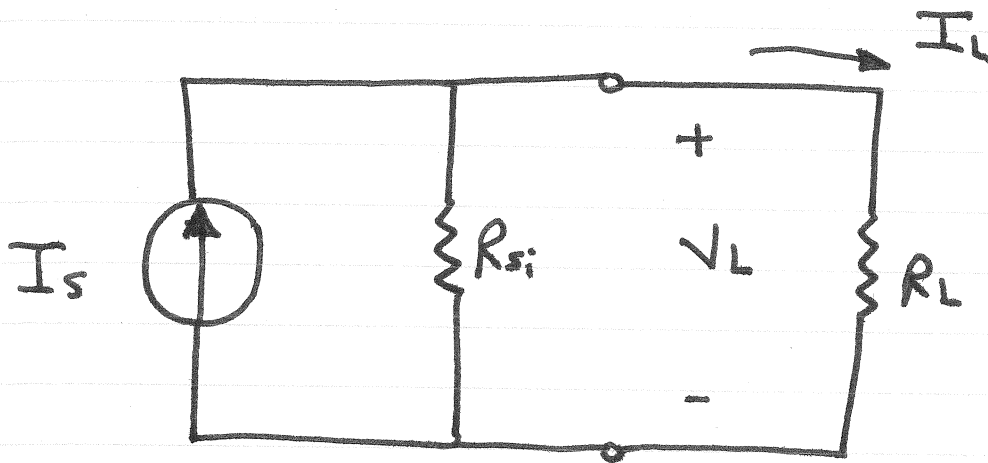
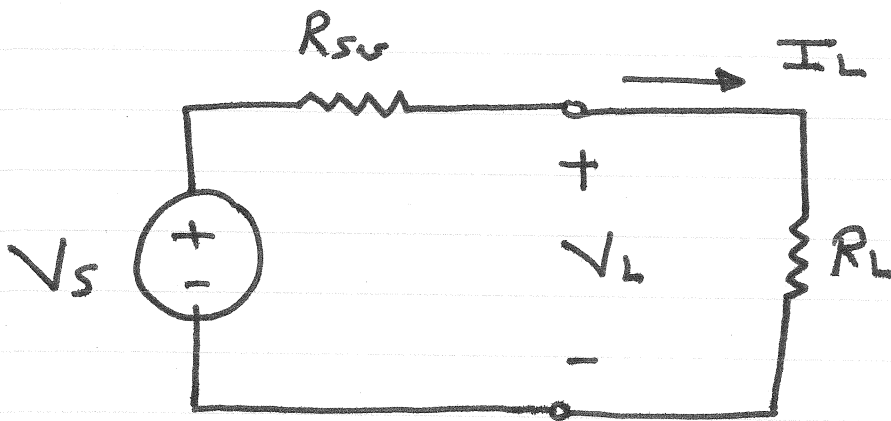
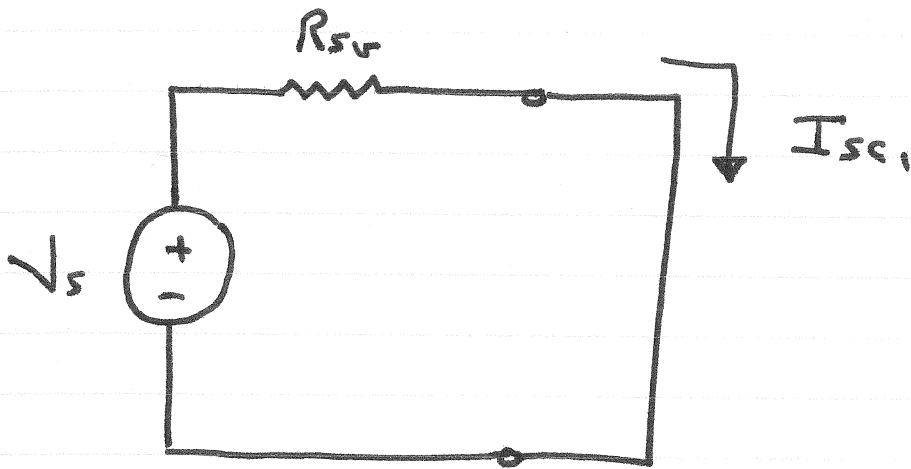


