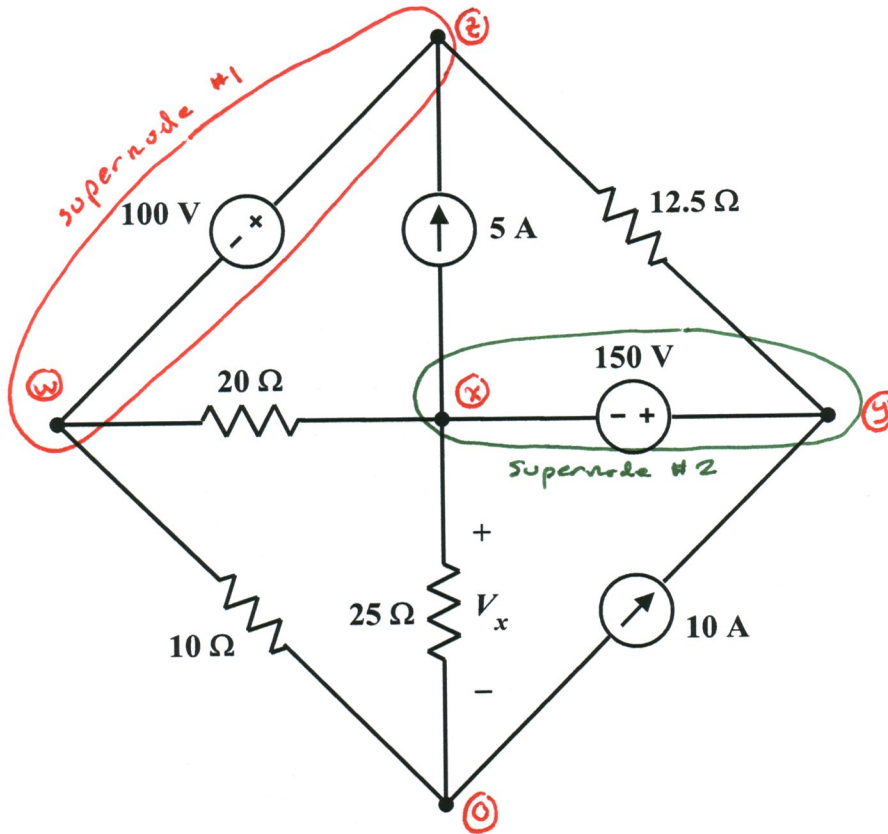


EE 2240
Problem #06

Use the nodal analysis method to determine V_x .



$$V_z - V_w = 100V \quad (\text{constraint equation for supernode \#1})$$

$$V_y - V_x = 150V \quad (\text{constraint equation for supernode \#2})$$

$$\frac{V_w}{10\Omega} + \frac{V_w - V_x}{20\Omega} - 5A + \frac{V_z - V_y}{12.5\Omega} = 0 \quad (\text{KCL for supernode \#1})$$

$$\frac{V_x - V_w}{20\Omega} + \frac{V_x}{25\Omega} - 10A + \frac{V_z - V_y}{12.5\Omega} + 5A = 0 \quad (\text{KCL for supernode \#2})$$

$$\begin{bmatrix} -1 & 0 & 0 & 1 \\ 0 & -1 & 1 & 0 \\ 3/20 & -1/20 & -1/12.5 & 1/12.5 \\ -1/20 & 1/100 & 1/12.5 & -1/12.5 \end{bmatrix} \begin{bmatrix} V_w \\ V_x \\ V_y \\ V_z \end{bmatrix} = \begin{bmatrix} 100 \\ 150 \\ 5 \\ 5 \end{bmatrix}$$

$$V_x \approx 63V$$