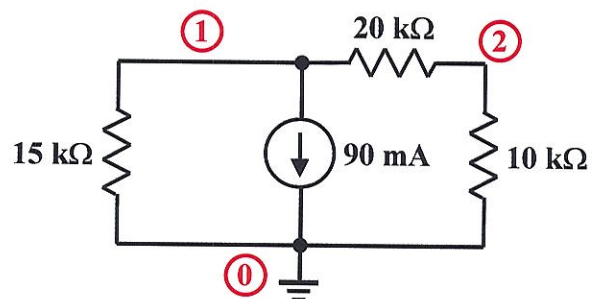


EE/EET 2240  
**Homework Problem 010**

Without making any simplifications, develop node equations and express them in the matrix form discussed in class.



$$\frac{V_1}{15k\Omega} + 90\text{mA} + \frac{V_1 - V_2}{20k\Omega} = 0 \quad (\text{KCL at node 1})$$

$$\frac{V_2 - V_1}{20k\Omega} + \frac{V_2}{10k\Omega} = 0 \quad (\text{KCL at node 2})$$

In matrix form:

$$\begin{bmatrix} \frac{1}{15k\Omega} + \frac{1}{20k\Omega} & -\frac{1}{20k\Omega} \\ -\frac{1}{20k\Omega} & \frac{1}{20k\Omega} + \frac{1}{10k\Omega} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} -0.09 \\ 0 \end{bmatrix}$$

or

$$\begin{bmatrix} 7/60k\Omega & -1/20k\Omega \\ -1/20k\Omega & 3/20k\Omega \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \end{bmatrix} = \begin{bmatrix} -0.09 \text{ A} \\ 0 \end{bmatrix}$$