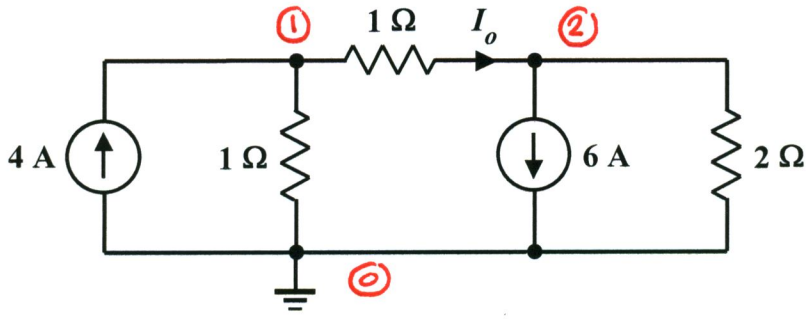
EE 2240

Problem #08



a. How many equations are necessary to analyze this circuit by the nodal analysis method?

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Use the method discussed in class to:

b. Develop the node equations describing the circuit. Note that the reference node is pre-determined.

$$-4A + \frac{V_1}{(1\Omega)} + \frac{V_1 - V_2}{1\Omega} = 0 \qquad \text{(KCL at node 1)}$$

$$\frac{V_2 - V_1}{1\Omega} + 6A + \frac{V_2}{2\Omega} = 0 \qquad \text{(KCL at node 2)}$$

c. Write the node equations in the matrix form discussed in class.

$$\begin{bmatrix} 2 & -1 \\ -1 & 3/2 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} 4 \\ -6 \end{bmatrix}$$

d. Solve the node equations.

$$V_1 = 0\ V$$

$$V_2 = -4\ V$$

e. Determine the value of I_o.

$$I_o = \frac{V_{12}}{1\Omega} = \frac{V_1 - V_2}{1\Omega} = \frac{4}{1} = 4\ A$$