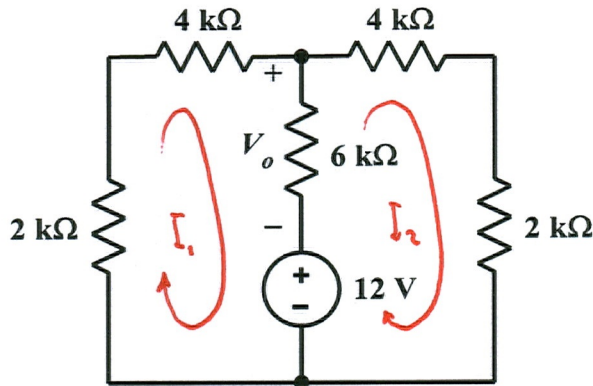


EE/EET 2240  
**Homework Problem #025**

Write mesh equations to describe the circuit, express them in the matrix form discussed in class, and then solve them for the mesh currents. Use Ohm's Law then to determine the value of  $V_o$ .



$$(2k\Omega)I_1 + (4k\Omega)I_1 + (6k\Omega)(I_1 - I_2) + 12V = 0$$

$$-12V + (6k\Omega)(I_2 - I_1) + (4k\Omega)I_2 + (2k\Omega)I_2 = 0$$

In matrix form:

$$\begin{bmatrix} 12k\Omega & -6k\Omega \\ -6k\Omega & 12k\Omega \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \end{bmatrix} = \begin{bmatrix} -12V \\ 12V \end{bmatrix}$$

Solving yields  $I_1 = -\frac{2}{3} \text{ mA}$

$$I_2 = \frac{2}{3} \text{ mA}$$

Then,

$$\begin{aligned} V_o &= (6k\Omega)(I_1 - I_2) = (6k\Omega)\left(-\frac{2}{3} \text{ mA} - \frac{2}{3} \text{ mA}\right) \\ &= (6k\Omega)\left(-\frac{4}{3} \text{ mA}\right) = -8 \text{ V} \end{aligned}$$