Electrical Engineering

HW 2 – Chapter 3

<1>

3.4 Using node voltage analysis in the circuit of Figure P3.4, find the current i through the voltage source.

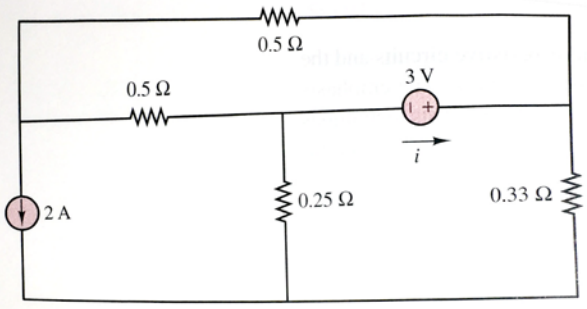

Figure P3.4

<2>

3.11 Use nodal analysis in the circuit of Figure P3.11 to find V_a and V_b. Let $R_1 = 10\,\Omega$, $R_2 = 4\,\Omega$, $R_3 = 6\,\Omega$, $R_4 = 6\,\Omega$, $V_1 = 2\,\text{V}$, $V_2 = 4\,\text{V}$, $I_1 = 2\,\text{A}$.

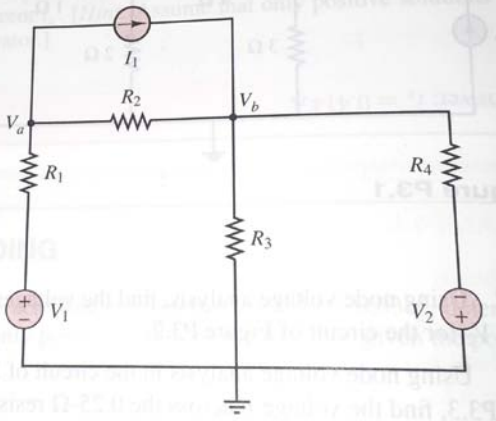

Figure P3.11

<3>

3.15 Using mesh analysis, find the currents i_1 and i_2 and the voltage across the upper 10-Ω resistor in the circuit of Figure P3.15.

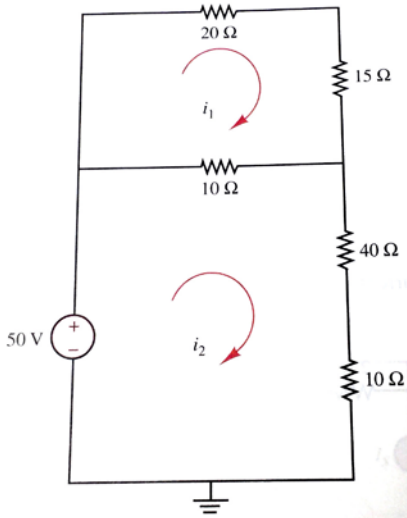

Figure P3.15

<4>

3.24 Use nodal analysis on the circuit in Figure P3.24 to determine the voltage V_4. Note that one source is a dependent (controlled) voltage source! Let $V_S = 5\,\text{V}$; $A_V = 70$; $R_1 = 2.2\,\text{k}\Omega$; $R_2 = 1.8\,\text{k}\Omega$; $R_3 = 6.8\,\text{k}\Omega$; $R_4 = 220\,\Omega$.

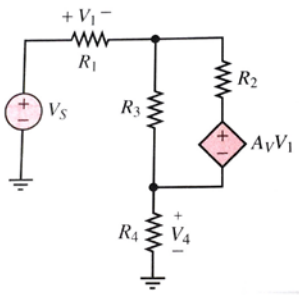

Figure P3.24

<5>

3.29 Use mesh analysis to find mesh currents in Figure P3.29. Let $R_1 = 8\,\Omega$, $R_2 = 3\,\Omega$, $R_3 = 5\,\Omega$, $R_4 = 2\,\Omega$, $R_5 = 4\,\Omega$, $R_6 = 3\,\Omega$, $V_1 = 4\,\text{V}$, $V_2 = 2\,\text{V}$, $V_3 = 1\,\text{V}$, $V_4 = 2\,\text{V}$, $V_5 = 3\,\text{V}$, $V_6 = 2\,\text{V}$.

