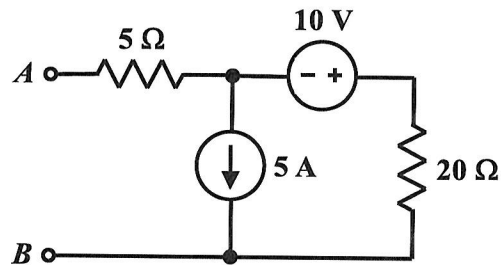
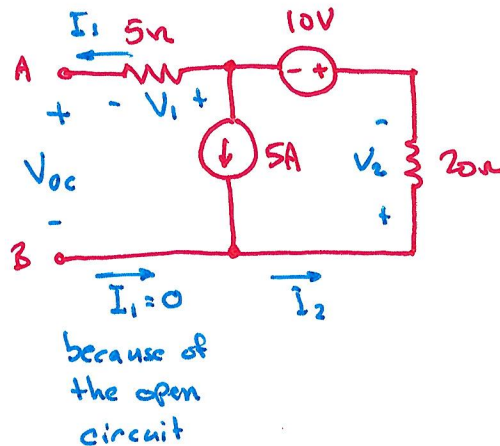


EE 2240  
Homework Problem #037



Determine the Norton equivalent circuit with respect to terminals  $A$  and  $B$ .

Under open-circuit conditions:



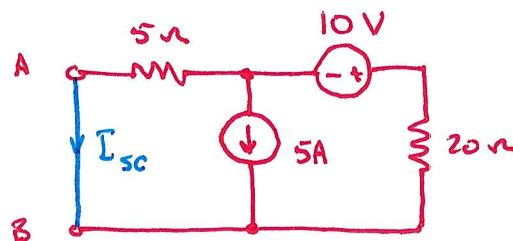
$$I_2 = I_1 + 5A = 5A$$

$$V_2 = (20\Omega) I_2 = 100V$$

$$V_1 = (5\Omega) I_1 = 0V$$

$$V_{oc} = -V_1 - 10V - V_2 = -110V$$

Under short-circuit conditions:



Using superposition:

$$\begin{aligned} I_{sc} &= - \underbrace{\frac{10V}{5\Omega + 20\Omega}}_{\text{Ohm's Law}} - \underbrace{\frac{20\Omega}{5\Omega + 20\Omega} (5A)}_{\text{current division}} \\ &= - \frac{2}{5} A - 4 A \\ &= - 4.4 A \end{aligned}$$

$$I_N = I_{sc} = -4.4 A$$

$$R_N = \frac{V_{oc}}{I_{sc}} = \frac{-110V}{-4.4A} = 25 \Omega$$

So, we have the following Norton equivalent circuit:

