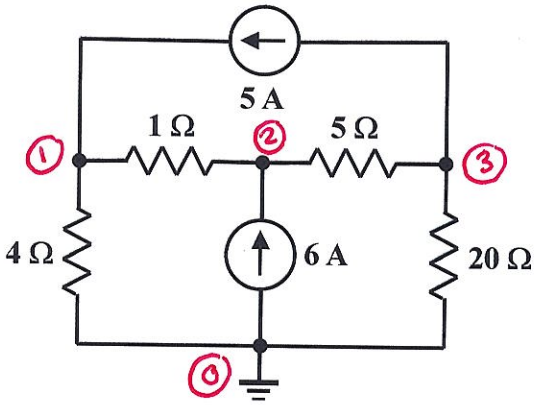
EE/EET 2240

# Homework Problem 012

Develop node equations and express them in the matrix form discussed in class.




$$\frac{V_1}{4} + \frac{V_1 - V_2}{1} - 5 = 0 \qquad \text{(KCL at node 1)}$$

$$\frac{V_2 - V_1}{1} - 6 + \frac{V_2 - V_3}{5} = 0 \qquad \text{(KCL at node 2)}$$

$$5 + \frac{V_3 - V_2}{5} + \frac{V_3}{20} = 0 \qquad \text{(KCL at node 3)}$$

In matrix form:

$$\begin{bmatrix} \frac{1}{4}+1 & -1 & 0 \\ -1 & 1+\frac{1}{5} & -\frac{1}{5} \\ 0 & -\frac{1}{5} & \frac{1}{5}+\frac{1}{20} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \\ -5 \end{bmatrix}$$

Or

$$\begin{bmatrix} 5/4 & -1 & 0 \\ -1 & 6/5 & -1/5 \\ 0 & -1/5 & 1/4 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 5 \\ 6 \\ -5 \end{bmatrix}$$