2.3 A bar of silicon is 4 cm long with a circular cross section. If the resistance of the bar is 240 Ω at room temperature, what is the cross-sectional radius of the bar?

$Ans:\ r = 0.1843m$

2.12 In the circuit of Fig. 2.76, obtain v_1, v_2, and v_3.

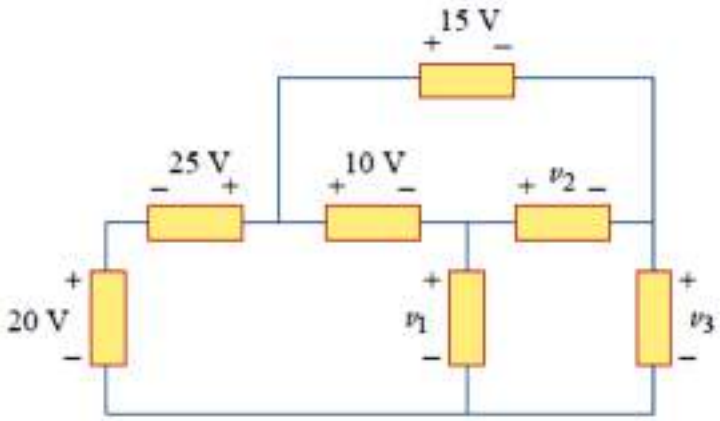
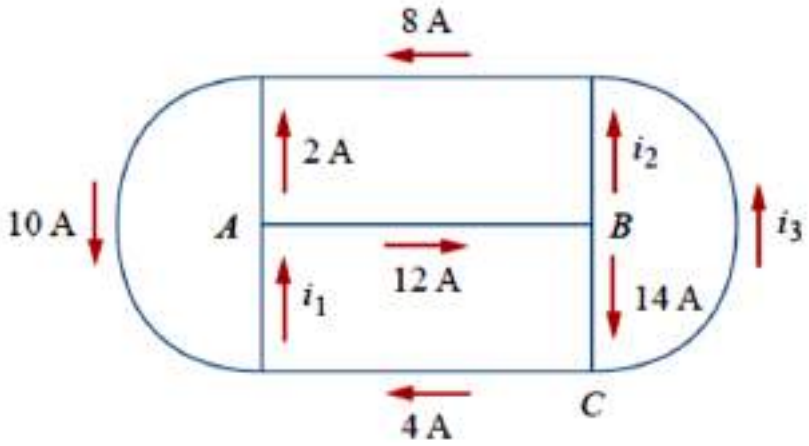


Figure 2.76
For Prob. 2.12.

$Ans:\ v_1 = 35V\ , v_2 = 5V\ , v_3 = 30V$

2.9 Find i_1, i_2, and i_3 in Fig. 2.73.



$Ans:\ i_1 = 14A\ , i_2 = -2A\ , i_3 = 10A$

2.10 Determine i_1 and i_2 in the circuit of Fig. 2.74.

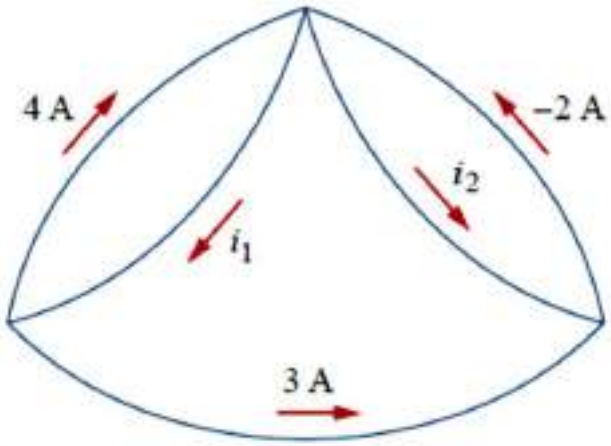


Figure 2.74
For Prob. 2.10.

