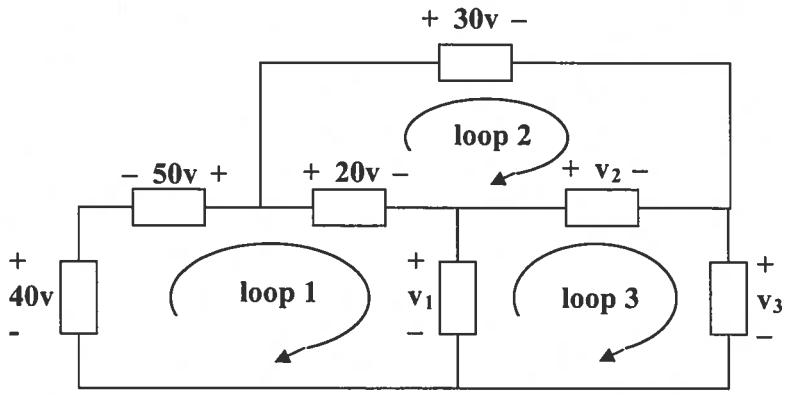
Chapter 2, Solution 12



For loop 1, $-40 - 50 + 20 + v_1 = 0$ or $v_1 = 40 + 50 - 20 =$ **70 V**

For loop 2, $-20 + 30 - v_2 = 0$ or $v_2 = 30 - 20 =$ **10 V**

For loop 3, $-v_1 + v_2 + v_3 = 0$ or $v_3 = 70 - 10 =$ **60 V**

Chapter 2, Solution 18

Applying KVL,

$$-30 - 10 + 8 + I(3+5) = 0$$

$$8I = 32 \longrightarrow I = \underline{\mathbf{4A}}$$

$$-V_{ab} + 5I + 8 = 0 \longrightarrow V_{ab} = \underline{\mathbf{28V}}$$

Chapter 2, Solution 22

Find V_o in the circuit in Fig. 2.86 and the power absorbed by the dependent source.

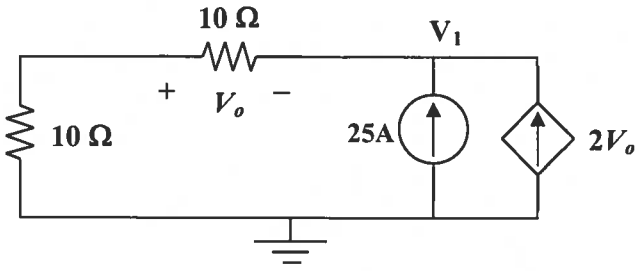


Figure 2.86
For Prob. 2.22

Solution

At the node, KCL requires that $[-V_o/10]+[-25]+[-2V_o] = 0$ or $2.1V_o = -25$

$$\text{or } V_o = \mathbf{-11.905\ V}$$

The current through the controlled source is $i = 2V_0 = -23.81$ A
and the voltage across it is $V_1 = (10+10)\ i_0$ (where $i_0 = -V_0/10$) $= 20(11.905/10)$ $= 23.81$ V.

Hence,

$$p_{\text{dependent source}} = V_1(-i) = 23.81\text{x}(-(-23.81)) = \mathbf{566.9\ W}$$

Checking, $(25-23.81)^2(10+10) + (23.81)(-25) + 566.9 = 28.322 - 595.2 + 566.9$ $= 0.022$ which is equal zero since we are using four places of accuracy!

Chapter 2, Solution 24

(a) $$I_0 = \frac{V_s}{R_1 + R_2}$$

$$V_0 = -\alpha I_0 \left(R_3 \| R_4\right) = -\frac{\alpha V_s}{R_1 + R_2} \cdot \frac{R_3 R_4}{R_3 + R_4}$$

$$\frac{V_0}{Vs} = \frac{-\alpha R_3 R_4}{(R_1 + R_2)(R_3 + R_4)}$$

(b) If $R_1 = R_2 = R_3 = R_4 = R$,

$$\left|\frac{V_0}{V_S}\right| = \frac{\alpha}{2R} \cdot \frac{R}{2} = \frac{\alpha}{4} = 10 \longrightarrow \alpha = \mathbf{40}$$

Chapter 2, Solution 42

(a) $R_{ab} = 5 \| (8 + 20 \| 30) = 5 \| (8 + 12) = \frac{5x20}{25} = \mathbf{4\ \Omega}$

(b) $R_{ab} = 2 + 4 \| (5 + 3) \| 8 + 5 \| 10 \| 4 = 2 + 4 \| 4 + 5 \| 2.857 = 2 + 2 + 1.8181 = \mathbf{5.818\ \Omega}$

Chapter 2, Solution 46

$$R_{eq} = 12 + 5||20 + [1/((1/15)+(1/15)+(1/15))] + 5 + 24||8$$
$$= 12 + 4 + 5 + 5 + 6 = 32\ \Omega$$

$$I = 80/32 = \mathbf{2.5\ A}$$