

A Template For Writing Lab Reports in L^AT_EX

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Abstract

A document was prepared which gives a framework which can be used to write documents suitable for lab reports.

1 Introduction

L^AT_EX is a typesetting language[1]. It is actually a set of *macros* for T_EX, which is a typesetting system. T_EX was written by Donald Knuth, a celebrated computer scientist and mathematician, in reaction to his dissatisfaction with available software. Much as Unix is an operating system which appeals to people who write programs, T_EX and L^AT_EX tend to appeal to technically minded people.

This document is written to expose you to some of the features of L^AT_EX which might make it suitable for preparing lab reports. It does not cover how to compile documents, this is covered on the *Wiki* page for this template[2].

This template is not provided as a part of any exercise, you do not have to use it, it is provided as a resource which you may use if you are interested.

2 Typesetting

The following is quoted from Wikipedia[3]:

L^AT_EX is based on the idea that authors should be able to concentrate on writing within the logical structure of their document, rather than spending their time on the details of formatting. It encourages the separation of formatting from content, whilst still allowing manual typesetting adjustments where needed. By keeping the formatting details in a separate file from the text, it is often regarded as superior to word processors and most other desktop publishing systems, which allow trivially easy visual layout changes but tend to intertwine content and form so tightly that consistency and automation are often difficult.

3 Citations

Notice how in the Introduction section I made reference to an item in the References section at the end of the document. In the bibliography file `report.bib` the information about this reference is stored and labeled `LAMPOR`T. Anywhere I wish to cite this reference it is just a matter of entering the command `\cite{LAMPOR}`T. L^AT_EX will keep track of the numbers, you just have to use the labels.

4 Using Equations

Sometimes in a lab report you might want to insert the odd equation, it is important to refer to these by number. Again we can let L^AT_EX keep track of the numbers and use labels. It is not at all required, but an unspoken convention that most people use upcase for labels. Labels can contain hyphens (-), but not underscores (_).

$$\mu = \frac{1}{N} \sum_{i=1}^N x_i. \quad (1)$$

Equation 1 shows a common definition for the mean, μ , where x_i is the value of the i th sample, N is the number of samples. First note that, as required, all symbols have been defined. Also note that the equation has a period. Equations are part of the text and should follow punctuation rules. That is they should have periods, commas etc as required. A good rule of thumb is to treat the equation like a sentence with the equal sign as the verb. Thus the above formula reads: μ equals one over N times the sum of x_i from 1 to N . As you can see, this sentence definitely requires a period.

There are two modes in L^AT_EX, *paragraph mode* and *math mode*. L^AT_EX is in paragraph mode when it is processing ordinary prose[4]. Between the `\begin{equation}` and `\end{equation}` commands L^AT_EX is in math mode, this allows access to a vast array of mathematical symbols. You can switch briefly into math mode using the dollar character (\$) as a delimiter.

5 Figures

Arbitrary encapsulated-postscript can be displayed in \LaTeX using the figure environment.

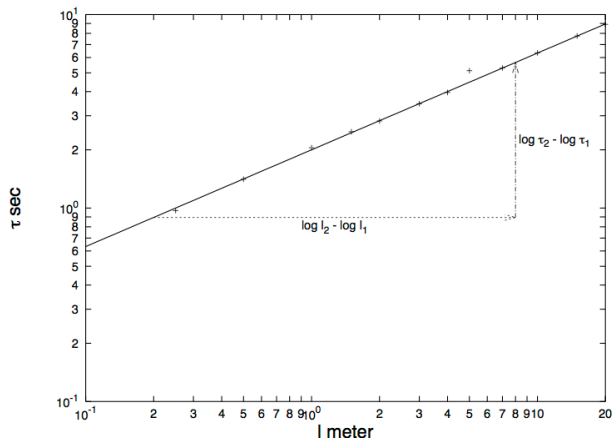


Figure 1: Variation of period of a pendulum as a function of length.

Please note that the graph shown in figure 1 is only to show how to insert a graph, not in any way how to format a graph. It is a graph which I made to reproduce an image in the Phys-257/258 lab notes a couple of years ago when they were being revised. Unfortunately, as an example of a graph, it is repugnant. On brief inspection the following points come to mind:

- Where are the error bars?
- A more descriptive x-axis caption would have been “Pendulum length (m).”
- Despite space restrictions, a better y-axis caption would have been “Period (s).”
- The numbering is on the small side, almost unreadable.

One of the nice features of \LaTeX is that one can define a macro to cut down on the amount of redundant typing required. This was the purpose of the `EPSFIG` macro defined in the header of this document. Notice how the figure 2 is inserted using the macro.

The Encapsulated Postscript image shown in figure 2 was created using Gnuplot.

6 Conclusions

Hopefully this might be slightly helpful. I urge you to look at some other reference materials, such as Oetiker’s paper[5].

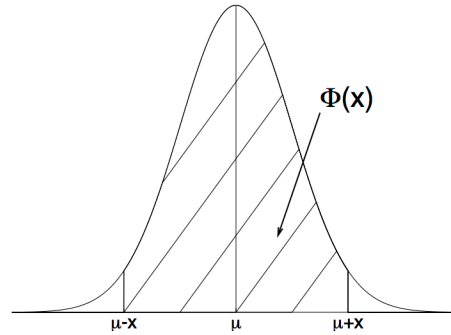


Figure 2: A decorated gaussian

References

- [1] Leslie Lamport. *\LaTeX A Document Preparation System*. Addison-Wesley Publishing Company, 1994.
- [2] Mark Orchard-Webb. *Latex template*. http://www.ugrad.physics.mcgill.ca/wiki/index.php/LaTeX_Template, January 2006.
- [3] Wikipedia article. *Latex*. <http://en.wikipedia.org/wiki/LaTeX>, January 2006.
- [4] Antoni Diller. *\LaTeX Line By Line*. John Wiley & Sons Ltd., 1993.
- [5] Tobias Oetiker. *The not so short introduction to latex 2ε*. <http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>, September 2005.