Ans: $i_1 = 7A\,, i_2 = -5A$

2.14 Given the circuit in Fig. 2.78, use KVL to find the branch voltages V_1 to V_4.

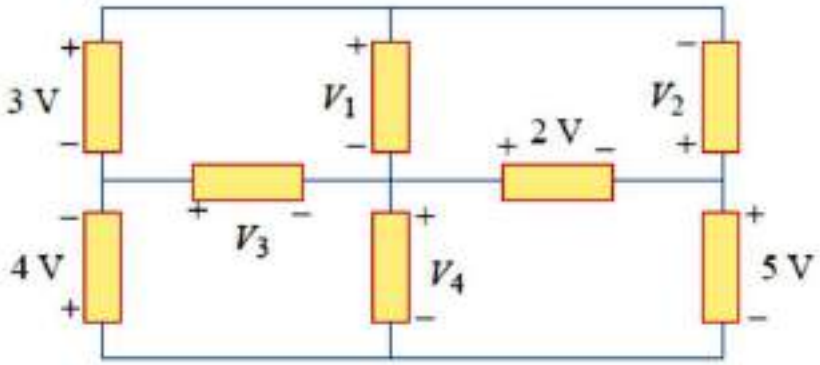


Figure 2.78
For Prob. 2.14.

Ans: $V_1 = -8V\,, V_2 = 6V\,, V_3 = -11V, V_4 = 7V$

2.15 Calculate v and i_x in the circuit of Fig. 2.79.

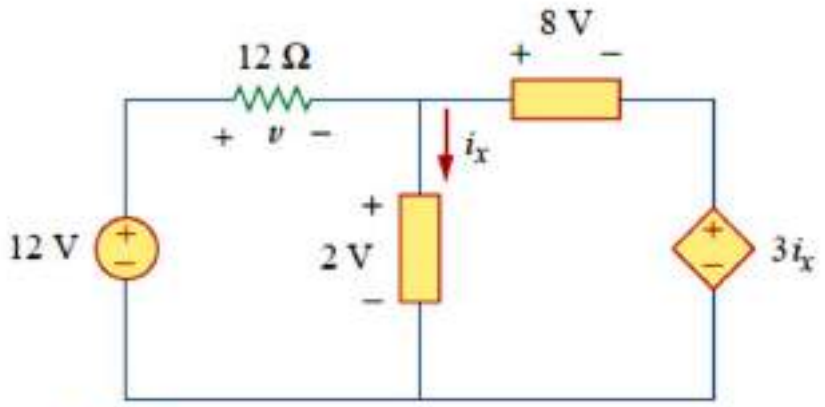


Figure 2.79
For Prob. 2.15.

$Ans:\ v = 10V\ , i_x = -2A$

2.16 Determine V_o in the circuit of Fig. 2.80.

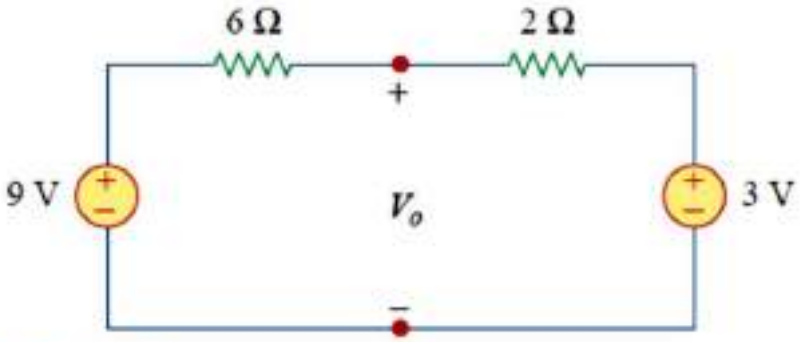


Figure 2.80
For Prob. 2.16.

$Ans:\ v_o = 4.5V$

2.17 Obtain v_1 through v_3 in the circuit of Fig. 2.81.

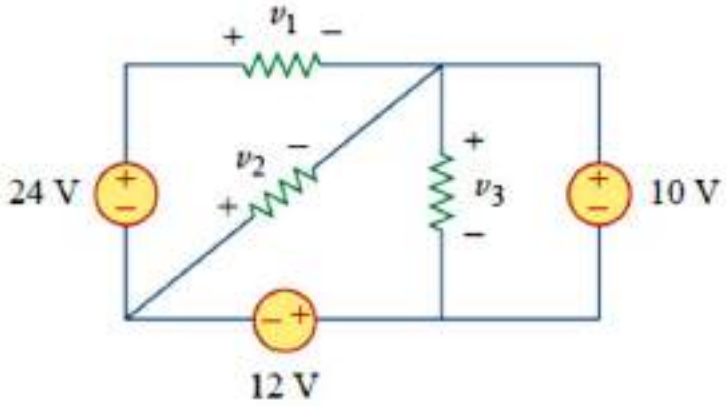


Figure 2.81
For Prob. 2.17.

