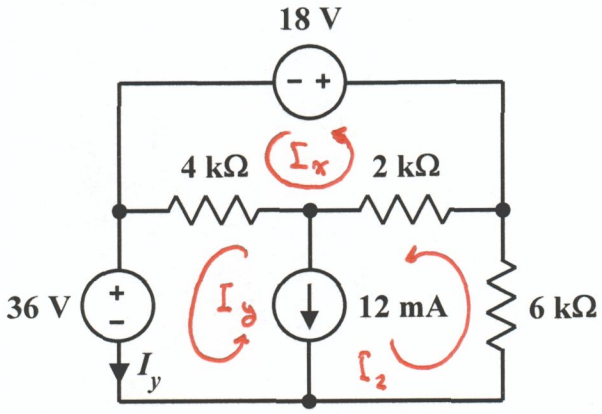
EE 2240

Problem #06



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

3

Use the method discussed in class to:

b. Develop the mesh equations describing the circuit.

$$I_z - I_y = 12\text{ mA}$$

$$36 + 6000 I_z + 2000 (I_z - I_x) + 4000 (I_y - I_x) = 0$$

$$18 + 4000 (I_x - I_y) + 2000 (I_x - I_z) = 0$$

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

$$\begin{bmatrix} 0 & -1 & 1 \\ -6000 & 4000 & 8000 \\ 6000 & -4000 & -2000 \end{bmatrix} \begin{bmatrix} I_x \\ I_y \\ I_z \end{bmatrix} = \begin{bmatrix} 0.012 \\ -36 \\ -18 \end{bmatrix}$$

d. Solve the node equations to determine the value of I_y.

$I_x = -20\text{ mA}$

$\boxed{I_y = -21\text{ mA}}$

$I_z = -9\text{ mA}$