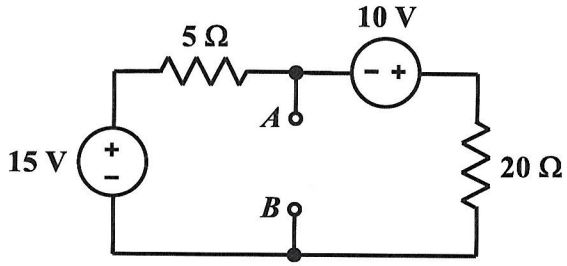
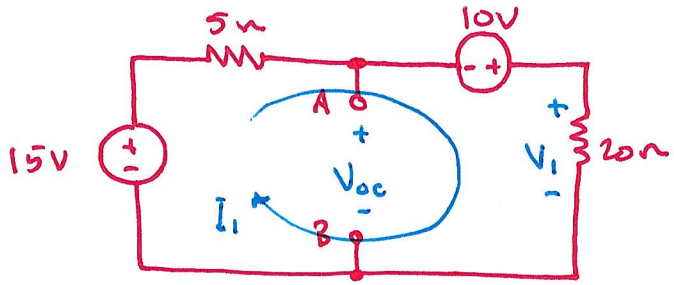
EE 2240

Homework Problem #038



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

Under open-circuit conditions:

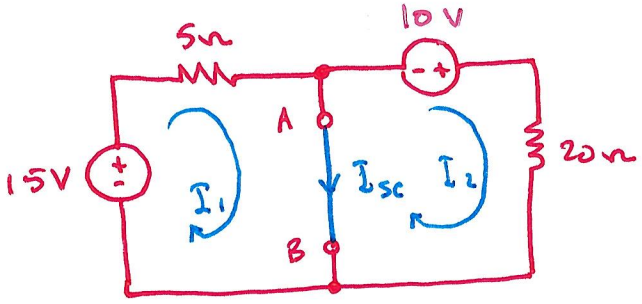


$$I_1 = \frac{15V + 10V}{5\Omega + 20\Omega} = \frac{25V}{25\Omega} = 1A$$

$$V_1 = (20\Omega)\, I_1 = 20V$$

$$V_{oc} = -10V + V_1 = 10V$$

Under short-circuit conditions:



Using superposition:

$$I_1 = \frac{15V}{5\Omega} = 3A$$

$$I_2 = \frac{10V}{20\Omega} = \frac{1}{2}A$$

$$I_{SC} = I_1 - I_2 = 2.5A$$

$$I_N = I_{SC} = 2.5A$$

$$R_N = \frac{V_{OC}}{I_{SC}} = \frac{10V}{2.5A} = 4\Omega$$

So, we have the following Norton equivalent circuit: