CHEMISTRY 101L REPORT

EXPT. 1

Mass Volume and Density

Your name: Joe Puccio Lab Section 425

Your partner's name Micah Halzer

Results: Present your data in the figures and tables below.
**If you collected more data than the table templates allow, you can add more rows to any of the tables below.*

Table 1. Constants From Experiment

	Trial 1	**Trial 2**
Buret segment mass (grams):	17.11	17.11
Buret segment mass with liquid (grams):	22.23	22.23
Mass of liquid (grams):	5.12	5.12
Largest volume Increment, V_b (mL):	50.00	50.00
Initial Volume of water, V_i (mL):	45.00	45.00
Volume with thermometer, V_t (mL):	43.00	43.00
Displacement Volume, V_d (mL):	2.00	2.00

Table 2. Experimental Calculations Of Density as a Function of Temperature

Corrected Volume (mL) Trial 1	**Temperature (°C) Trial 1**	**Density (g/mL) Trial 1**	**Corrected Volume (mL) Trial 2**	**Temperature (°C) Trial 2**	**Density (g/mL) Trial 2**
5.04	25.00	1.02	5.08	25.00	1.01
5.05	35.00	1.01	5.09	35.00	1.01
5.09	45.00	1.01	5.10	45.00	1.00
5.17	55.00	0.99	5.19	55.00	0.99
5.20	65.00	0.98	5.22	65.00	0.98
5.30	75.00	0.97	5.30	75.00	0.97
5.37	80.00	0.95	5.33	80.00	0.96

