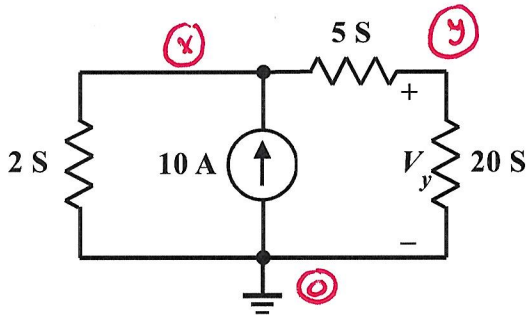
EE 2240

Homework Problem #022

Use the nodal analysis method to determine V_y.



$2V_x - 10 + 5(V_x - V_y) = 0$

$5(V_y - V_x) + 20V_y = 0$

In matrix form:

$$\begin{bmatrix} 7 & -5 \\ -5 & 25 \end{bmatrix} \begin{bmatrix} V_x \\ V_y \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \end{bmatrix}$$

$$V_y = \frac{\begin{vmatrix} 7 & 10 \\ -5 & 0 \end{vmatrix}}{\begin{vmatrix} 7 & -5 \\ -5 & 25 \end{vmatrix}} = \frac{50}{175 - 25} = \frac{50}{150}$$

$$= \frac{1}{3}\ \text{V}$$