Problem 1:
Using KVL and Ohm’s Law - show equations or state reasoning:

Given:
R_1 = 6 \Omega, R_2 = 8 \Omega, R_3 = 8 \Omega
R_4 = 8 \Omega, V_s = 12 V

Find:
- The equivalent resistance as seen by the source.
- The current through the source using Ohm’s Law.
- The current through the resistors using current division.
- The voltage across the resistors using voltage division.

From Fig 3:
V_s = V_{R_1} = V_{R_2} = 12 V \rightarrow V_s = 12 V
\frac{1}{i_1} = \frac{1}{i_s} + \frac{1}{i_{R_2} + i_{R_3}} = \frac{1}{6} + \frac{1}{4} = \frac{5}{12}
\frac{i_1}{i_s} = \frac{3}{5} \rightarrow i_1 = \frac{3}{5} V_s
\frac{i_{R_2}}{i_{R_3}} = \frac{1}{3} \rightarrow i_{R_2} = \frac{1}{3} i_{R_3}
\frac{V_{R_2}}{V_{R_3}} = \frac{1}{3} \rightarrow V_{R_2} = \frac{1}{3} V_{R_3}

From Fig 2:
\frac{V_{R_2}}{V_{R_3}} = \frac{R_{R_2}}{R_{R_3}} = \frac{3}{4} \rightarrow V_{R_1} = \frac{3}{4} V_{R_3}

From Fig 1:
V_{R_2} = V_{R_3} = V_{R_2} = V_{R_3} = V_s = 12 V
\frac{i_1}{i_2} = \frac{1}{3} \rightarrow i_1 = \frac{1}{3} i_2
\frac{i_{R_2}}{i_{R_3}} = \frac{1}{3} \rightarrow i_{R_2} = \frac{1}{3} i_{R_3}
\frac{V_{R_2}}{V_{R_3}} = \frac{1}{3} \rightarrow V_{R_2} = \frac{1}{3} V_{R_3}

Problem 2 on back
Problem 1:

Given:
- $R_1 = 3 \, \Omega$, $R_2 = 4 \, \Omega$, $R_3 = 4 \, \Omega$
- $R_4 = 4 \, \Omega$, $V_S = 12 \, V$

Find:
- The equivalent resistance as seen by the source.
- The current through the source using Ohm's Law.
- The current through the resistors using current division.
- The voltage across the resistors using voltage division.

Fig. 1

Fig. 2

Fig. 3

Problem 2 on back
Problem 2
Find the equivalent resistance between terminals a and b

Given:
\[ R_1 = 2 \, \Omega \]
\[ R_2 = 2 \, \Omega \]
\[ R_3 = 3 \, \Omega \]
\[ R_4 = 6 \, \Omega \]

Helps to redraw

\[ R_{1e} = R_1 \parallel R_3 = \frac{2 \cdot 2}{2 + 2} = \frac{4}{4} = 1 \, \Omega \]

\[ R_{2y} = R_2 \parallel R_4 = \frac{3 \cdot 6}{3 + 6} = \frac{18}{9} = 2 \, \Omega \]

\[ R_{ab} = R_{1e} + R_{2y} = 1 + 2 = 3 \, \Omega \]
**Problem 2**

Find the equivalent resistance between terminals a and b

Given:

- \( R_1 = 2 \ \Omega \)
- \( R_2 = 3 \ \Omega \)
- \( R_3 = 2 \ \Omega \)
- \( R_4 = 6 \ \Omega \)

**Helps to Redraw**

\[ R_{12} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{2 \cdot 3}{2 + 3} = 1 \ \Omega \]

\[ R_{34} = \frac{R_3 \cdot R_4}{R_3 + R_4} = \frac{2 \cdot 6}{2 + 6} = 1.8 \ \Omega \]

\[ R_{24} = R_{12} + R_{34} = 1 + 1.8 = 2.8 \ \Omega \]

\[ R_{a_b} = 3 \ \Omega \]

\[ R_{a_b} = 3 \ \Omega \]