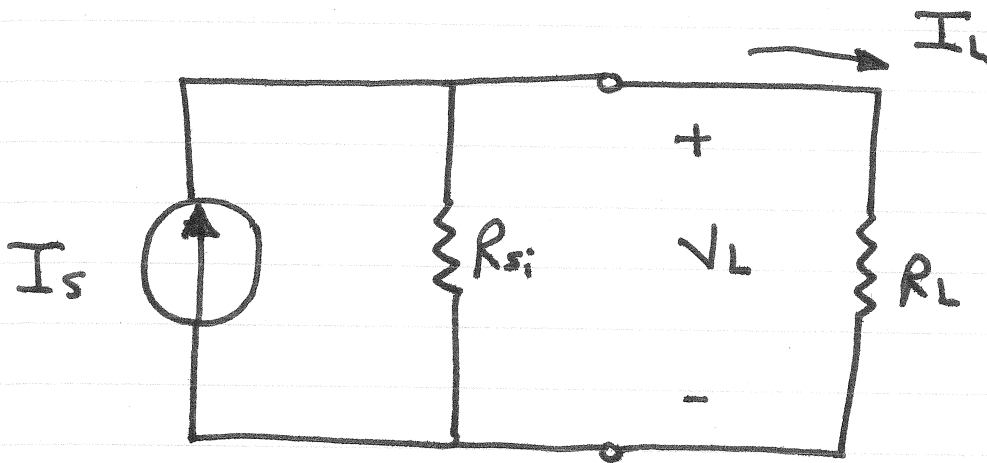
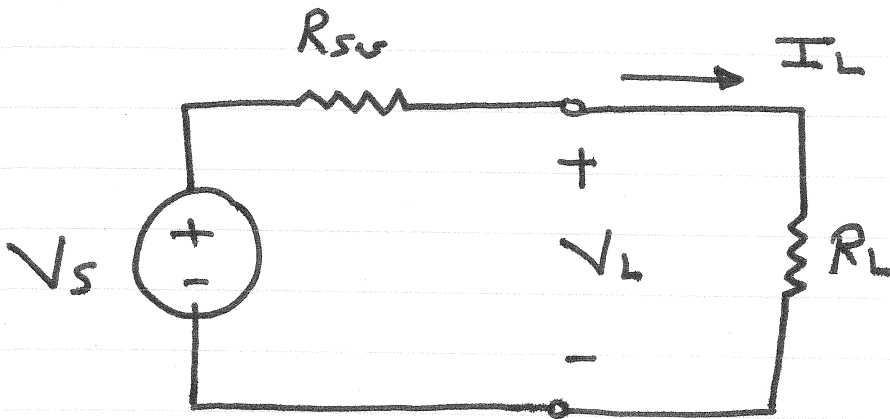