$Ans:\ v_1 = 2V\ , v_2 = -22V\ , v_3 = 10V$

2.18 Find I and V_{ab} in the circuit of Fig. 2.82.

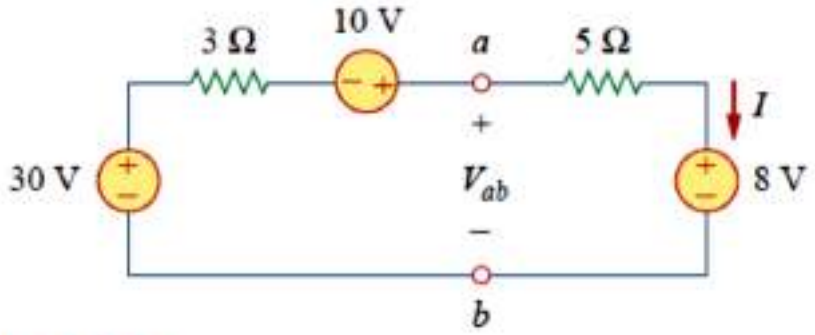


Figure 2.82
For Prob. 2.18.

$Ans:\ I = 4A\ , V_{ab} = 28A$

2.19 From the circuit in Fig. 2.83, find I, the power dissipated by the resistor, and the power absorbed by each source.

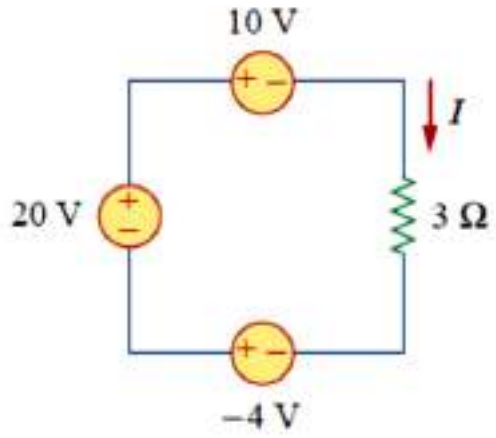


Figure 2.83
For Prob. 2.19.

Ans: $I = -2A\,, P_{3\Omega} = 12W, P_{12V} = -24W, P_{10V} = 20W, P_{8V} = 16W$

2.20 Determine i_o in the circuit of Fig. 2.84.

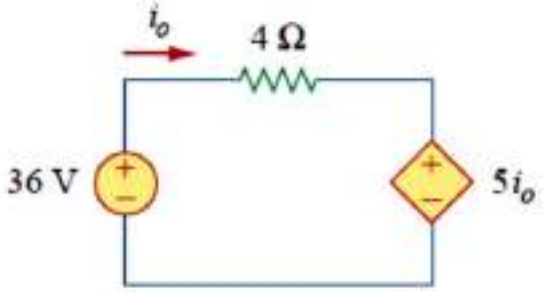


Figure 2.84
For Prob. 2.20.

Ans: $i_o = 4A$

2.21 Find V_x in the circuit of Fig. 2.85.

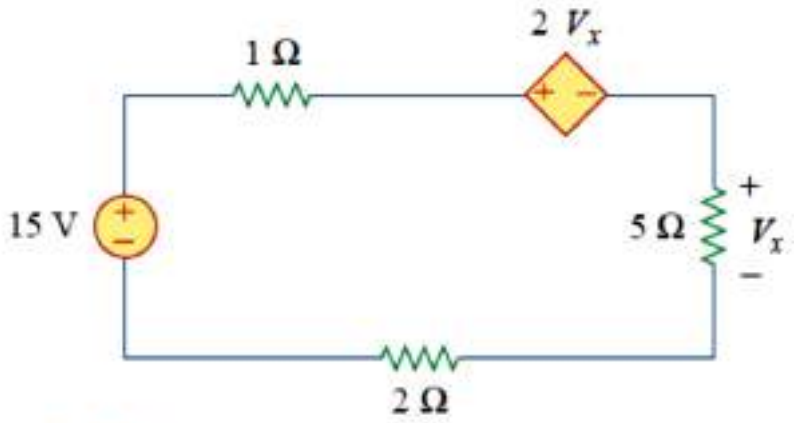


Figure 2.85
For Prob. 2.21.

