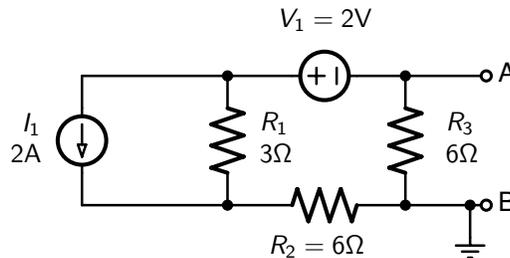


Problem Set 1 - Circuit Review

Question 1

Consider the circuit shown below where it is desired to find the Norton and Thevenin equivalent circuits between nodes A/B. Use i_{sc} for the short circuit output current and v_{oc} for the open circuit output voltage and R_{out} for the output resistance.

Solve by using Thevenin/Norton source transformations.



Answer

$$R_{out} = 3.6\Omega$$

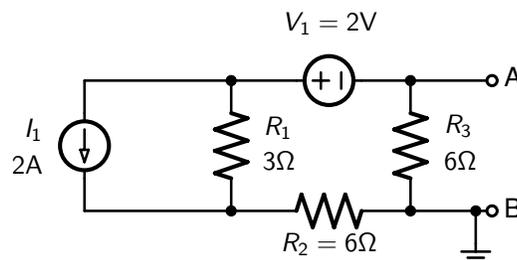
$$v_{oc} = -3.2V$$

$$i_{sc} = -0.8889A$$

Question 2

Consider the circuit shown below where it is desired to find the Norton and Thevenin equivalent circuits for the port A/B. Use i_{sc} for the short circuit output current and v_{oc} for the open circuit output voltage and R_{out} for the output resistance.

Solve by using superposition to find v_{oc} and find R_{out} directly from the above circuit. Then find i_{sc} .



Answer

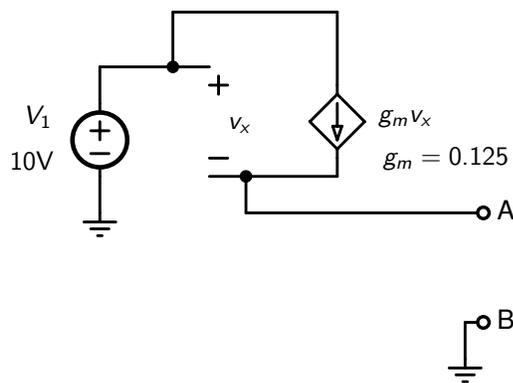
$$R_{out} = 3.6\Omega$$

$$v_{oc} = -3.2V$$

$$i_{sc} = -0.8889A$$

Question 3

Find the Norton equivalent circuit and the Thevenin equivalent circuit for the circuit shown below between nodes A and B. Use i_{sc} for the short circuit output current and v_{oc} for the open circuit output voltage and R_{out} for the output resistance.



Answer

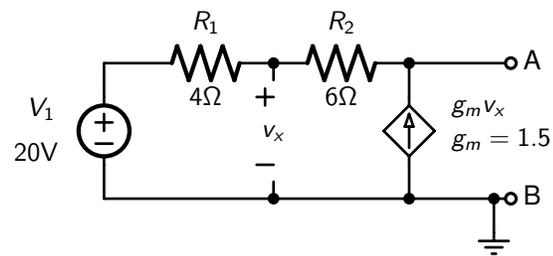
$$R_{out} = 8\Omega$$

$$v_{oc} = -10V$$

$$i_{sc} = -1.25A$$

Question 4

Find the Norton equivalent circuit and the Thevenin equivalent circuit for the circuit shown below between nodes A and B. Use i_{sc} for the short circuit output current and v_{oc} for the open circuit output voltage and R_{out} for the output resistance.



Answer

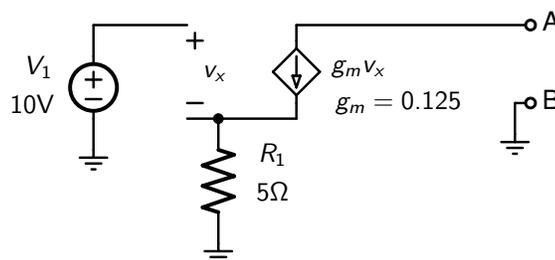
$$R_{out} = -2\Omega$$

$$v_{oc} = -40V$$

$$i_{sc} = 20A$$

Question 5

Find the Norton equivalent circuit and the Thevenin equivalent circuit for the circuit shown below between nodes A and B. Use i_{sc} for the short circuit output current and v_{oc} for the open circuit output voltage and R_{out} for the output resistance.



Answer

$$R_{out} \rightarrow \infty$$

$$v_{oc} \rightarrow \infty$$

$$i_{sc} = -0.7692A$$