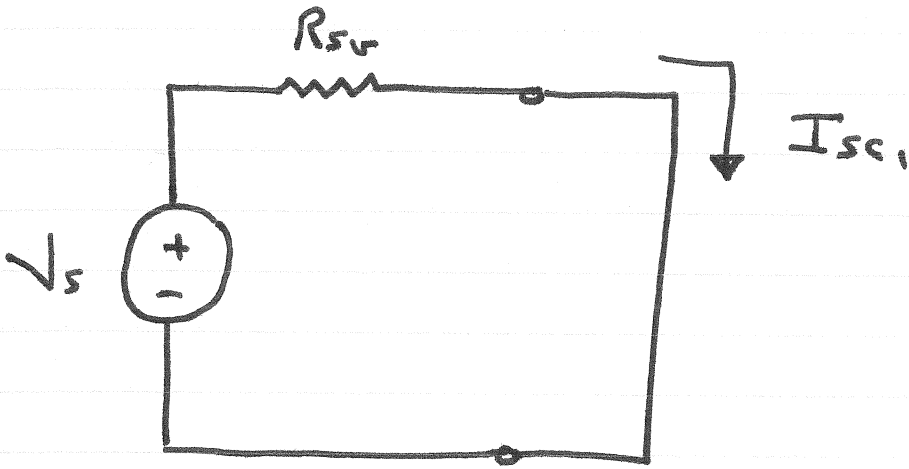
# Source Transformation

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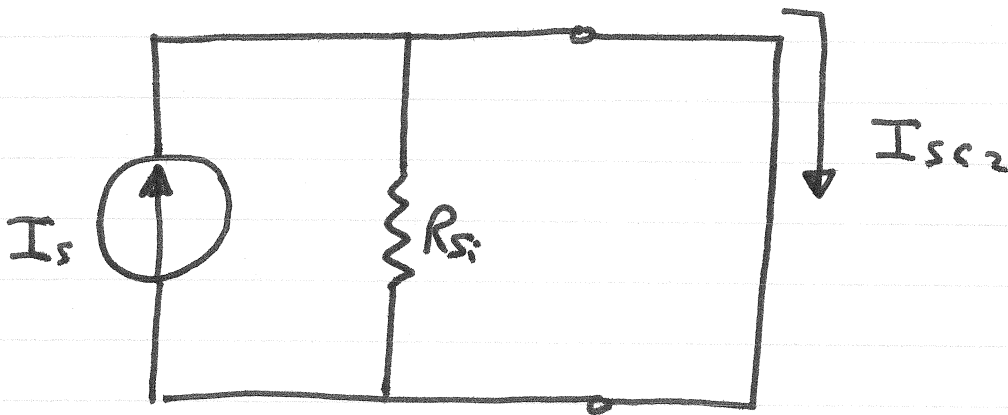


Two sources are equivalent, if each produces identical current and identical voltage in any load which is placed across its terminal.