Ans: $V_x = 4.167V$

2.22 Find V_o in the circuit of Fig. 2.86 and the power dissipated by the controlled source.

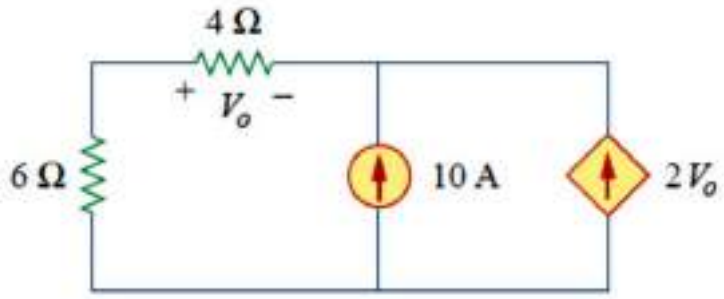


Figure 2.86
For Prob. 2.22.

Ans: $V_o = -4.444V, P = 98.75$

2.23 In the circuit shown in Fig. 2.87, determine v_x and the power absorbed by the 12-Ω resistor.

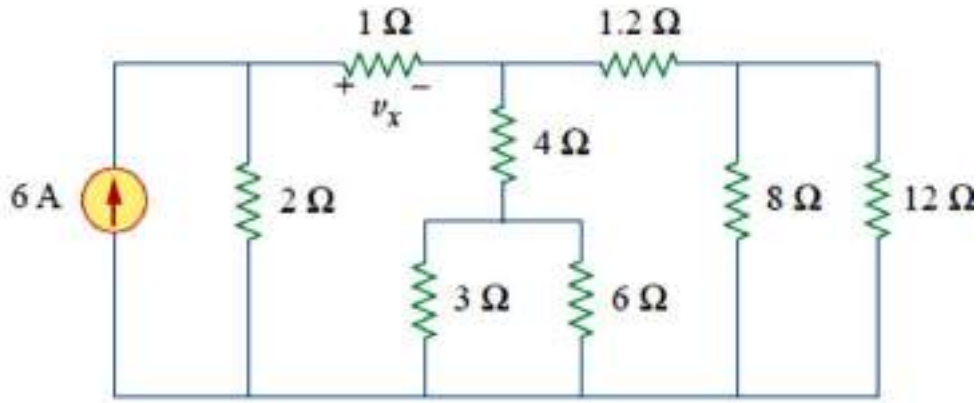


Figure 2.87
For Prob. 2.23.

$Ans:\ V_x = 2V, P = 1.92W$

2.25 For the network in Fig. 2.89, find the current, voltage, and power associated with the 20-kΩ resistor.

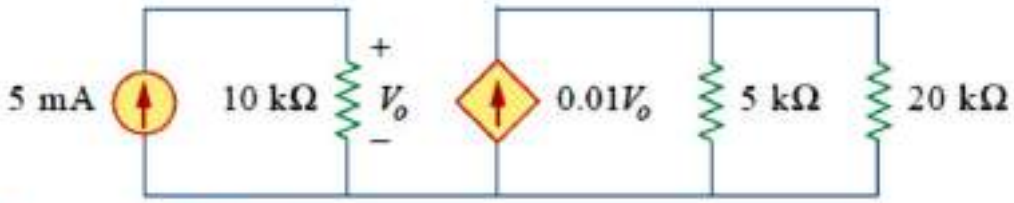


Figure 2.89
For Prob. 2.25.

