Chapter 5, Solution 60.

Calculate v_o/v_i in the op amp circuit in Fig. 5.87.

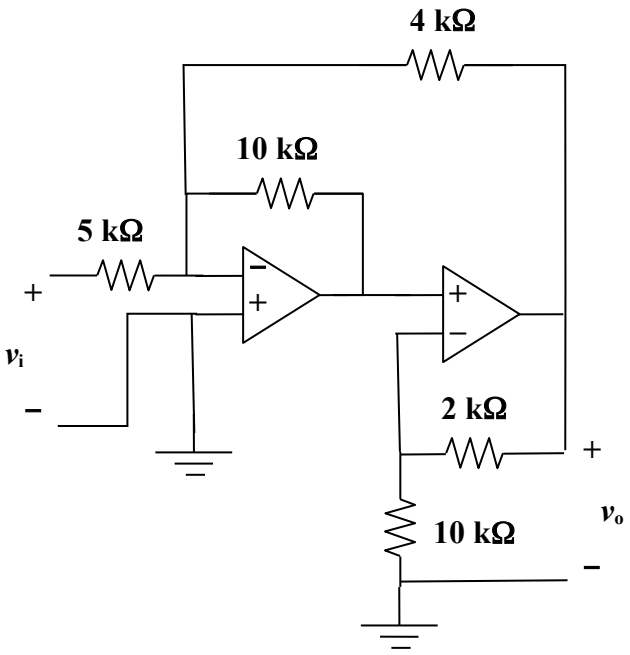

Figure 5.87
For Prob. 5.60.

Solution

The first stage is a summer. Let V_1 be the output of the first stage.

$$v_1 = -\frac{10}{5}v_i - \frac{10}{4}v_o \quad \longrightarrow \quad v_1 = -2v_i - 2.5v_o \tag{1}$$

By voltage division,

$$v_1 = \frac{10}{10+2}v_o = \frac{5}{6}v_o \tag{2}$$

Combining (1) and (2),

$$\frac{5}{6}v_o = -2v_1 - 2.5v_0 \quad \longrightarrow \quad \frac{10}{3}v_0 = -2v_i$$

$$\frac{v_o}{v_i} = -6/10 = \underline{-0.6}$$