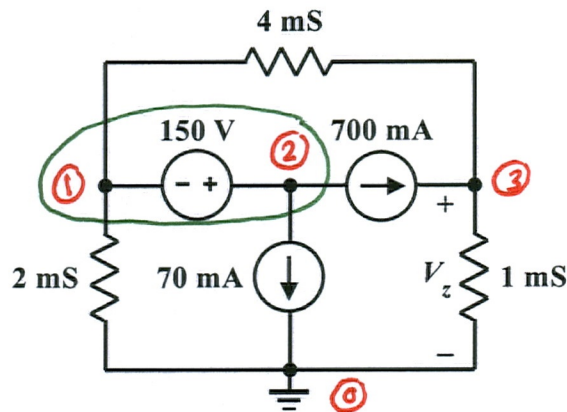


EE/EET 2240
Homework Problem #14



- (a) Develop node equations and express them in the matrix form discussed in class. Note that the resistors are specified in conductance units.

$$V_2 - V_1 = 150 \quad (\text{constraint eqn. for voltage source})$$

$$4 \times 10^{-3} (V_3 - V_1) - 700 \times 10^{-3} + 1 \times 10^{-3} (V_3) = 0 \quad (\text{KCL at node 3})$$

$$4 \times 10^{-3} (V_1 - V_3) + 700 \times 10^{-3} + 70 \times 10^{-3} + 2 \times 10^{-3} V_1 = 0 \quad (\text{KCL for the SN})$$

In matrix form:

$$\begin{bmatrix} -1 & 1 & 0 \\ -4 \times 10^{-3} & 0 & 1 \times 10^{-3} \\ 6 \times 10^{-3} & 0 & -4 \times 10^{-3} \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 150 \\ 700 \times 10^{-3} \\ -770 \times 10^{-3} \end{bmatrix}$$

- (b) Using a method of your choosing, solve for V_z .

Solving yields:

$$V_1 = -75 \text{ V}$$

$$V_2 = 75 \text{ V}$$

$$V_3 = 80 \text{ V}$$

$$\therefore V_z = V_3 = 80 \text{ V}$$