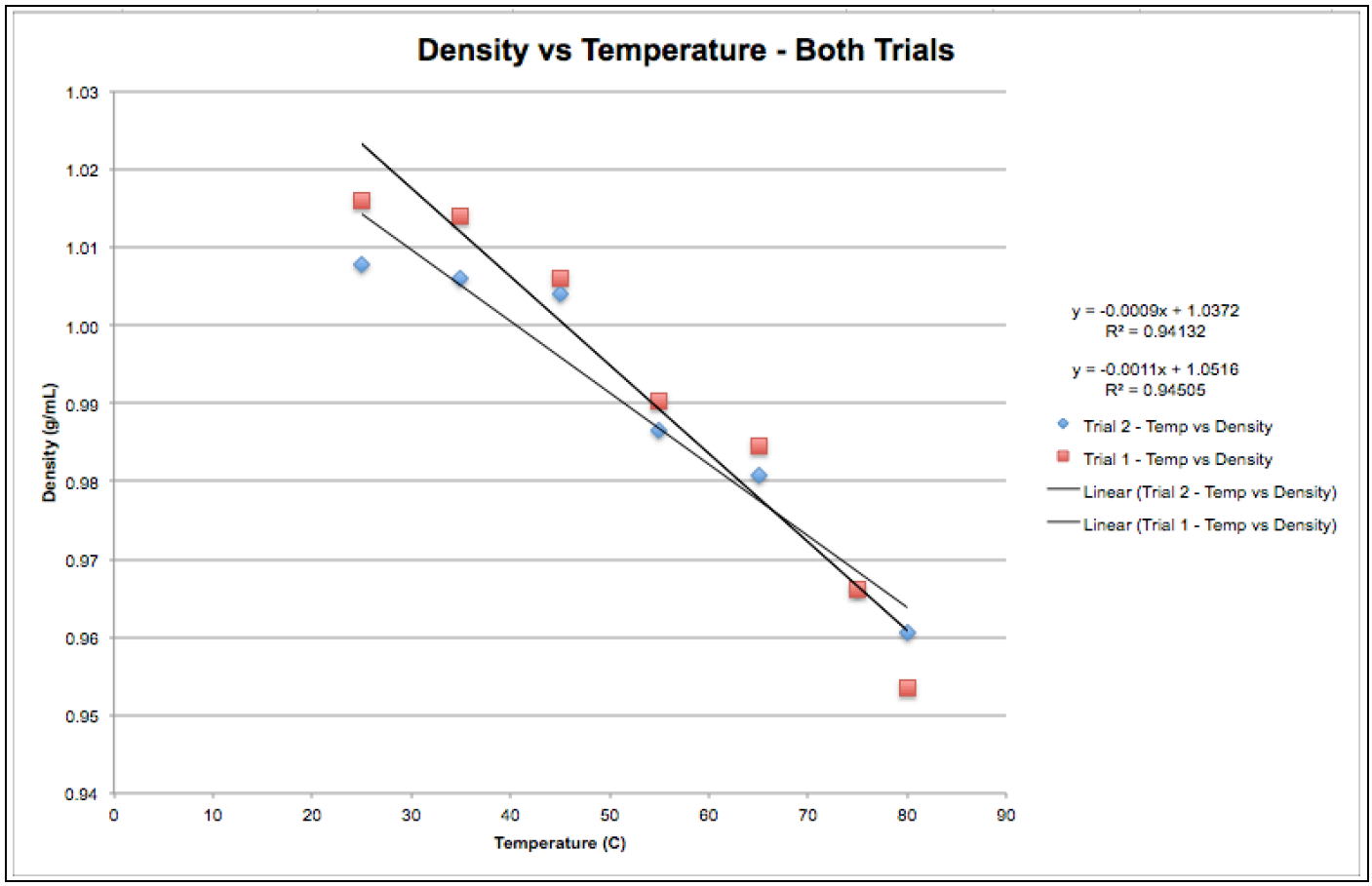
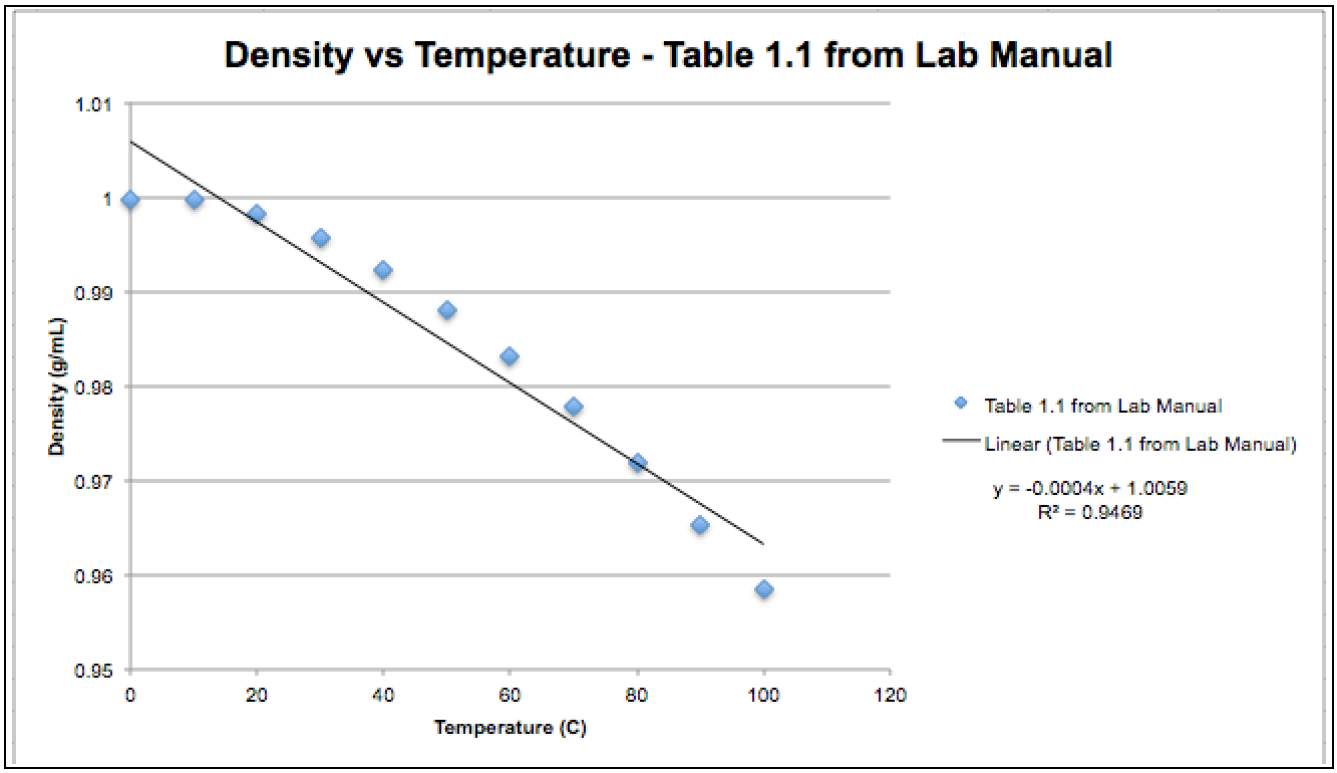


