**MAE221 Thermodynamics Lab – Lab 1.4 *(30 points)***

**Name:**

**Lab Day:**

**Instructions:** Complete this worksheet as you work through the lab. Once completed, submit it through Canvas before the start of your next lab. Each person should submit a worksheet.

**Exercise 1:** Pressure & Temperature Measurements

**A)** Make a plot of your pressure measurements over a range of volumes, including error bars. Discuss the extent to which your data support Boyle’s Law. *(8 pts)*

**B)** Make a plot of your temperature measurements over the range of volumes, including error bars. Discuss the extent to which your data support Charles’s Law. *(8 pts)*

You should measure about a 1°C change in temperature as you compress from 150mL to 60mL. If you are not able to record good temperature data, calculate the temperatures you expected to see from the ideal gas law. In this case, submit the plot of your bad temperature data and a table of the expected values.

**Exercise 2:** Ideal Gas Law

**A)** Plot the quantity as a function of volume for each of your measurements, including error bars. Use your temperature measurements even if they are not great. *(6 pts)*

**B)** For one of your measurements, show how you calculated the uncertainty in the quantity from your measurements of pressure, temperature, and volume. Does one of the measurements dominate the aggregate uncertainty? *(4 pts)*

**C)** Discuss the accuracy of the ideal gas approximation for air in the range of conditions you measured. (Is constant for all your measurements? Does the variance of lie within the expected uncertainty?) *(4 pts)*