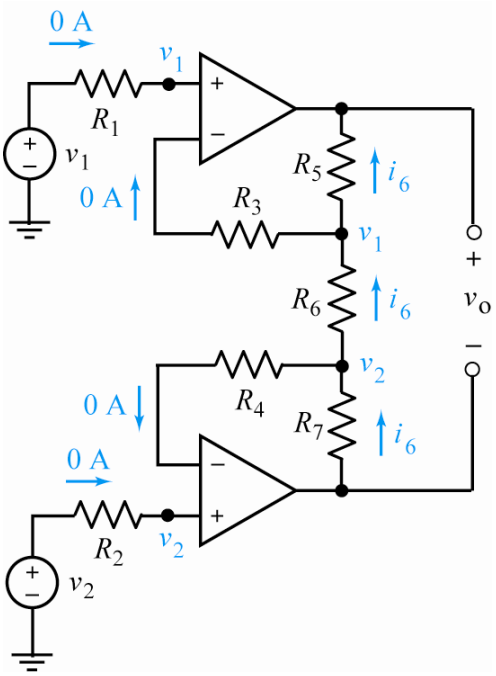
Solutions

P1 Use the properties of the ideal op amp to label the circuit as shown.



Then

$$i_6 = \frac{v_2 - v_1}{R_6}$$

and

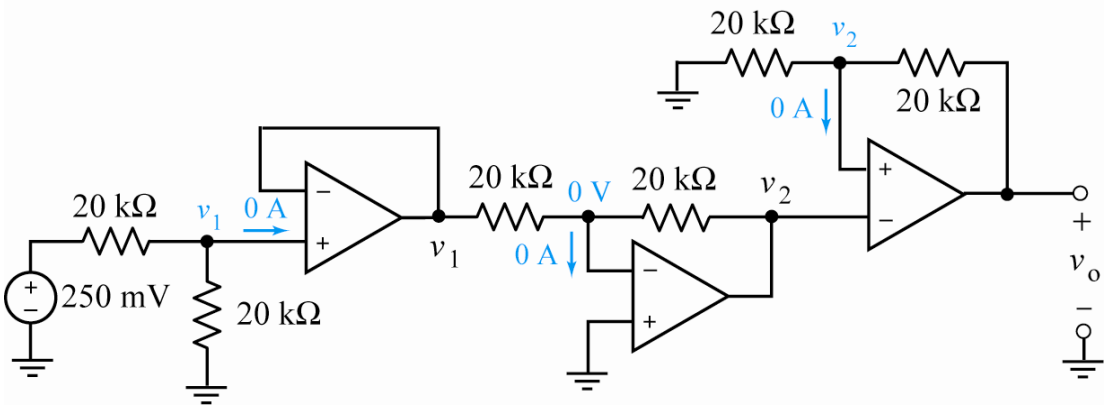
$$v_o + \left(R_5 + R_6 + R_7\right) i_6 = 0$$

so

$$v_o = -\left(R_5 + R_6 + R_7\right)\frac{v_2 - v_1}{R_6}$$

$$= -\frac{R_5 + R_6 + R_7}{R_6}\left(v_2 - v_1\right)$$

P2 Use the properties of the ideal op amp to label the circuit as shown.



Then

$$\frac{0.25 - v_1}{20\times10^3} = \frac{v_1}{20\times10^3} + 0 \quad \Rightarrow \quad v_1 = 0.125\text{ V} = 125\text{ mV}$$

$$\frac{v_1}{20\times10^3} + \frac{v_2}{20\times10^3} = 0 \quad \Rightarrow \quad v_2 = -v_1 = -0.125\text{ V} = -125\text{ mV}$$

$$\frac{v_o - v_2}{20\times10^3} = \frac{v_2}{20\times10^3} + 0 \quad \Rightarrow \quad v_o = 2v_2 = -0.25\text{ V} = -25\text{ mV}$$