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



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



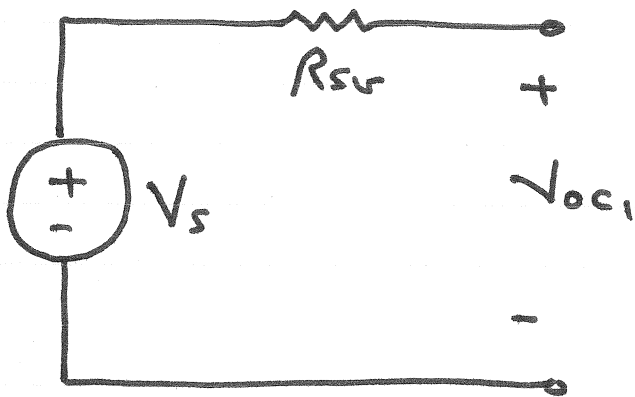
$$I_{sc2} = I_s$$

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

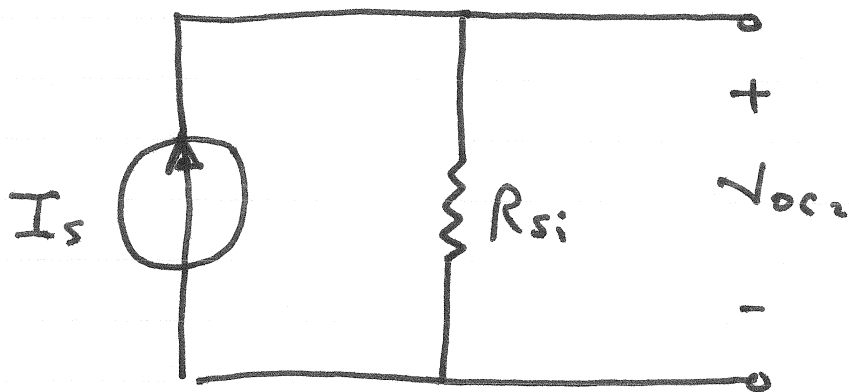
$$\frac{V_s}{R_{sv}} = I_s$$

— ①

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



$$V_{oc1} = V_s$$



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

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

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

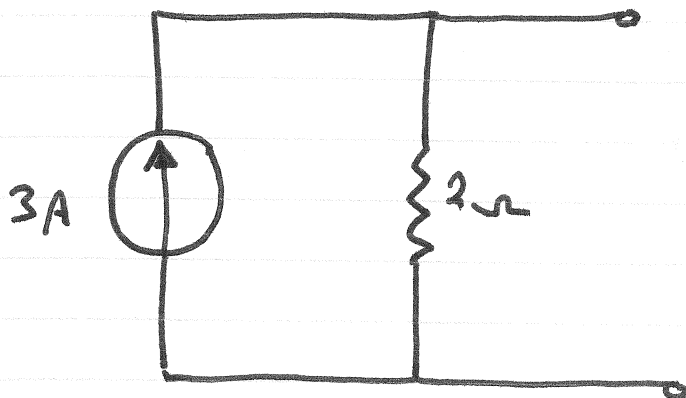
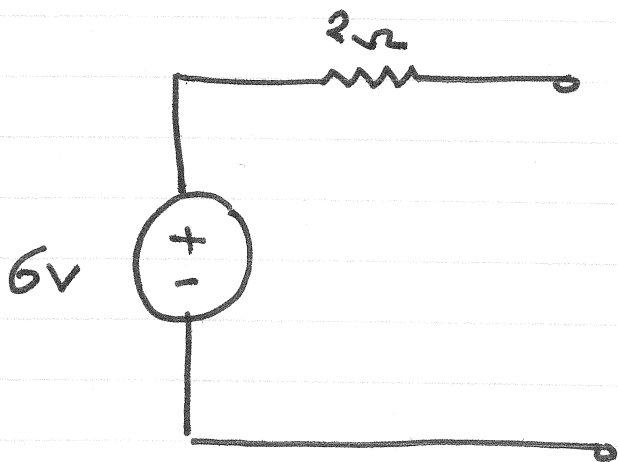
— (2)

$$V_s = I_s R_{si}$$

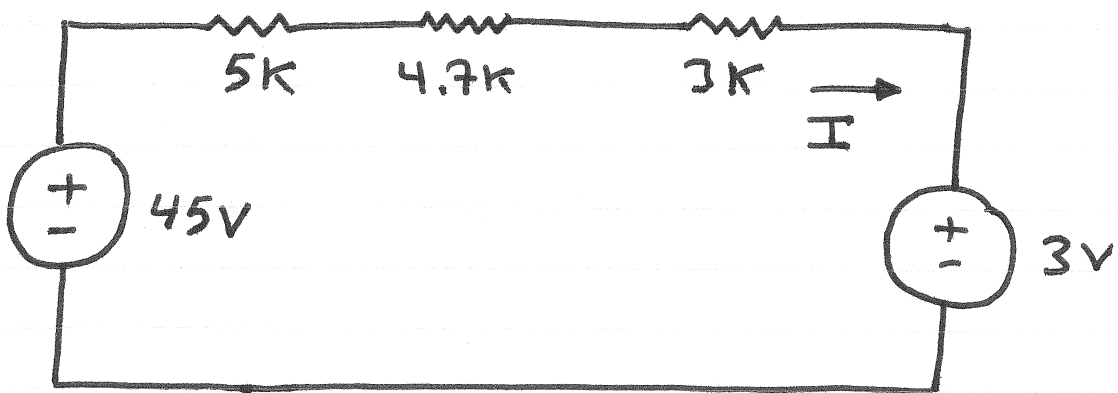
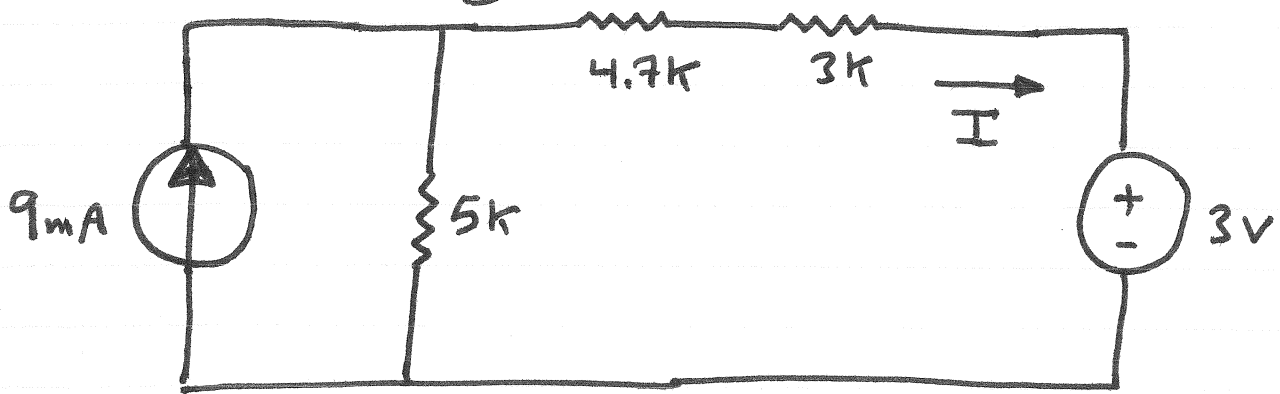
using equation ①, we get

