Guidelines for Lab Reports

(with examples from the Log Plots Lab)

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1. Your report should be organized in the same way the lab is organized. In particular you should use the numbering and lettering in the lab manual (similar to what you would do in an outline), so the grader can tell which questions you are answering. For example, for the second investigation you could use the following format:

> <u>*Investigation #2*</u>
> *(a) To find the function $C(t)$ we first had to determine the type of function that would be appropriate. To make that determination we …*
>
> *(b) The function, $C(t)$, derived in part (a) models the amount of Xylopain in the patient's bloodstream t hours after the Xylopain was administered. To determine …*
>
> *(c) The defense attorney could raise questions about the reliability of the model constructed in part (a). Her argument could go as follows:*
> *Yada, yada, yada…*

2. You should describe what you are doing when you show mathematical expressions, and you should explain nontrivial mathematical steps. Use complete sentences when you give these descriptions and explanations. State clearly the meaning of all variables and functions you introduce. Show all significant mathematics, but do not show the details of trivial arithmetic. Unless somehow it has affected your results (e.g., round-off error or misleading graphs), you should not mention the calculator and certainly not keystrokes.

For example, you could start the Log Plot Lab report as follows:

Investigation #1:
Galileo's first hypothesis was that the velocity of a free-falling object is proportional to the distance it has fallen. This hypothesis is equivalent to assuming that $v = kd$, where v is the velocity, d is the distance, and k is some constant. We tested this hypothesis by computing the ratio, $\frac{v}{d}$, for each data point in the table.

d	7.056	56.64	82.369	117.649	137.64
v	11.76	33.32	40.18	48.02	51.94
$\frac{v}{d}$	??	??	??	??	??

Because the values of $\frac{v}{d}$, shown in the third row of the table, are not constant, we concluded that v is indeed not proportional to d; i.e., Galileo's first hypothesis is false.

Here's an example of a response which is insufficient:
The ratios were different so Galileo was wrong.

Here's an example of a response which is so detailed it distracts the reader from the important ideas. And remember, calculator technicalities should not appear in the report.

We put the values of d into L_1 and the values of v into L_2. Then we pressed the L_2 key, the $\div$ key, the L_1 key, then the $=$ key.

3. You should always make it clear how you got your results. For example, to say only that "We computed the value of the slope m to be 0.5" is insufficient. A much clearer (and verifiable) statement is, "Using the logarithms of the first and last data points from the table, we computed $m = \frac{\ln(51.94) - \ln(11.76)}{\ln(137.64) - \ln(7.066)} \approx 0.5$."

4. Passive voice should be avoided. Oops. **You** should avoid passive voice. Here's an example of poor wording in a report:

The amount of Xylopain in the bloodstream was found to be $\ldots$.

Even though passive voice has its place in our language, you should avoid it in a mathematical or scientific report. Here's a better way to start that previous sentence:

Our team computed the amount of Xylopain in the bloodstream by $\ldots$

5. Maybe you are wondering, *do we have to type the report*? No, you don't. You are welcome to submit a handwritten report, but please choose a person with good handwriting for that job. In particular, your scribe should have much better handwriting than your teacher does.

6. Use standard mathematical expressions. The expression, y=X^2, is poorly written. The proper notation is the following: $y = x^2$. A handwritten x^2 is better than a typed x^2.

7. Be consistent with your variables. For example, a reader would not normally assume that n $=$ N. In mathematics Capitalization matters At least As much as It does In english Class. If you need both n and N, then use both, but be aware that *The Reader* will assume they are different symbols with different meanings. You will see applications in which x, X, t, T, m, and M all have different meanings.

8. When your results or arguments involve a graph, then you should include the graph in your report. You may copy a graph from the calculator screen by hand— just do so carefully. You can also use a computer with a calculator link to print a copy of your calculator's screen. The computers in the help room and outside your teacher's office (118 Physics) have such links. Be sure to add (by hand) the scales and labels for the axes. And when you do insert graphs or images into your reports, make clear references to them, label them, and put them where *The Reader* can find them easily.

9. As you should do in all your written work, avoid ambiguous referents. In math papers this mistake often appears in a sentence which begins, "This means $\ldots$."