$Ans:\ I_{20} = 0.1A, V_{20} = 2kV, P_{20} = 0.2kW$

2.26 For the circuit in Fig. 2.90, $i_o = 2$ A. Calculate i_x and the total power dissipated by the circuit.

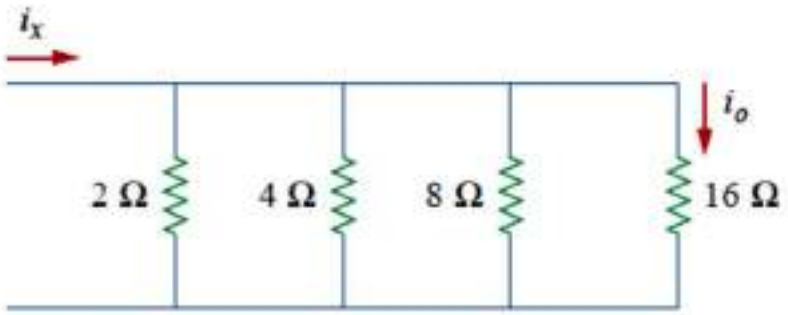


Figure 2.90
For Prob. 2.26.

Ans: $i_x = 30V, P = 960W$

2.31 For the circuit in Fig. 2.95, determine i_1 to i_5.

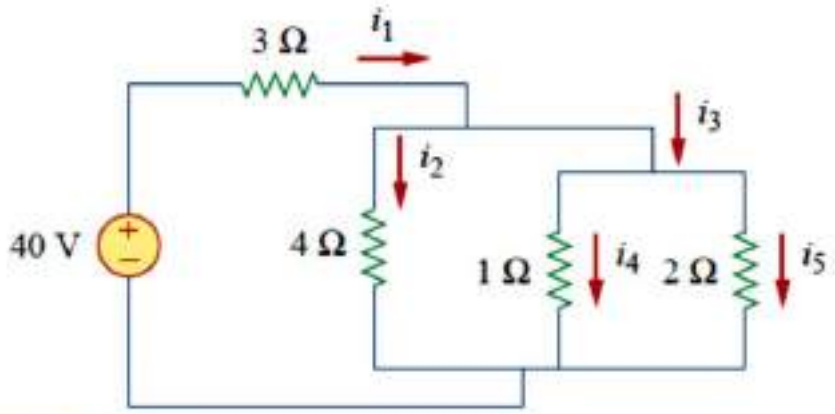


Figure 2.95
For Prob. 2.31.

Ans: $i_1 = 11.2A, i_2 = 1.6A, i_3 = 9.6A, i_4 = 6.4A, i_5 = 3.2A$

2.32 Find i_1 through i_4 in the circuit of Fig. 2.96.

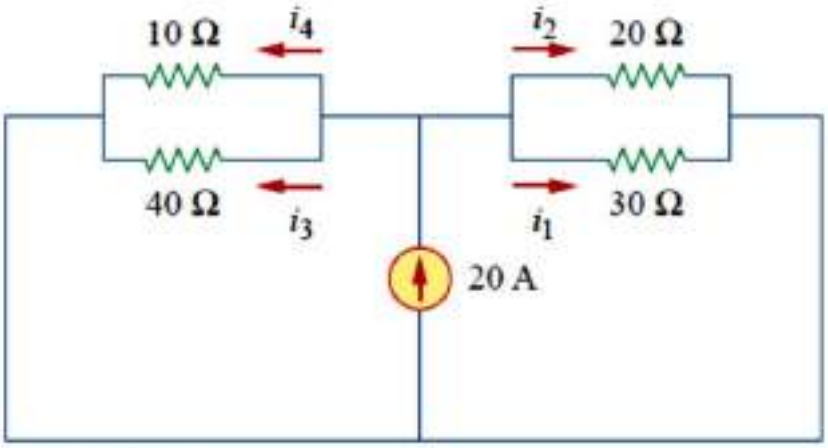


Figure 2.96
For Prob. 2.32.