Source Transformation

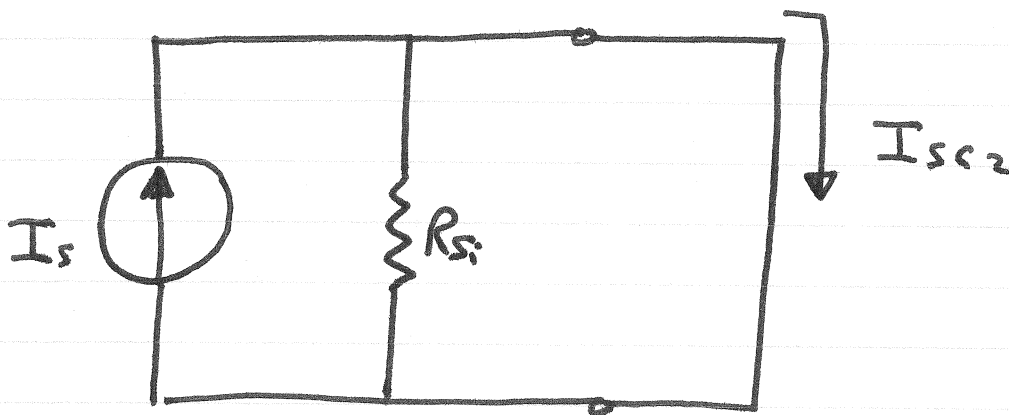


Two sources are equivalent, if each produces identical current and identical voltage in any load which is placed across its terminal.

1) let $R_L = 0$ (short circuit)



$$I_{sc1} = \frac{V_s}{R_{sr}}$$



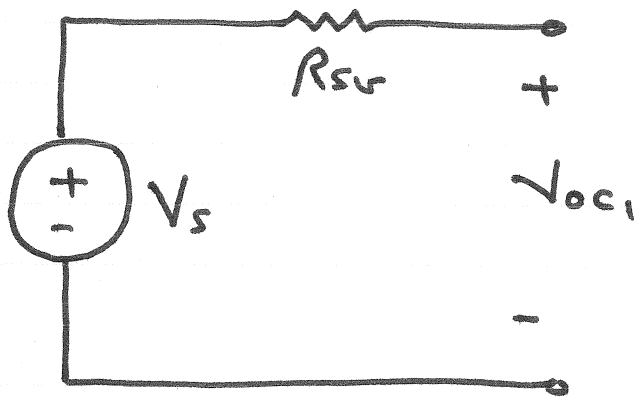
$$I_{sc2} = I_s$$

For $I_{sc1} = I_{sc2}$

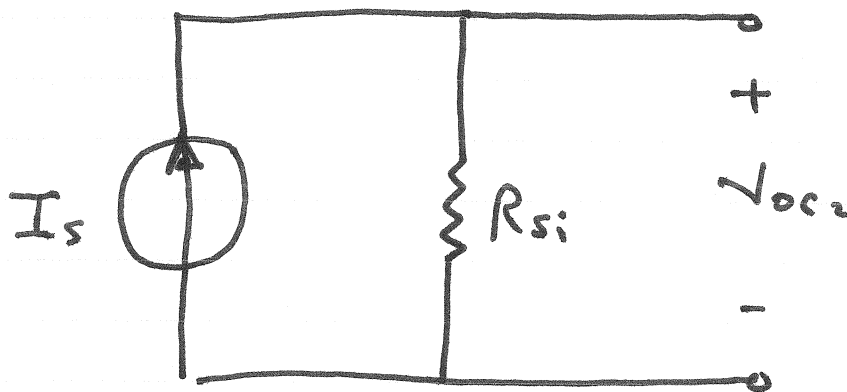
$$\boxed{\frac{V_s}{R_{sr}} = I_s}$$

— ①

2) Let $R_L = \infty$ (open circuit)



