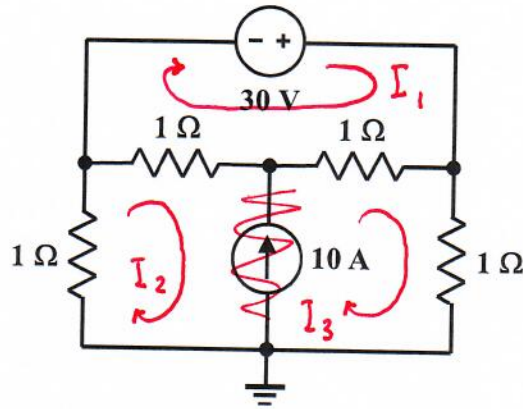


Homework Problem #018



- a. Express mesh equations in the matrix form discussed in class.

$$I_3 - I_2 = 10$$

$$-30 + 1(I_1 - I_3) + 1(I_1 - I_2) = 0$$

$$1I_2 + 1(I_2 - I_1) + 1(I_3 - I_1) + 1I_3 = 0$$

In matrix form:

$$\begin{bmatrix} 0 & -1 & 1 \\ 2 & -1 & -1 \\ -2 & 2 & 2 \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} 10 \\ 30 \\ 0 \end{bmatrix}$$

- b. Solve the equations.

Solving yields: $I_1 = 30 \text{ A}$

$$I_2 = 10 \text{ A}$$

$$I_3 = 20 \text{ A}$$

- c. Is the 30 V source *delivering* power or *absorbing* power? How much?

The 30V source is *delivering* $(30\text{V})(30\text{A}) = 900 \text{ W}$