Ans: $i_1 = 3.2A, i_2 = 4.8A, i_3 = 2.4A, i_4 = 9.6A$

2.35 Calculate V_o and I_o in the circuit of Fig. 2.99.

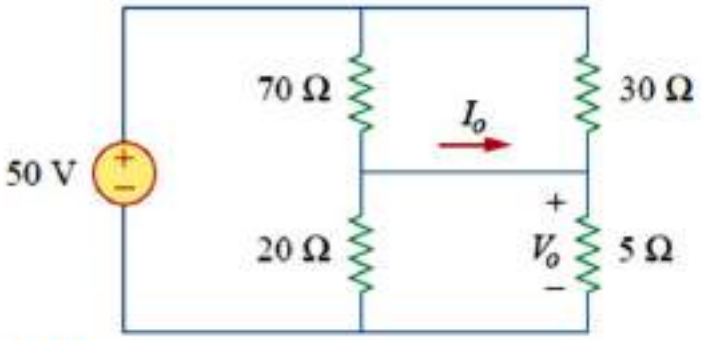


Figure 2.99
For Prob. 2.35.

Ans: $V_0 = 8V, i_0 = 0.2A$

2.36 Find i and V_o in the circuit of Fig. 2.100.

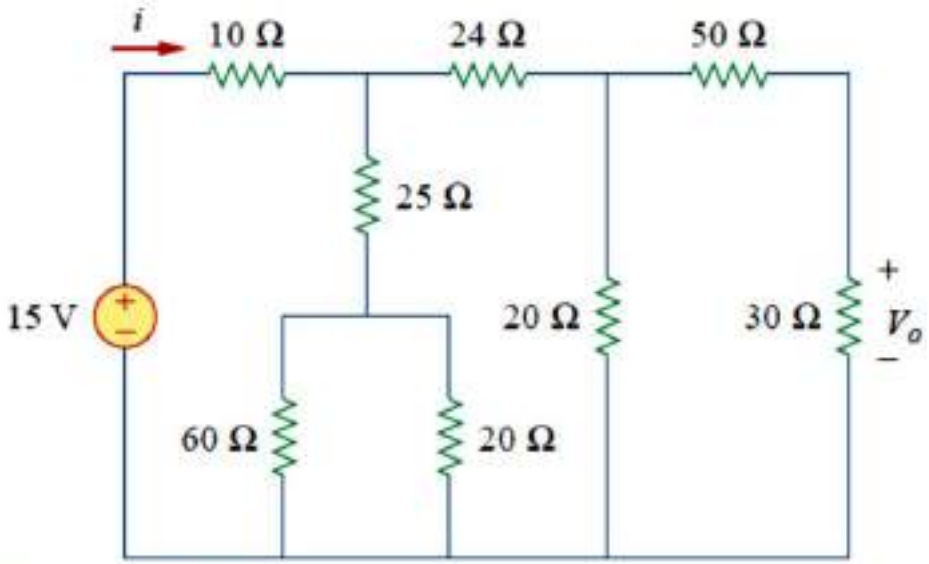


Figure 2.100
For Prob. 2.36.

$Ans:\ i = 0.5A, V_0 = 1.5A$

2.37 Find R for the circuit in Fig. 2.101.

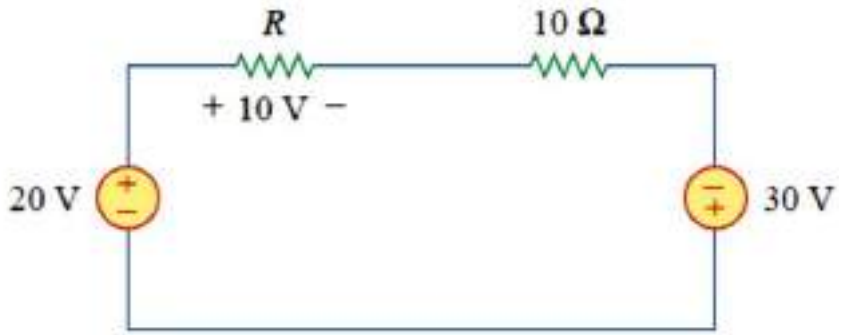


Figure 2.101
For Prob. 2.37.