$$V_{oc1} = V_s$$



$$V_{oc2} = I_s R_{si}$$

$$\text{For } V_{oc1} = V_{oc2}$$

$$\boxed{V_s = I_s R_{si}}$$

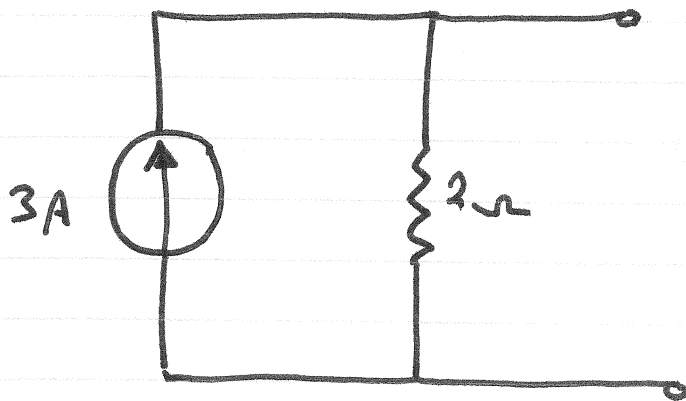
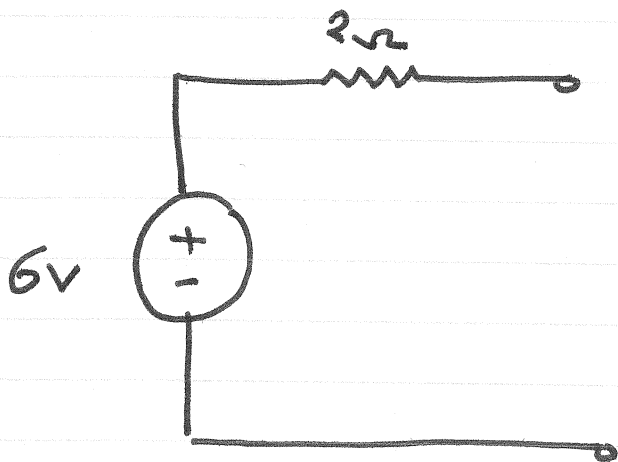
— (2)

$$V_s = I_s R_{si}$$

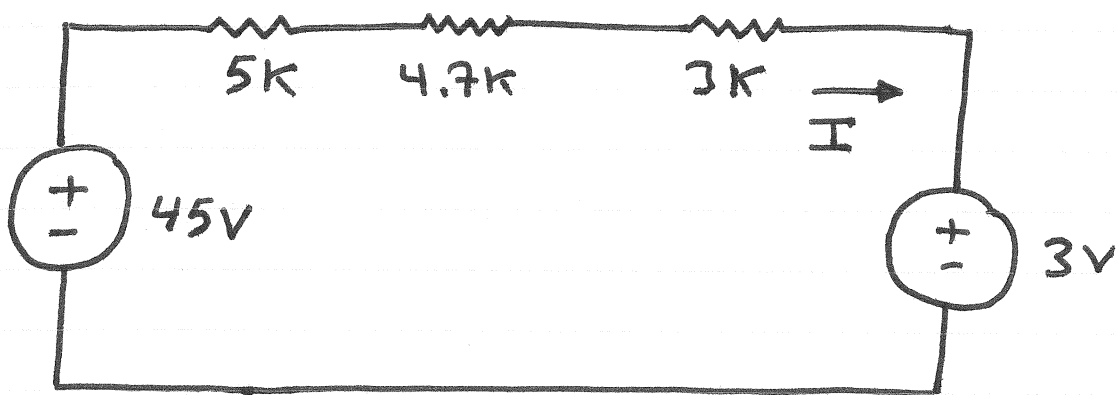
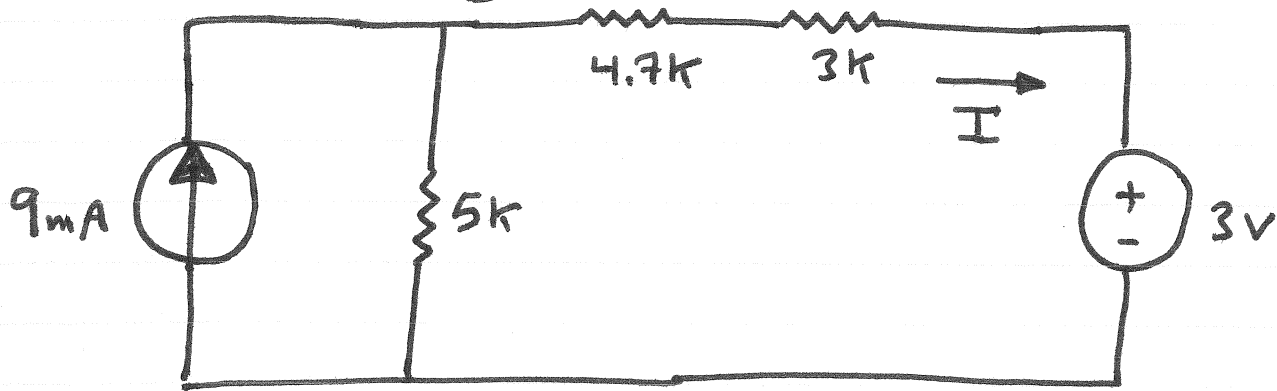
using equation ①, we get

