METHODS/ RESULTS

- The primary characteristics of an operational amplifier include high input impedance, low output impedance, and high open-loop gain. All contribute to the ability to control closed-loop gain through feedback and input impedance.
- To ensure enough voltage is supplied, R2 is set to 2.2kΩ and R1 to 1kΩ
  \[
  \frac{2.2k}{1k} + 1 = 3.2 \quad (Gain)
  \]
- The schematic for the circuit is drawn up in KiCad
- The input draws no current, meaning the current flowing through R1 and R2 is the same
- The voltage at the negative, inverting, terminal is equal to the voltage across R2, found using voltage division
- The inverting voltage is equal to the non-inverting input voltage
  \[
  V_{in} = V_{out} \times \frac{R1}{(R1+R2)}
  \]
  which can be written as the equation above in terms of gain.
- The circuit is built on a solderless breadboard for testing
- Supplied with voltage, the circuit is analyzed using an oscilloscope
  - The blue wave, channel 2, is the input, 0 – 3.3V, while the yellow wave, channel 1, is the output of the op amp, 0 – 9.954V
  - With a desired max voltage of 10V, 9.954V is only 0.46% off