Problem 2.13  Determine the current $I$ in the circuit of Fig. P2.13 given that $I_0 = 0$.

Solution: Since $I_0 = 0$, the middle branch in the bridge section is of no consequence. The voltage between nodes $a$ and $b$ is the same following either path between them. Hence,

$$I_1 \times 1 + I_1 \times 1 = I_2 \times 1 + I_2 \times 1,$$

or $I_1 = I_2$, which is obvious considering that all 4 resistors in the bridge section are the same. For the left loop that includes the 24-V source,

$$-24 + V_1 + V_2 + V_3 = 0$$

$$V_1 = 3I$$

$$V_2 = I_1$$

$$V_3 = I_1$$

and $I = I_1 + I_2 = 2I_1$. Hence,

$$-24 + 3I + 2I_1 = 0$$

$$-24 + 3I + I = 0$$

or

$$I = \frac{24}{4} = 6 \, \text{A}.$$
Problem 2.28  The independent source in Fig. P2.28 supplies 48 W of power. Determine $I_2$.

![Circuit of Problem 2.28.](image)

**Figure P2.28:** Circuit of Problem 2.28.

**Solution:** From

\[ P = V_0 I_1, \]

\[ I_1 = \frac{P}{V_0} = \frac{48}{12} = 4 \text{ A}. \]

Current of dependent current source is the same as $I_3$. Hence,

\[ I_3 = 0.25I_1 = 0.25 \times 4 = 1 \text{ A}. \]

By KCL,

\[ I_2 = I_1 - I_3 = 4 - 1 = 3 \text{ A}. \]