$$V_s = I_s R_{sr}$$

$$\therefore R_{si} = R_{sr}$$



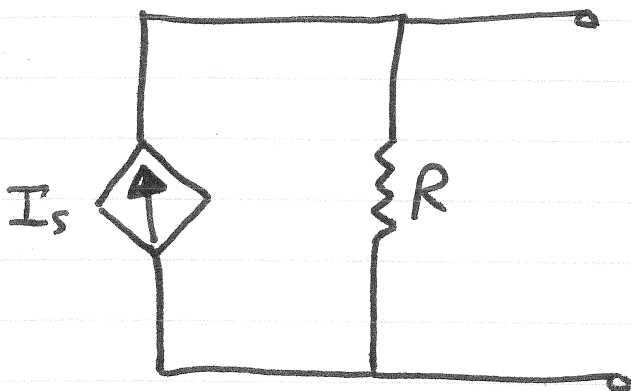
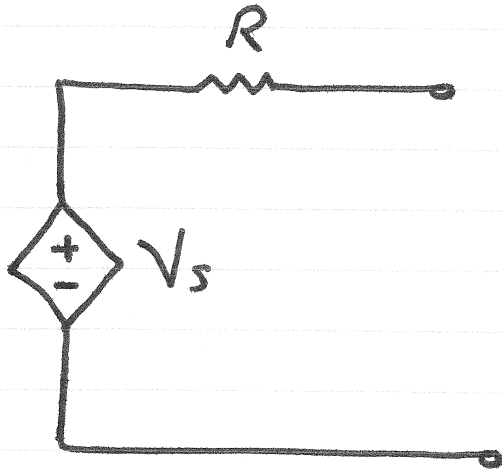
Find I using source transformation



