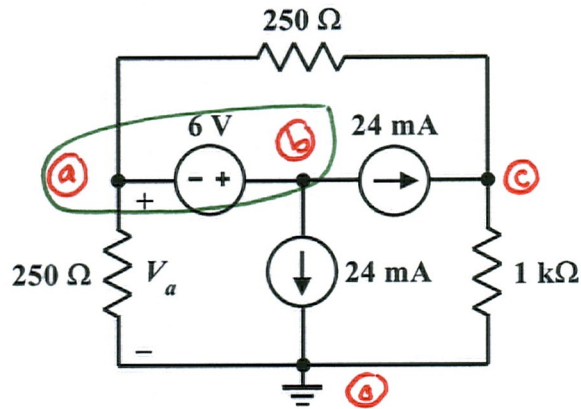


EE/EET 2240
Homework Problem #15



- (a) Use the nodal analysis method to write nodal equations and express them in the matrix form discussed in class.

$$V_b - V_a = 6 \quad (\text{constraint equation})$$

$$\frac{V_a - V_c}{250} + 24 \times 10^{-3} + 24 \times 10^{-3} + \frac{V_a}{250} = 0 \quad (\text{KCL for the SN})$$

$$\frac{V_c - V_a}{250} - 24 \times 10^{-3} + \frac{V_c}{1000} = 0 \quad (\text{KCL for node c})$$

In matrix form:

$$\begin{bmatrix} -1 & 1 & 0 \\ 1/125 & 0 & -1/250 \\ -1/250 & 0 & 1/200 \end{bmatrix} \begin{bmatrix} V_a \\ V_b \\ V_c \end{bmatrix} = \begin{bmatrix} 6 \\ -48 \times 10^{-3} \\ 24 \times 10^{-3} \end{bmatrix}$$

- (b) Solve the equations to determine V_a .

Solving yields:

$$V_a = -6 \text{ V}$$

$$V_b = 0$$

$$V_c = 0$$