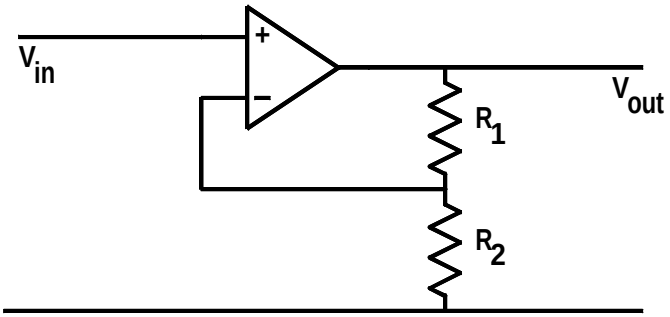
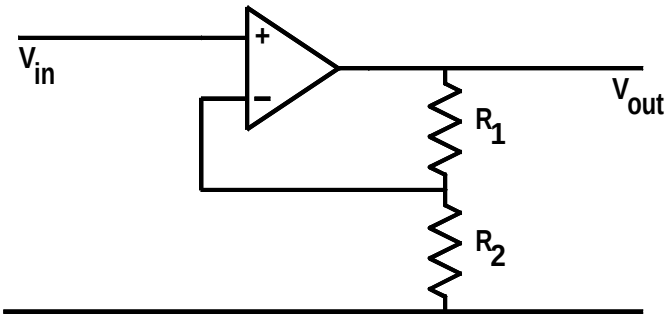


The gain of a noninverting amplifier is given by:—

$$A_V = 1 + \frac{R_1}{R_2}$$

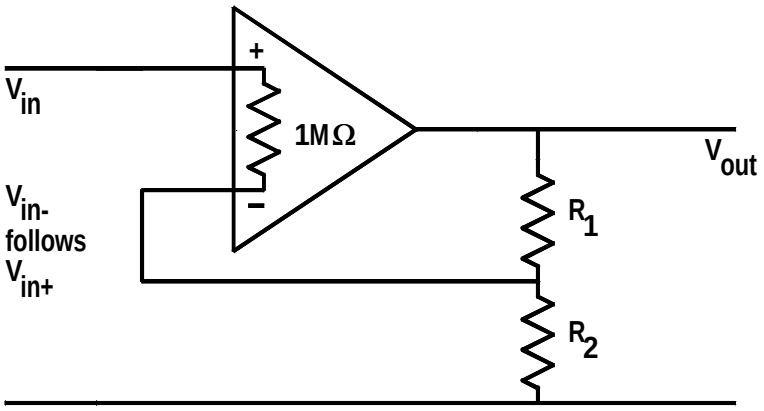
The input resistance of a noninverting is of the order of $100M\Omega$.



The noninverting amplifier circuit
Fraction of output voltage determined by the potential divider is applied to inverting input of op-amp.
Use Rule 1. Voltages at the two inputs to the op-amp are nearly equal.

$$V_{in} = V_{in+} = V_{in-} = V_{out} \times \frac{R_2}{R_1 + R_2}$$

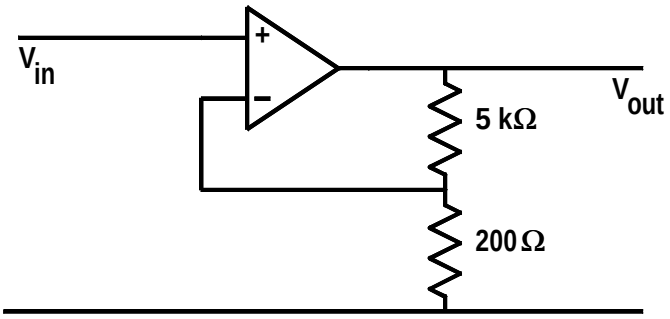
Giving $A_V = \frac{V_{out}}{V_{in}} = \frac{R_1 + R_2}{R_2} = 1 + \frac{R_1}{R_2}$



Resistance between the two input terminals is about $1M\Omega$.
But full input voltage does not appear across the $1M\Omega$ due to feedback
Maximum difference between the two inputs is about $100\mu V$
Maximum input current is

$$I_{in(max)} = \frac{100\mu V}{1M\Omega} = 10^{-10}A$$

Giving a minimum $R_{in} \approx 10^9\Omega$.
But may be less than this due to various leakage paths



Example 1

The circuit for a noninverting amplifier is shown in Figure 40.3. The power supply voltages are $\pm 15V$. Calculate the gain of this amplifier and plot a graph of the output voltage as V_{in} is varied from -1V to +1V.

The gain of the amplifier is given by:—

$$A_V = 1 + \frac{R_1}{R_2} = 1 + \frac{5000}{200} = 1 + 25 = 26$$

V_{in}	Calculated V_{out}	Actual V_{out}
-2V	-52V	-13V
-1V	-26V	-13V
-0.4V	-10.4V	-10.4
-0.1V	-2.6V	-2.6V
0V	0V	0v
0.1V	2.6V	2.6V
0.4V	10.4V	10.4V
1V	26V	13V
2v	52V	13V