$$V_s = I_s R_{sr}$$

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



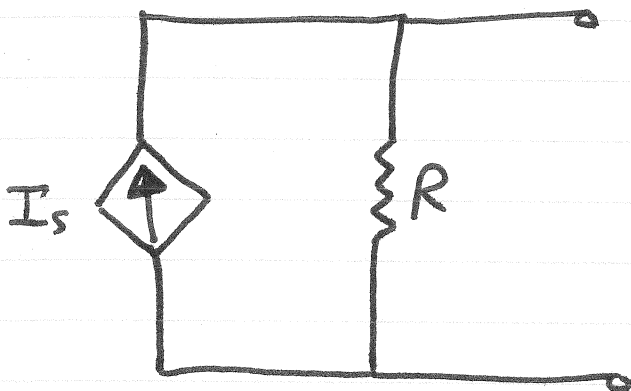
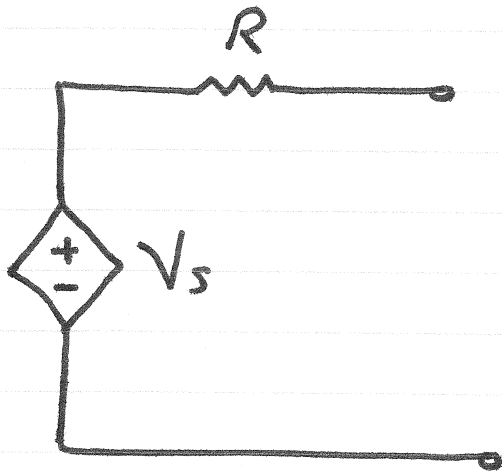
Find I using source transformation



