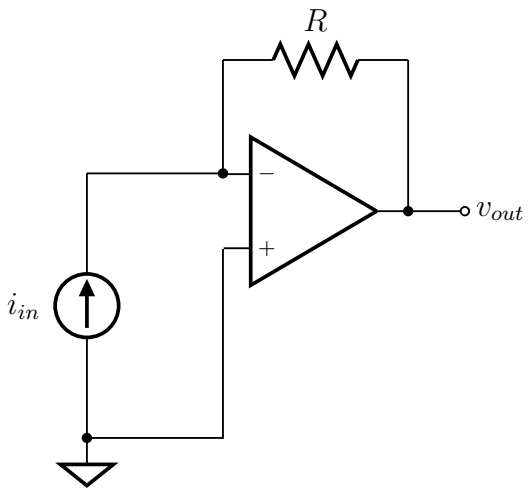
- Homework is due at the beginning of class
- Start early and get help if you need it
- Show all work neatly and clearly; redraw and/or rewrite problem if needed as work turned in should stand alone
- Identify your answers (with units) using a box or circle
- Staple multiple pages together

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 $\pm V_S = \pm 12\text{V}$ and resistor $R = 1.2\text{k}\Omega$.



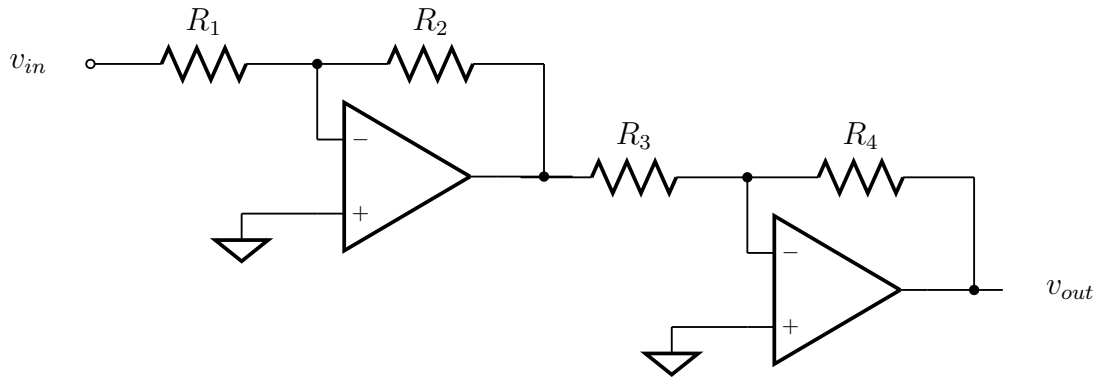
2. Consider the noninverting amplifier shown in Figure 8.12 on page 641, and use ideal assumptions about the op-amp's behavior in your analysis. Solve for the following:

   (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 $\pm V_S = \pm 15\text{V}$ 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 $\frac{v_{out}}{v_{in}}$.



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 99kΩand 100kΩ design an op-amp-based circuit that can perform this amplification. Note some of the circuits you analyzed above may make good options.