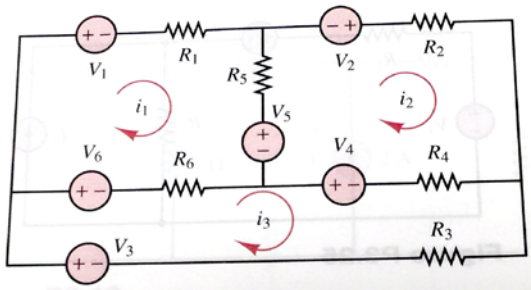

Figure P3.29

<6>

3.50 Use the principle of superposition to determine the current i_o through R_1 in Figure P3.50. Let $R_1 = 8\,\Omega$, $R_2 = 2\,\Omega$, $R_3 = 3\,\Omega$, $R_4 = 4\,\Omega$, $R_5 = 2\,\Omega$, $V_1 = 15\,\text{V}$, $I_1 = 2\,\text{A}$, $I_2 = 3\,\text{A}$.

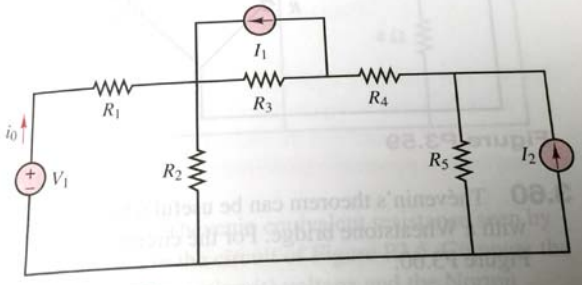

Figure P3.50

<7>

3.51 Find the Thévenin equivalent of the network seen by the 3-Ω resistor in Figure P3.51.

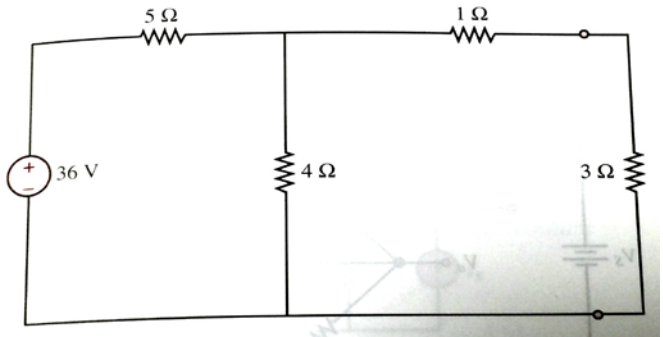

Figure P3.51

<8>

3.53 Find the Norton equivalent of the network seen by R_2 in Figure P3.53. Use it and current division to compute the current i through R_2. Assume $I_1 = 10\,\text{A}$, $I_2 = 2\,\text{A}$, $V_1 = 6\,\text{V}$, $R_1 = 3\,\Omega$, and $R_2 = 4\,\Omega$.

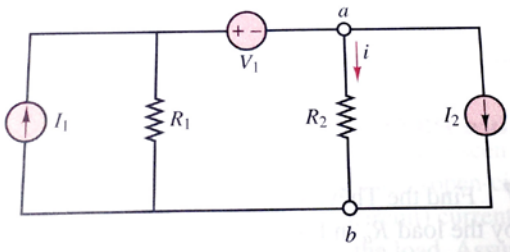

Figure P3.53

<9>

3.73 The Thévenin equivalent network seen by a load R_o is depicted in Figure P3.73. Assume $V_T = 10\,\text{V}$, $R_T = 2\,\Omega$, and that the value of R_o is such that maximum power is transferred to it. Determine:

a. The value of R_o.

b. The power P_o dissipated by R_o.

c. The efficiency (P_o/P_{V_T}) of the circuit.

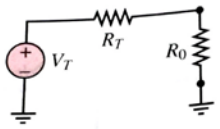

Figure P3.73