

EE301 Feb. 6, 2009

Quiz 2 - No Calculators - pencil (or pen) and paper only

Problem 1:

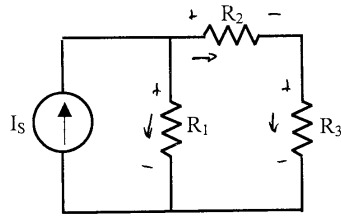


Fig. 1

$$R_{23} = R_2 + R_3 = 1 + 2 = 3 \Omega$$

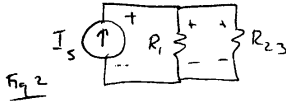


Fig. 2

$$R_{eq} = R_{23} = R_1 \parallel R_{23} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_{23}}} = \frac{1}{\frac{1}{6} + \frac{1}{3}}$$

$$R_{eq} = 2 \Omega \leftarrow = \frac{1}{\frac{1}{6} + \frac{2}{6}} = \frac{1}{\frac{3}{6}} = \frac{6}{3} = 2 \Omega$$

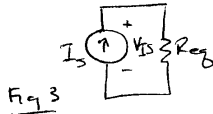


Fig. 3

$$V_{I_s} = R_{eq} \cdot I_s = 2(6)$$

$$V_{I_s} = 12V \leftarrow$$

From Fig. 2

$$V_{I_s} = V_{R_1} = V_{R_{23}} = 12V$$

$$i_{R_{23}} = \frac{\frac{1}{R_{23}}}{\frac{1}{R_1} + \frac{1}{R_{23}}} \cdot I_s = \frac{\frac{1}{3}}{\frac{1}{6} + \frac{1}{3}} \cdot 6A$$

$$= \frac{\frac{1}{3}}{\frac{2}{3}} \cdot 6 = \frac{1}{2} \cdot \frac{2}{1} \cdot \frac{6}{3} = 4A$$

$$i_{R_{23}} = 4A \left[ \begin{array}{l} \text{OR BY REASONING} \\ \text{2X AS MUCH GOES THROUGH} \\ \text{1/2 RESISTANCE} \end{array} \right]$$

Given:

$$R_1 = 6 \Omega, \quad R_2 = 1 \Omega, \quad R_3 = 2 \Omega$$

$$I_s = 6 A$$

Find:

- The equivalent resistance as seen by the source.
- The voltage across the source using Ohm's Law.
- The current through  $R_3$  using **current division**.
- The voltage across  $R_3$  using **voltage division**.

From Fig. 1

$$i_{R_3} = i_{R_{23}}$$

$$i_{R_3} = 4A \leftarrow$$

$$V_{R_3} = \frac{R_3}{R_2 + R_3} \cdot V_{R_{23}}$$

$$V_{R_3} = \frac{2}{1+2} \cdot 12$$

$$V_{R_3} = \frac{2}{3} \cdot 12 = 8V$$

$$V_{R_3} = 8V \leftarrow$$