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).



$R_N = (6+6)II4 = 3 \text{ ohms}$

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,

$$I_{\rm N} = 4/2 = \underline{2A}$$

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Chapter 4, Problem 48.

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

$$R_{\rm N} = R_{\rm Th} = V/1 = -4 \text{ ohms}$$

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

$$I_o = 2$$
, $V_{Th} = -10I_o + 4I_o = -12 V$
 $I_N = V_{Th}/R_{Th} = 3A$

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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,

$$i + 0.5v_x = (1/10) + (1 - v_x)/2$$
, or $i + v_x = 0.6$ (1)

(4)

At node B,

$$(1 - v_0)/2 = (v_x/3) + (v_x/6)$$
, and $v_x = 0.5$ (2)

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

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

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 $v_1 = 0.6v_2$

From (3) and (4),

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

 $I_N = V_{Th}/R_{Th} = \underline{16.667 A}$
 $R_N = R_{Th} = \underline{10 \text{ ohms}}$

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