$Ans:\ R = 2.5\Omega$

2.38 Find R_{eq} and i_o in the circuit of Fig. 2.102.

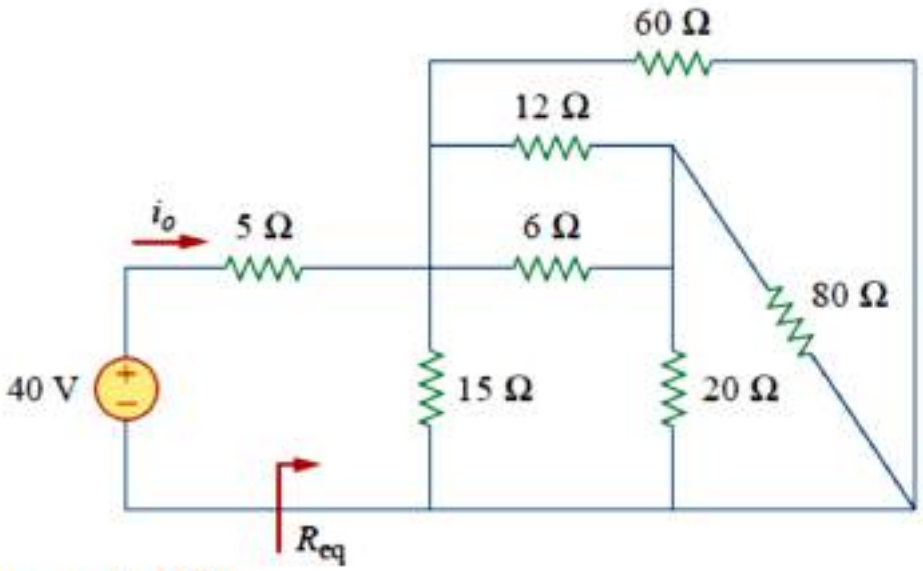


Figure 2.102
For Prob. 2.38.

$Ans:\ R_{eq} = 12.5\Omega, i_0 = 3.2A$

2.41 If $R_{eq} = 50\ \Omega$ in the circuit of Fig. 2.105, find R.

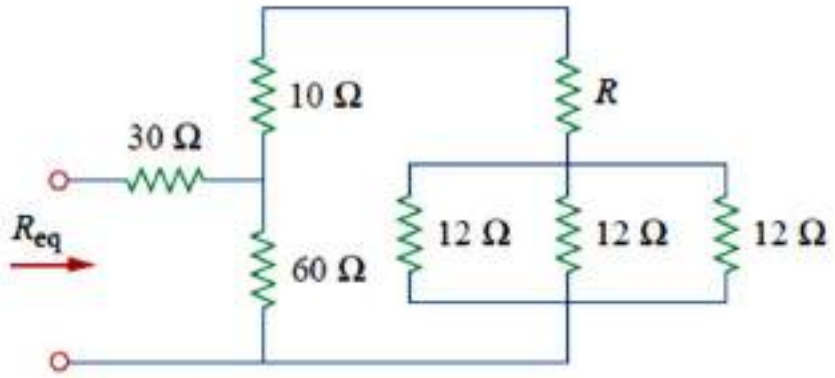


Figure 2.105
For Prob. 2.41.

