Standard Deviation Report Write-up

This should be a formal report with the following sections. The report will be submitted on Blackboard. There will be a link to upload the formal report, the spreadsheet, and lab book page images. Both the formal report and spreadsheet must be submitted electronically. You may submit the lab book pages in class or upload pdf’s of them. Either is acceptable.

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| --- | --- | --- |
| Lab Notebook |  | /25 |
|  | Procedure | /5 |  |
|  | Signatures | /5 |  |
|  | Data | /15 |  |
| Formal Report |  | /75 |
|  | Title Page | /5 |  |
|  | Objective | /5 |  |
|  | Introduction | /10 |  |
|  | Procedure | /5 |  |
|  | Results and Calculations | /20 |  |
|  | Discussion  | /15 |  |
|  | Conclusion | /5 |  |
|  | Questions | /10 |  |
| Total |  | /100 |

1. Title Page with experiment title, name, instructor, section number and date.
2. Objective – This is a statement of the purpose of the experiment and how this experiment will fulfill this purpose. (Hint: The purpose of this experiment is to determine the accuracy of a variety of measuring devices and to learn statistical methods of analyzing data.)
3. Introduction –Include some background information. This should include definitions of types of error, mean, deviation, and standard deviation. It should explain why standard deviation is a useful statistical tool. You should also make a statement explaining how the experiment will achieve the objective of the experiment. Keep it short and precise, one or two paragraphs.
4. Procedure - reference the procedure you followed for the experiment. Follow the reference guidelines found on blackboard. If any changes have been made to the experiment by the instructor they should be explicitly described here.
5. Results and calculations - It probably makes sense to copy the pages out of the excel worksheet for this section.
6. Discussion -Discuss the relative accuracy and precision of the three devices you used to measure volume in the first part of the experiment. Discuss the differences in your calculated absolute error for the three different density determinations. Discuss the types of measurements that give the greatest contribution to the error in a calculated value. You should also include the answers to the following questions in your discussion

For Part A: Glassware

* 1. Make a table which shows the mean volume and standard deviation for each device. Also show within what limits you would expect 50%, 90%, and 99% of the measurements to fall.
	2. For each piece of equipment, classify the precision and accuracy of the volume contained or delivered as good, fair, or poor. Include a discussion of why you classified each type of equipment as you did. Be sure to include data to justify your classification scheme.
	3. The error analysis assumes that all of the errors are random and indeterminate. Do you detect at least the possibility of a determinate or nonrandom error in any of the volume measurements? If so, tell which method it is and what is the source of this error.

For Part B

* 1. Explain how you chose which glassware to use to determine the density of the soda samples. Be sure to use data to validate any conclusions you make in this section.

**NOTE: Discussion is not a place to tell me whether or not you had fun or if you liked the experiment. I would love to hear you tell me what you do and do not like in person, but this is not part of a scientific document.**

1. Conclusion – Here you will just tell me the final results of the experiment. I expect to see a listing of the volume and standard deviation for each measuring device, and the density of both the regular and diet sodas with the corresponding standard deviations.
2. Questions – Answer the questions at the back of the lab

Lab notebook

1. Either submit the copies of the data, or upload images of the pages. If you are not using carbon pages you may show me your originals. You need to keep the originals so that if the report is lost you will have your data.

Note: Many of you did not have your lab notebooks at the time of doing this lab. This means that you will be appending the sheet of paper that you and I signed as containing the **original** data.

1. Make sure that your lab notebook includes the following
	1. Completely referenced procedure including any changes made by the instructor
	2. Any safety precautions that may be necessary. (Were there any here??)
	3. Clearly laid out and completed data tables are nice. Do not redo them just to make them pretty. As long as you have organized the data in a way that you can figure out and explain to me it is OK. Calculated values need not be included as they are on the computer spreadsheets
		1. Be sure to use the correct number of significant figures on all measurements
		2. Be sure to write all data in the lab book in ink when you take the data!
	4. Each data sheet is signed and dated at the end of a day’s work by both the student and the instructor.