$$I = \frac{45 - 3}{5\text{k} + 4.7\text{k} + 3\text{k}} = 3.3\text{mA}$$

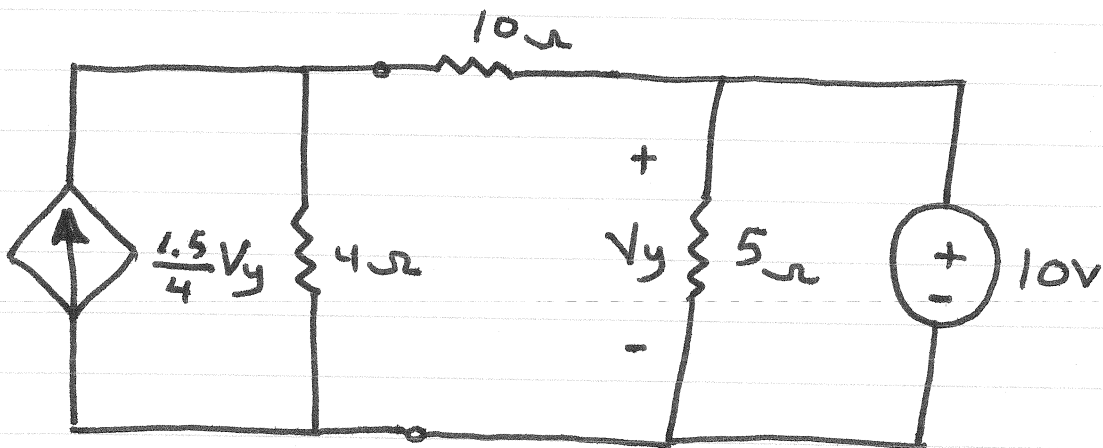
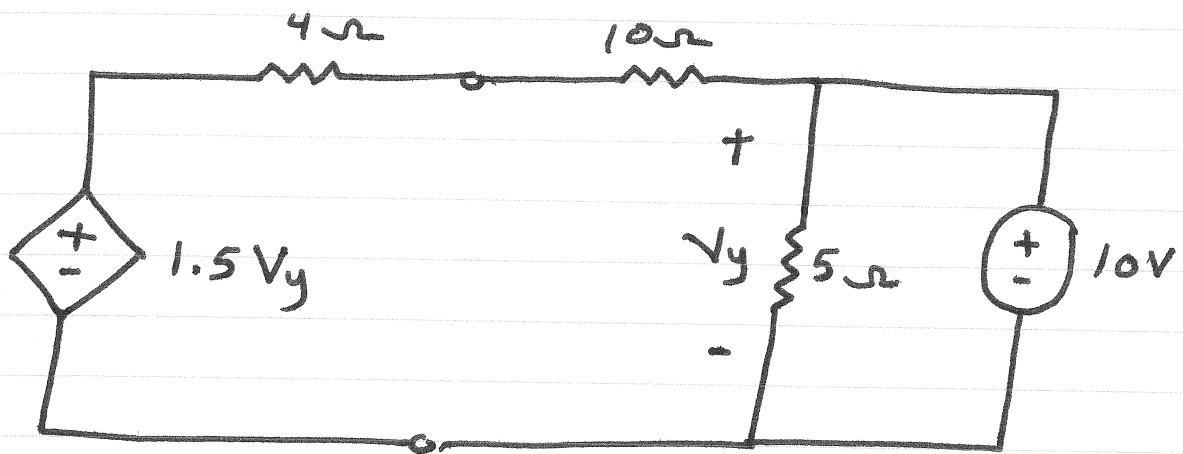
Source Transformation

