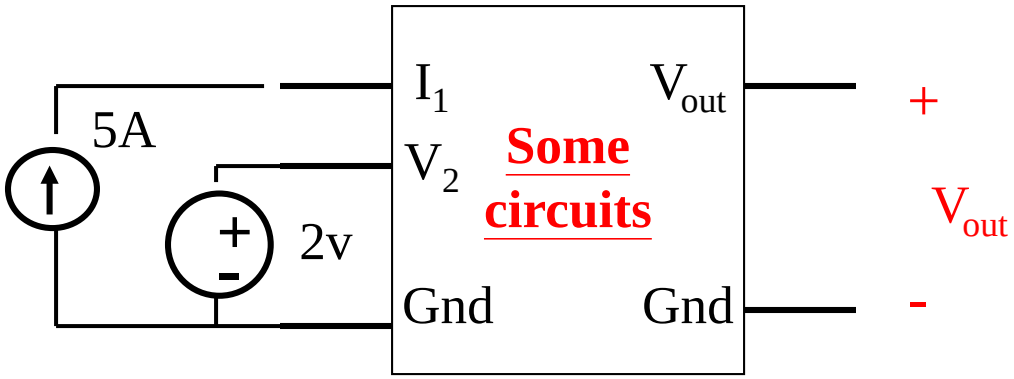
$\mathbf{V_{out} = ?}$



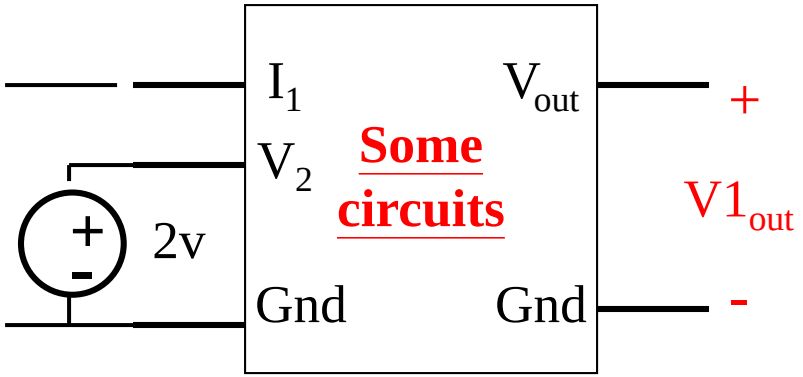


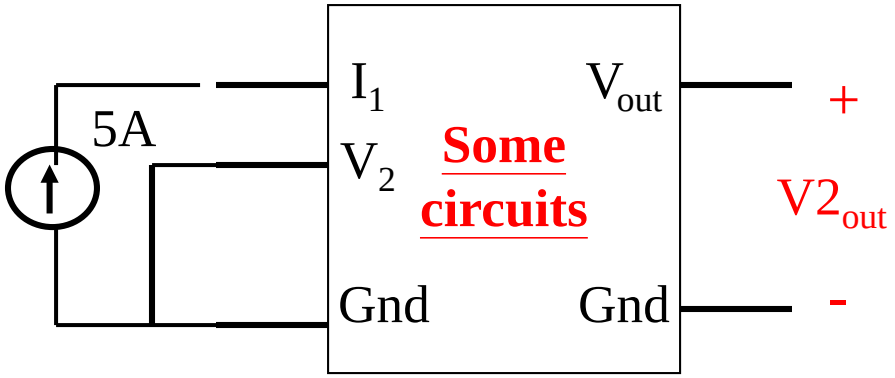
$$V_{out} = V1_{out} + V2_{out}$$

Superposition



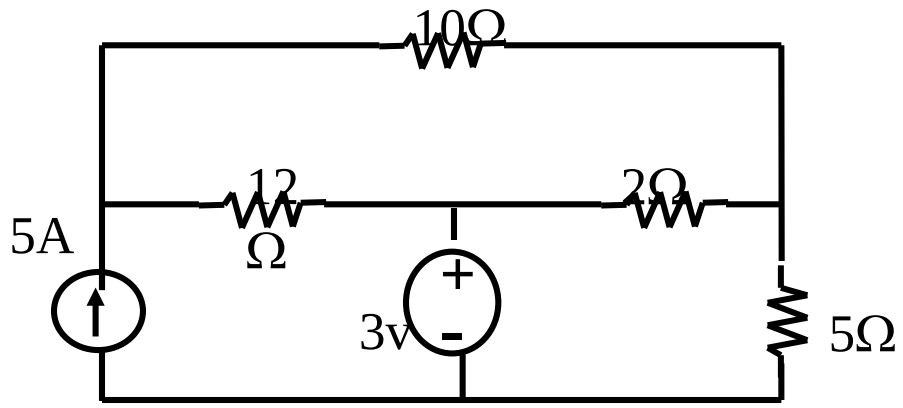
V_{out} = ?





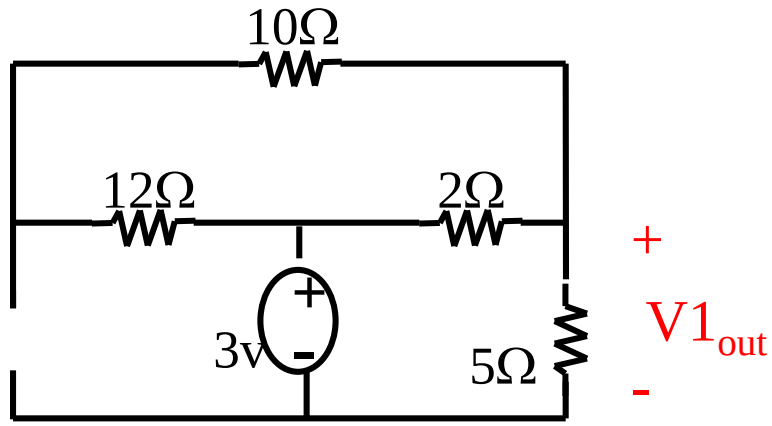
$$V_{out} = V1_{out} + V2_{out}$$

Superposition

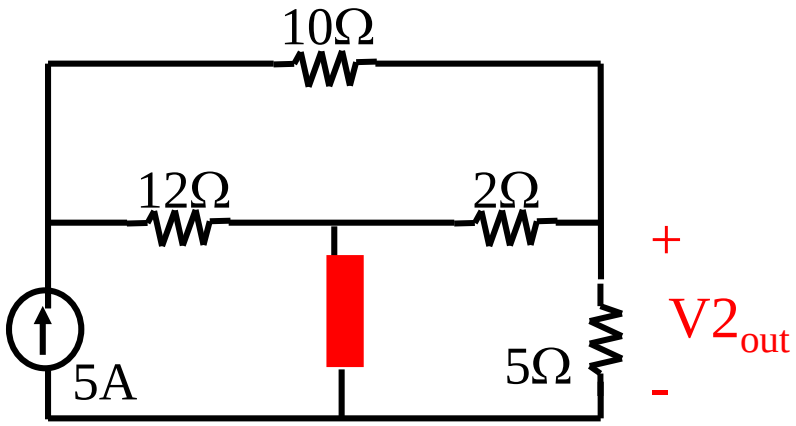


- **OPEN** the current source
- **SHORT** the voltage source

- ***OPEN*** *the current source*



- ***SHORT*** *the voltage source*



$$V_{out} = V1_{out} + V2_{out}$$

(Source Transform)