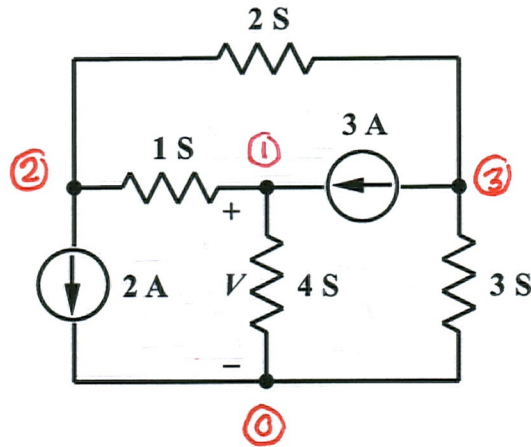


EE/EET 2240
Homework Problem #020

Use the nodal analysis method to determine the voltage, V , across the 4 siemens conductance.



$$2(V_2 - V_3) + 1(V_2 - V_1) + 2 = 0 \quad (\text{KCL at node 2})$$

$$1(V_1 - V_2) + 4V_1 - 3 = 0 \quad (\text{KCL at node 1})$$

$$2(V_3 - V_2) + 3 + 3V_3 = 0 \quad (\text{KCL at node 3})$$

In matrix form:

$$\begin{bmatrix} -1 & 3 & -2 \\ 5 & -1 & 0 \\ 0 & -2 & 5 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} -2 \\ 3 \\ -3 \end{bmatrix}$$

Solving yields

$$V_1 = 0.34$$

$$V_2 = -1.30$$

$$V_3 = -1.12$$

$$\text{So, } V = V_1 = 0.34V$$