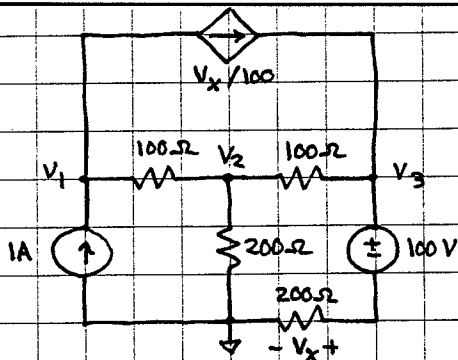


4.



Write equations for node voltages V_1 , V_2 , and V_3 in the form:

$$g_{11}V_1 + g_{12}V_2 + g_{13}V_3 = i_1$$

$$g_{21}V_1 + g_{22}V_2 + g_{23}V_3 = i_2$$

$$g_{31}V_1 + g_{32}V_2 + g_{33}V_3 = i_3$$

List the values of g_{ij} 's and i 's.

Sol'n: Our constraint eqn is $V_x = V_3 - 100V$.

Use this in place of V_x . Now use Node-V method

$$V_1 \text{ eqn: } -1A + \frac{V_1 - V_2}{100\Omega} + \frac{V_3 - 100V}{100} = 0A$$

$$\text{or } \underbrace{\frac{1}{100\Omega}}_{g_{11}} V_1 + \underbrace{-\frac{1}{100\Omega}}_{g_{12}} V_2 + \underbrace{\frac{1}{100}}_{g_{13}} V_3 = \underbrace{1A + \frac{100V}{100}}_{i_1} = 2A$$

$$V_2 \text{ eqn: } \frac{V_2 - V_1}{100\Omega} + \frac{V_2}{200\Omega} + \frac{V_2 - V_3}{100\Omega} = 0A$$

$$\text{or } \underbrace{-\frac{1}{100\Omega}}_{g_{21}} V_1 + \underbrace{\left(\frac{1}{100\Omega} + \frac{1}{200\Omega} + \frac{1}{100\Omega}\right)}_{g_{22} = 5/200 = 1/40} V_2 + \underbrace{-\frac{1}{100\Omega}}_{g_{23}} V_3 = \underbrace{0A}_{i_2}$$

$$V_3 \text{ eqn: } -\frac{V_3 - 100V}{100} + \frac{V_3 - V_2}{100\Omega} + \frac{V_3 - 100V}{200\Omega} = 0A$$

$$\text{or } \underbrace{0}_{g_{31}} V_1 + \underbrace{-\frac{1}{100\Omega}}_{g_{32}} V_2 + \underbrace{\left(-\frac{1}{100} + \frac{1}{100\Omega} + \frac{1}{200\Omega}\right)}_{g_{33} = 1/200} V_3 = \underbrace{\frac{-100V + 100V}{100} + \frac{100V}{200\Omega}}_{i_3 = -\frac{1}{2}A}$$