Problem 3.26 Apply mesh analysis to find the mesh currents in the circuit of Fig. P3.26. Use the information to determine the voltage V.

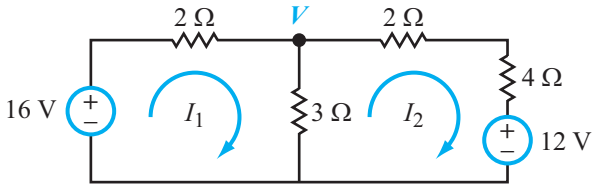

Figure P3.26: Circuit for Problem 3.26.

Solution: Application of KVL to the two loops gives:

$$\text{Mesh 1:} \qquad -16+2I_1+3(I_1-I_2)=0,$$
$$\text{Mesh 2:} \qquad 3(I_2-I_1)+(2+4)I_2+12=0,$$

which can be simplified to

$$5I_1-3I_2=16 \tag{1}$$
$$-3I_1+9I_2=-12. \tag{2}$$

Simultaneous solution of (1) and (2) leads to

$$I_1=3\text{ A}, \qquad I_2=-\frac{1}{3}\text{ A}.$$

Hence,

$$V=3(I_1-I_2)=3\left(3+\frac{1}{3}\right)=10\text{ V}.$$