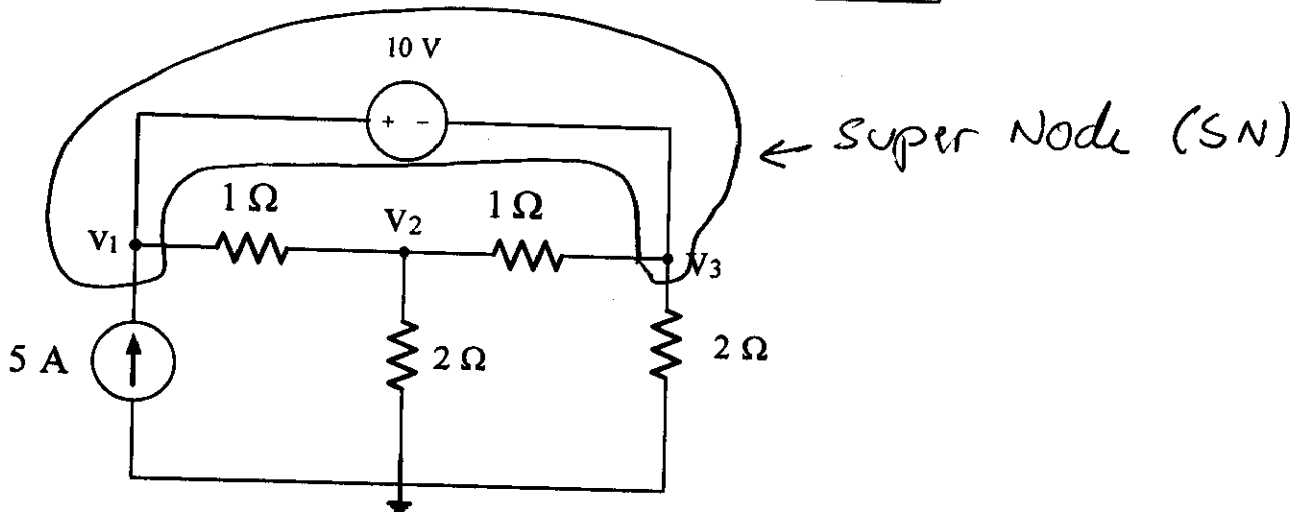


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For the circuit shown above, Find necessary equations to solve for the nodes voltages V_1, V_2, V_3 and put your result in a matrix form (DO NOT SOLVE)

$$GV = I \quad \text{where } V = \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix}$$

$$\begin{aligned} \text{Kcl at SN} &\Rightarrow -5 + \frac{V_1 - V_2}{1} + \frac{V_3}{2} + \frac{V_3 - V_2}{1} = 0 \\ &\Rightarrow 2V_1 - 4V_2 + 3V_3 = 10 \quad \text{--- (1)} \\ &V_1 - V_3 = 10 \quad \text{--- (2)} \end{aligned}$$

$$\text{Kcl at Node } V_2 \quad \frac{V_2}{2} + \frac{V_2 - V_1}{1} + \frac{V_2 - V_3}{1} = 0$$

$$\Rightarrow -2V_1 + 5V_2 - 2V_3 = 0$$

$$\Rightarrow \begin{bmatrix} 2 & -4 & 3 \\ 1 & 0 & -1 \\ -2 & 5 & -2 \end{bmatrix} \begin{bmatrix} V_1 \\ V_2 \\ V_3 \end{bmatrix} = \begin{bmatrix} 10 \\ 10 \\ 0 \end{bmatrix}$$