$Ans: R = 16\Omega$

2.42 Reduce each of the circuits in Fig. 2.106 to a single resistor at terminals *a-b*.

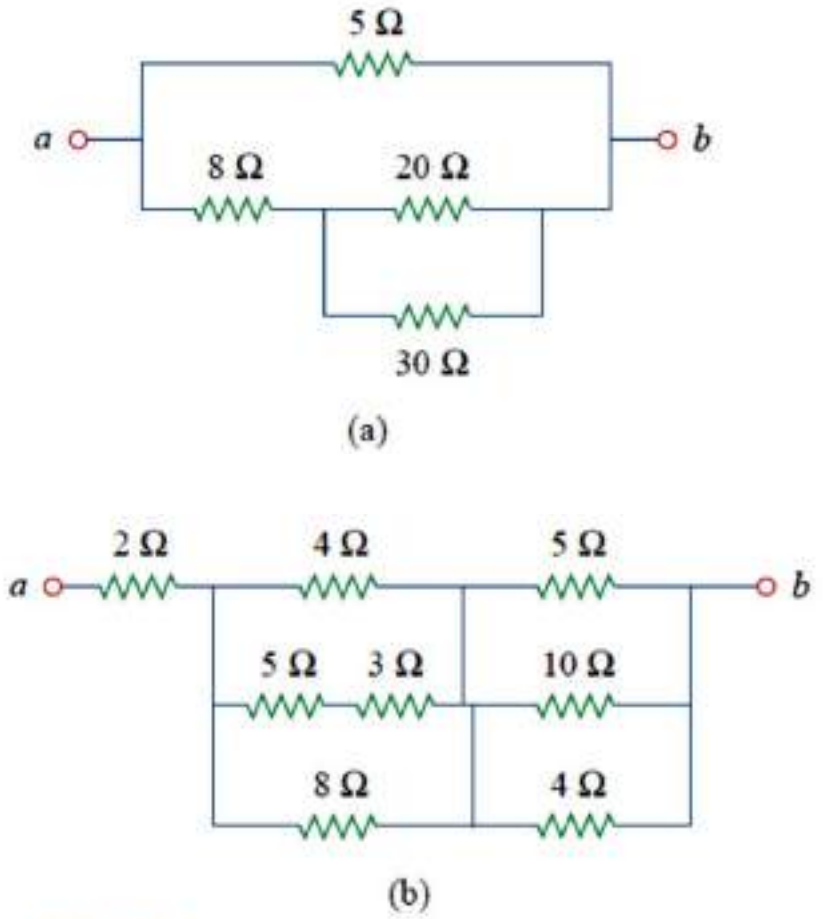
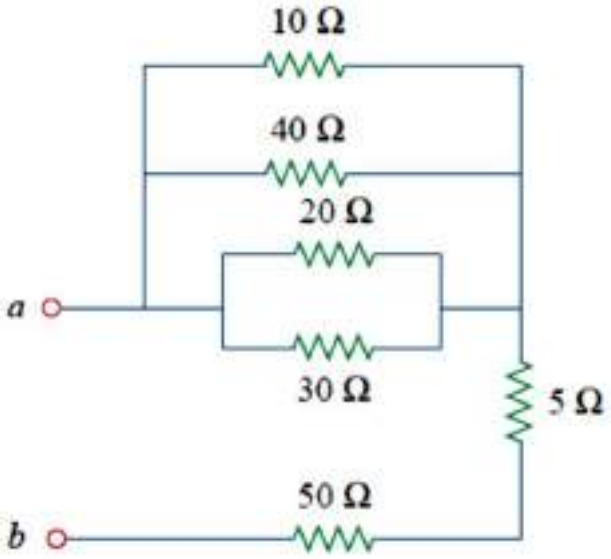


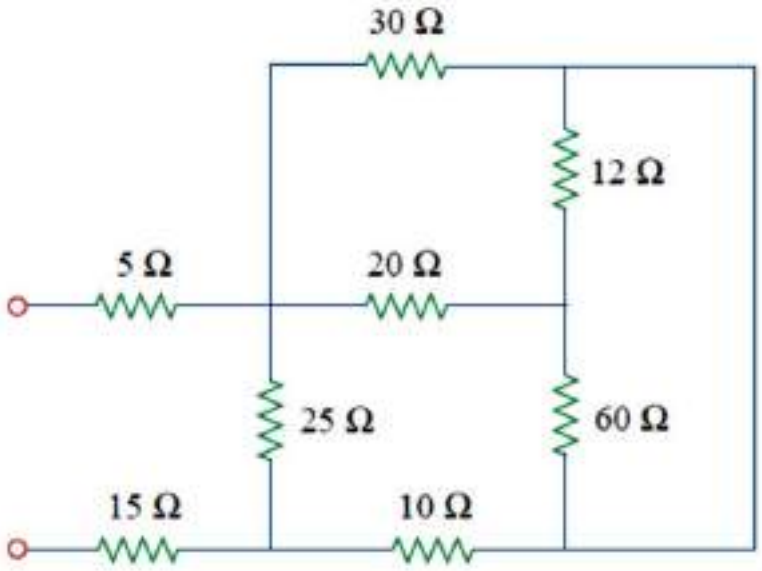
Figure 2.106
For Prob. 2.42.

$Ans: (a)\ R_{ab} = 4\Omega, (b)\ R_{ab} = 5.818\Omega,$

2.45 Find the equivalent resistance at terminals *a-b* of each circuit in Fig. 2.109.



(a)



(b)

Figure 2.109
For Prob. 2.45.

$Ans: (a)\ R_{ab} = 59.8\Omega, (b)\ R_{ab} = 32.5\Omega,$