Dependent Sources

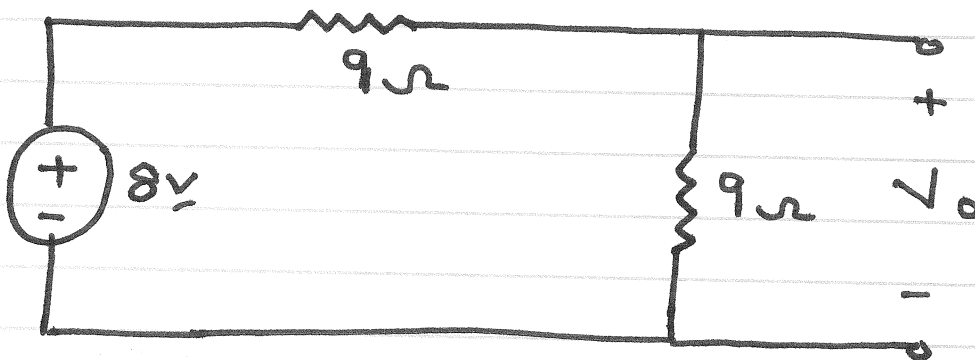
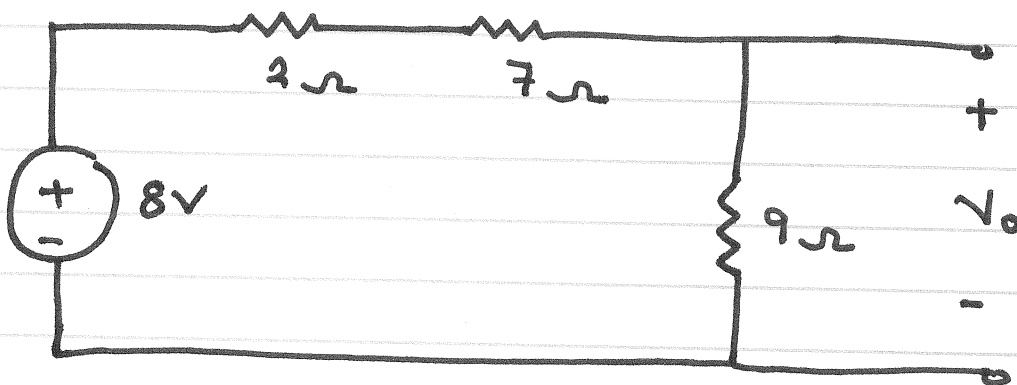
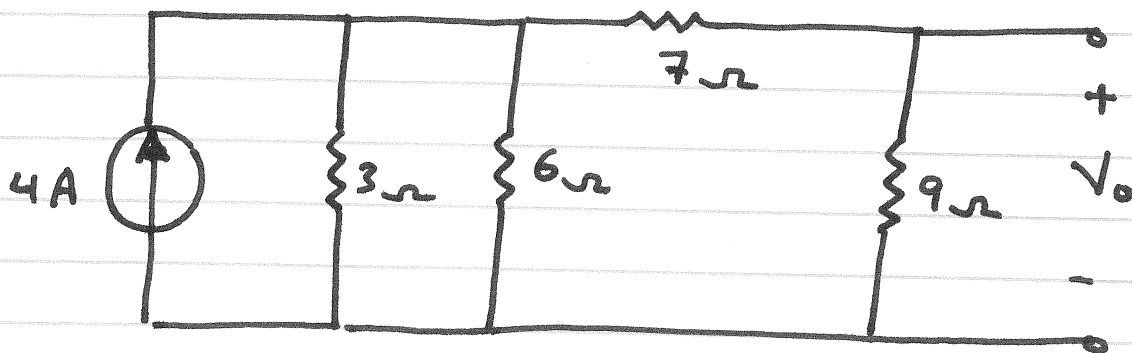
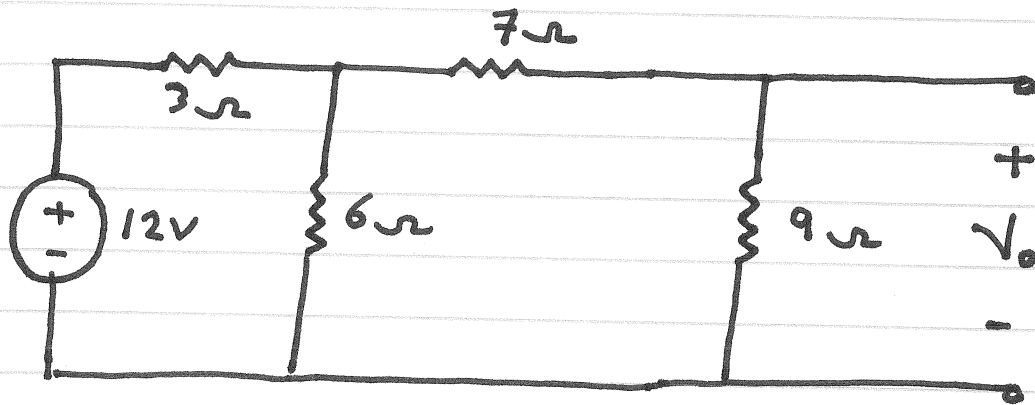


$$I_s = \frac{V_s}{R}$$

The Control variable must be outside the transformation.



Find V_o using source transformation



$$V_o = \frac{9}{9+9} \cdot 8V = 4V$$

-98-