1. The circuit shown below is known as a transimpedance amplifier or current-to-voltage converter. Using ideal assumptions about the op-amp’s behavior, solve for the following:

(a) output voltage $v_{out}$ in terms of $R$ and $i_{in}$,
(b) gain $\frac{v_{out}}{i_{in}}$ in terms of $R$, and
(c) largest magnitude of input current, $|i_{in}|$, that can be applied before the output saturates assuming supply voltages of $\pm V_S = \pm 12V$ and resistor $R = 1.2k\Omega$.

![Transimpedance Amplifier Diagram]

2. Consider the noninverting amplifier shown in Figure 8.12 on page 641, and use ideal assumptions about the op-amp’s behavior in your analysis. Solve for the following:

(a) output voltage $V_{out}$ and gain $\frac{V_{out}}{V_{in}}$ in terms of resistors $R_1, R_2$,
(b) output voltage $V_{out}$ and gain $\frac{V_{out}}{V_{in}}$ using specific values given for resistors $R_1, R_2$, and
(c) largest magnitude of input voltage, $|V_{in}|$, that can be applied before the output saturates assuming supply voltages of $\pm V_S = \pm 15V$ and specified values for resistors.
3. Given the circuit shown and ideal assumptions about the op-amp’s behavior, solve for
the circuit’s output voltage $v_{out}$ and gain $\frac{v_{out}}{v_{in}}$.

![Circuit Diagram]

4. An input signal that ranges between 0V and 50mV needs to be amplified to the range
0V and 5V.

   (a) What gain is needed to perform the desired amplification?
   
   (b) Given you have op-amps and resistors of values 1kΩ, 9.9kΩ, 10kΩ 99kΩ and 100kΩ
design an op-amp-based circuit that can perform this amplification. Note some
of the circuits you analyzed above may make good options.