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

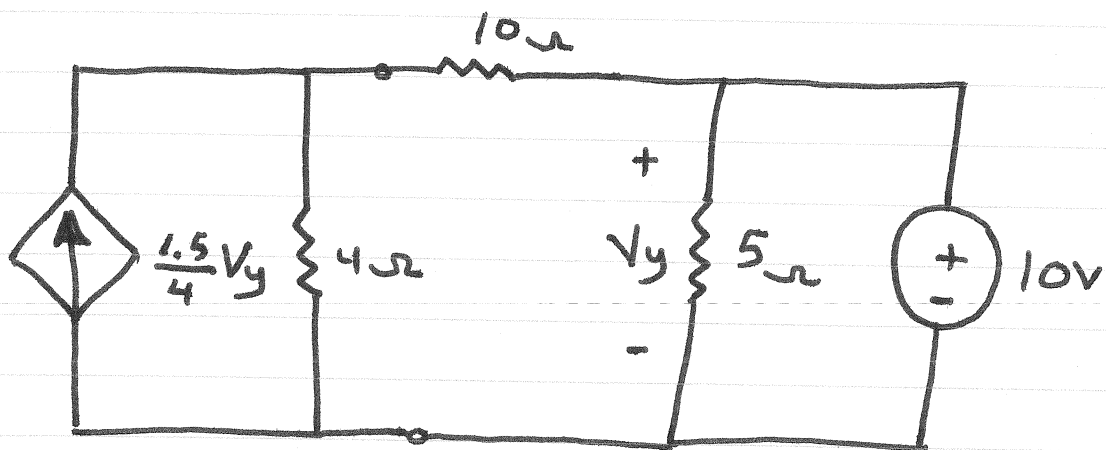
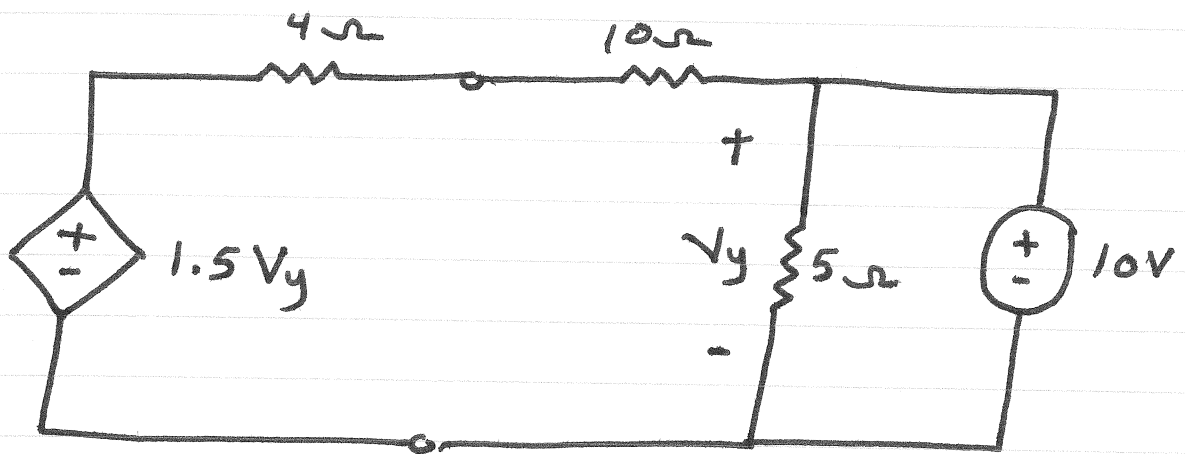
# Source Transformation