Figure 1. Density vs Temperature – Both Trials. This is a plot of Density vs Temperature of water for the both trials conducted.

Figure 2. Density vs Temperature – Table 1.1 from Lab Manual Literature Values. This is a plot of



Density vs Temperature of water based on the data provided in Table 1.1 from the Fall 2015 Student Packet.

Table 3. Comparison of Experimental to Literature Values
Note: Report units for each entry.

	Trial 1	**Trial 2**	**Literature Values**
Coefficient of determination, R^2	0.94505	0.94132	0.9469
y-intercept	1.0516 g/mL	1.0372 g/mL	1.0059 g/mL
Slope	-0.0011 g/C*mL	-0.0009 g/C*mL	-0.0004 g/C*mL
Average Slope (Trials 1 & 2)	-0.0010 g/C*mL		
Percent Error	-150%		

Table 4. Lab Classmate's Slope Values and Error

Name	Average Slope	Percent Error
Erin Blalock	-0.00115	-187.5%
Lindsay Jones	-0.0011	-175%
Caroline Minnick	-0.00105	-162.5%
Natajha Phillips	-0.00185	-362.5%
Sara Safi	-0.0012	-200%
Hawi Tasissa	-0.00145	-262.5%
Jadey Macdonald	-0.0008	-100%

Discussion: Write a discussion and conclusions of your findings for Experiment 1. It should include a summary of your findings, comparisons between your data set and data sets collected by your classmates and published literature values, as well as addressing the questions listed below. Always remember to reference specific data and examples to support your conclusions.

My findings show the inverse linear relationship between temperature and water density, with a calculated constant of -0.0010 g/C*mL. The purpose of this experiment was to measure this relationship. That is, the density of water decreases as its temperature increases. This has to do with the fact that water expands when heated, as the increased molecular motion of the water molecules necessitates that they each take up more space. Because the mass remains constant, an increasing volume means a corresponding decreasing density. A comparison of my findings from Experiment 1 to those of my classmate's show that my findings were second closest to the true value, as my percent error was -150%, second closest after Jadey Macdonald's -100%. None of the classmates had a percent error < |100%| (that is, less than a factor of 2), which indicates a very large difference in the experimental conditions and rigor of the literature and our lab. There was a wide spread of error, although the majority of individual's fell between -100% and -200%.

Excel was better able to fit the linear trendline to the literature values ($0.9469 > \max(0.94505, 0.94132)$), this could be due to the fact that the literature experimenters were able to reduce to a greater extent possible systematic errors in their experiment. Possible sources of random and systematic errors that we encountered were condensation build-up near the top of the Buret, which is variable and not possible to account for. Additionally, trapped air in the water during the experiment, as this alters the measured volume of the water. This could have been accounted for by further averaging with the trials of the other lab classmate's, as well as attempting to estimate some of the errors present.