Chapter 4, Problem 45.

Find the Thevenin equivalent of the circuit in Fig. 4.112.

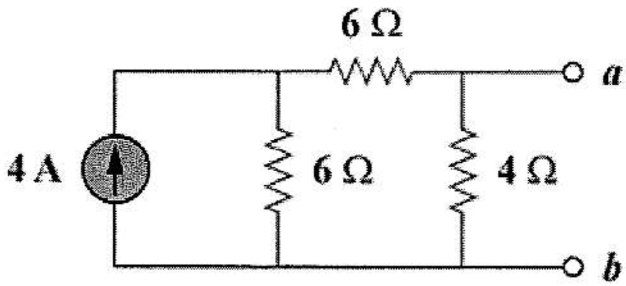
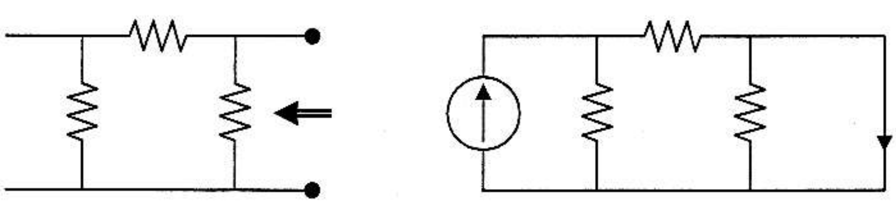


Figure 4.112

Chapter 4, Solution 45.

For R_N, consider the circuit in Fig. (a).



$$R_N = (6 + 6) \| 4 = \underline{\mathbf{3\ ohms}}$$

For I_N, consider the circuit in Fig. (b). The 4-ohm resistor is shorted so that 4-A current is equally divided between the two 6-ohm resistors. Hence,

$$I_N = 4/2 = \underline{\mathbf{2\ A}}$$

Chapter 4, Problem 48.

Determine the Norton equivalent at terminals ***a-b*** for the circuit in Fig. 4.115.

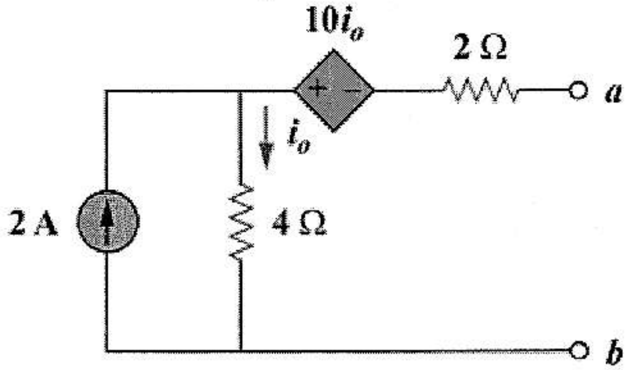
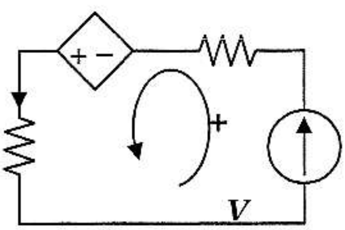
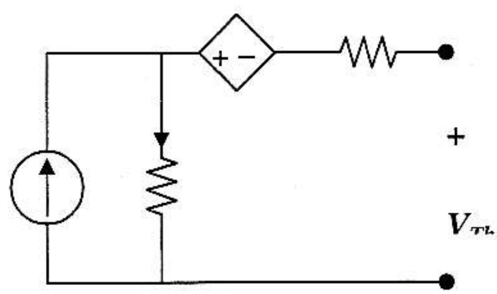


Figure 4.115

Chapter 4, Solution 48.

To get R_{Th}, consider the circuit in Fig. (a).





From Fig. (a), $I_o = 1$, $6 - 10 - V = 0$, or $V = -4$

$$R_N = R_{Th} = V/1 = \underline{\mathbf{-4\ ohms}}$$

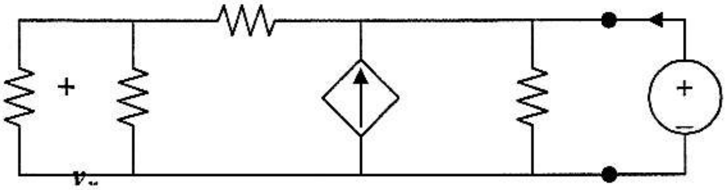
To get V_{Th}, consider the circuit in Fig. (b),

$$I_o = 2,\ V_{Th} = -10I_o + 4I_o = -12\ V$$

$$I_N = V_{Th}/R_{Th} = \underline{\mathbf{3A}}$$

Chapter 4, Solution 57.

To find R_{Th}, remove the 50V source and insert a 1-V source at a – b, as shown in Fig. (a).



We apply nodal analysis. At node A,

$$i + 0.5v_x = (1/10) + (1 - v_x)/2, \text{ or } i + v_x = 0.6 \quad (1)$$

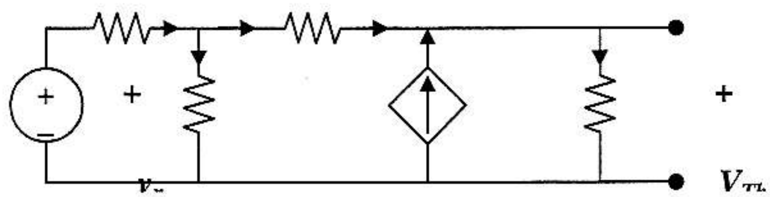
At node B,

$$(1 - v_o)/2 = (v_x/3) + (v_x/6), \text{ and } v_x = 0.5 \quad (2)$$

From (1) and (2), $i = 0.1$ and

$$R_{Th} = 1/i = \underline{\mathbf{10\ ohms}}$$

To get V_{Th}, consider the circuit in Fig. (b).



At node 1, $(50 - v_1)/3 = (v_1/6) + (v_1 - v_2)/2$, or $100 = 6v_1 - 3v_2$ (3)

At node 2, $0.5v_x + (v_1 - v_2)/2 = v_2/10$, $v_x = v_1$, and $v_1 = 0.6v_2$ (4)

From (3) and (4),

$$v_2 = V_{Th} = \underline{\mathbf{166.67\ V}}$$

$$I_N = V_{Th}/R_{Th} = \underline{\mathbf{16.667\ A}}$$

$$R_N = R_{Th} = \underline{\mathbf{10\ ohms}}$$