1. Design an op-amp circuit with $R_1' = 1000\Omega$. $A' = -10$. $R_0' < 10\Omega$.
2. Design an op-amp circuit with $R_1' > 1M\Omega$. $A' = +10$. $R_0' < 10\Omega$.
3. Two input voltages are $v_1(t)$ and $v_2(t)$. Design an op-amp circuit that will generate the voltage $3v_1(t) - 2v_2(t)$. Its input resistance must exceed $1\ k\Omega$ and its output resistance must be less than $10\ \Omega$. Use more than one op-amp if necessary.
4.

8.9 Consider the inverting amplifier circuit shown in Fig. 8.17. A signal source with Thévenin resistance R_S is to be connected to the input. Calculate the output voltage by two different methods:

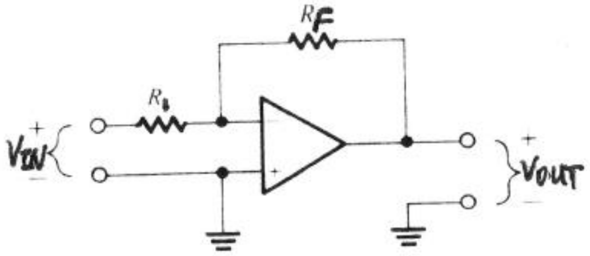
a. By combining R_S and R_1 into a single resistance R_i' and using Eq. (8.19).

b. By finding the input resistance R_i' for the inverting amplifier block and regarding R_S and R_1' as a voltage divider.

Show that the results obtained via parts (a) and (b) are in agreement.

Figure 8.17:

Another circuit capable of providing voltage amplification is shown in Fig. 8.17. This circuit is known as an *inverting amplifier* because the output has the opposite sign from the input. The voltage amplification is easily found with the ideal-op-amp technique. From Assumption 1 the voltage at the (−) input terminal is taken to be zero. We write a node equation for this point, postulating, from Assumption 2, that no current enters the amplifier terminal.



$$A' \cong -\frac{R_F}{R_1}$$

$$R_i' \cong R_1$$

$$R_o' \cong \frac{R_o}{A}\frac{R_1 + R_F}{R_1}$$

Figure 8.17

Equation 8.19

$$A' = \frac{V_{OUT}}{v_{in}} = -\frac{R_F}{R_1} \quad \text{(inverting amplifier)}$$

5.

8.10 Find the open-circuit output voltage of the system shown in Fig. 8.43 as a function of the input voltage v_S.

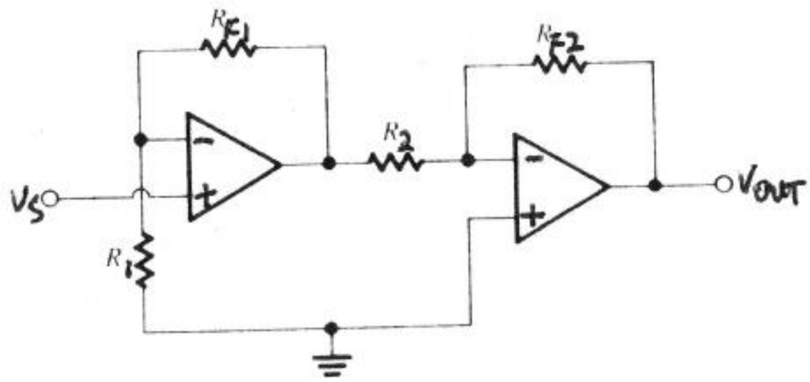


Figure 8.43

6.

8.11 In the circuit of Fig. 8.44 find i_L in terms of v_{IN}.

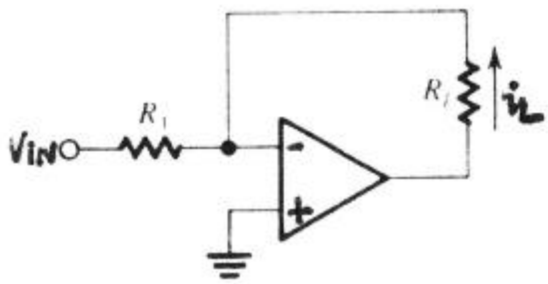


Figure 8.44

7.

8.12 In Fig. 8.45, use the ideal-op-amp technique.

a. Find v_{OUT} as a function of v_{IN}.

b. What is the voltage at A?

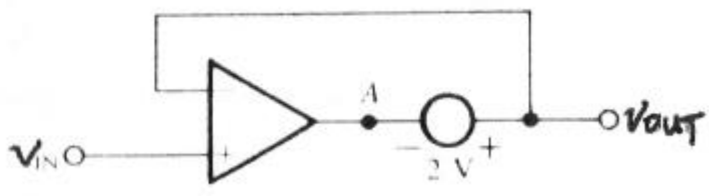


Figure 8.45