## Dependent Sources

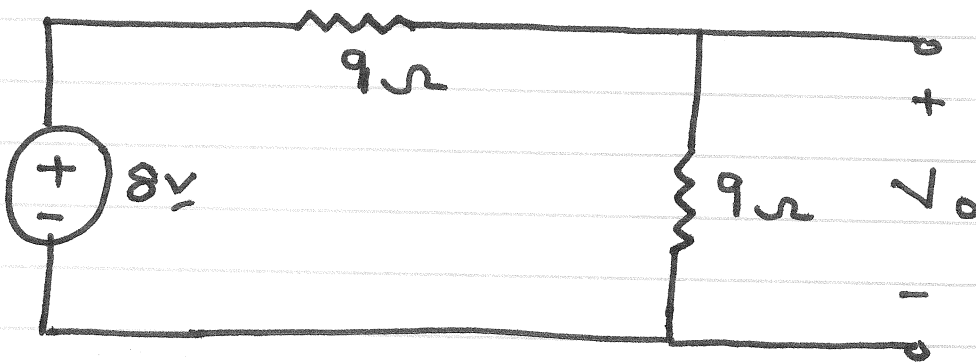
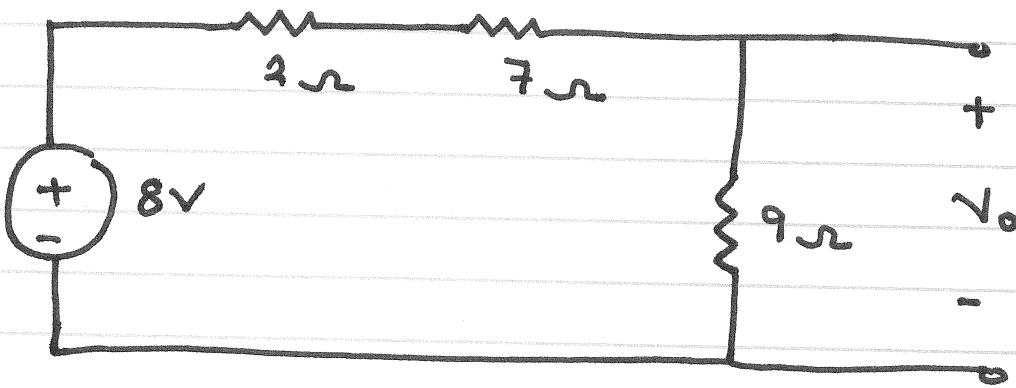
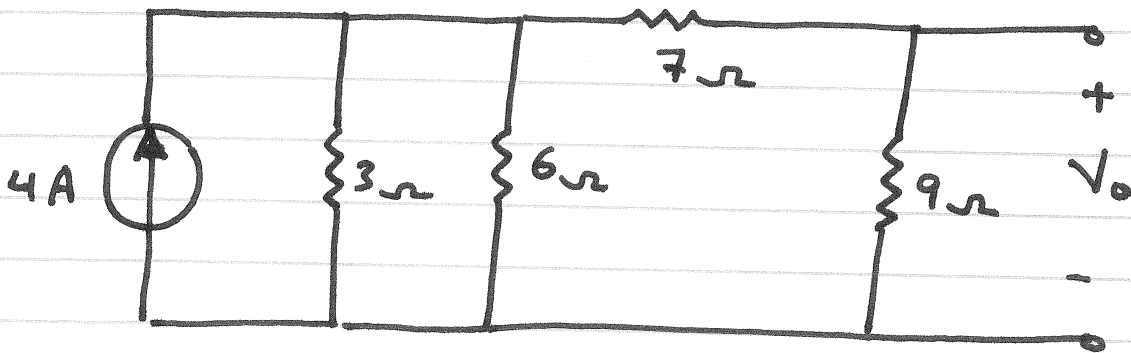
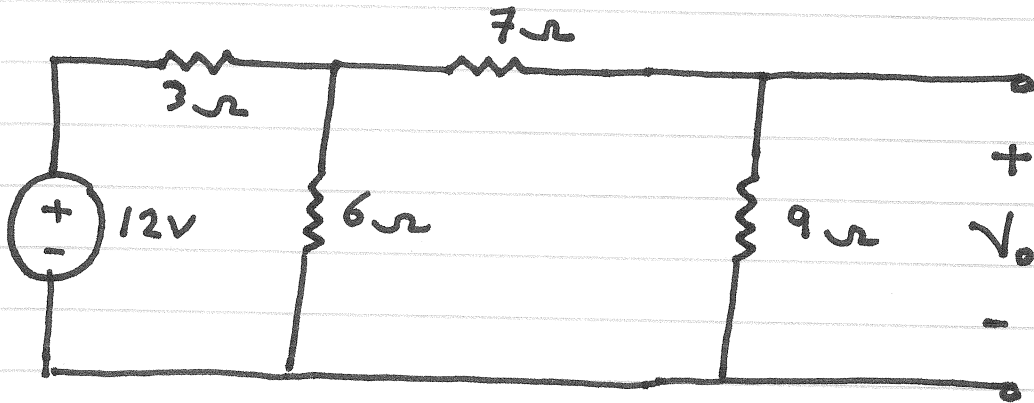


$$I_s = \frac{V_s}{R}$$

The control variable must be outside the transformation.



Find  $V_o$  using source transformation



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