**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. *(4 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. *(4 pts)*

**C)** Calculate the temperatures you would expect from the ideal gas law: . Compare those temperatures to your measurements in the table below and discuss your findings. The syringe has an extra in the cap so the total volume is . The density of air at sea level is so the total mass is about . The gas constant of air is . Be careful about units! . *(8 pts)*

|  |  |  |
| --- | --- | --- |
| **Volume (mL)** | **Measured Temperature (K)** | **Calculated Temperature (K)** |
| 180 |  |  |
| 160 |  |  |
| 140 |  |  |
| 120 |  |  |

**Exercise 2:** Ideal Gas Law

**A)** Plot the quantity as a function of volume for each of your measurements, including error bars. *(6 pts)*

**B)** The quantity is equivalent to , which we expect to be constant for an ideal gas. Do your findings support this? *(4 pts)*

**C)** 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)*