Short example/introduction to LaTeX

Christian Schulz

July 11, 2006

1 General

In LaTeX you do not say "I want this to be bold because its a headline", you say instead "This is a headline" and LaTeX than displays this headline correspondingly to its parameters. You can change the way how LaTeX handles nearly everything, but I would strongly advice that you do not do this (at least not in your beginning phase, how to customize LaTeX is a more advanced topic).

As well as this a newline in the document is not created when you type a newline in your tex-file. LaTeX does that on its own, it just interprets the text as a stream of words. Paragraphs are separated by empty lines in your tex-file. If you want to enforce a newline without starting a new paragraph you can use the command `\\` or `\newline`.

2 Document Structure

In tex a document is separated into chapters, sections, subsections, subsubsections, paragraphs and subparagraphs. Of course you do not need to use all of them. Chapters are only available if you choose the documentclass book or report. LaTeX numbers the different structures automatically, but remember that if you create a subsection without having created a section before you will get something like 0.1 as you are currently in section 0.

3 Lists

There are three general different ways to create lists.

1. An itemize-environment is unnumbered and has symbols in front of it. Of course you can put lists into lists again. Like
   - First subpoint
   - Second subpoint
   - Third subpoint
     - with first subsubpoints
     - and second
2. An enumerate-environment is a numbered list. If several lists of the same type are put into each other, the symbol in front changes.
   (a) this subpoints have a different style of counting
   (b) second subpoint
3. A special list is the description-environment, where you can specify a different text in front of each points.

All lists have the same structure:

start each list-environment starts with the command `\begin{_listtype_}`

items to add a item just type in `\item` and all after that will be at the next point

end each list-environment ends with the command `\end{_listtype_}`

4 Mathematics

One of the big advantages of LaTeX is its capability to display complex mathematical expressions and at the same time they are relatively easy to type in. First you have to start a mathematics environment, then type in your formulas or equations and then close the environment.

We have mainly two different environments. The first is used inline, which means the math is displayed in the same line as the rest of the text. The other uses extra space, see the examples.

4.1 Inline

The following formula $a^2 + b^2 = c^2$ is inline, it stays within the text.

4.2 Extra Line

Here the formula

$$a^2 + b^2 = c^2 \tag{1}$$

uses extra space.

If you want to write several lines of math with some symbol always at the same position (normally the =) use the `eqnarray` environment.

We strongly advice you to mark vectors somehow in your document in order to make it easy for the user to distinguish between scalars and vectors. In LaTeX you can use the `\vec{a}` command which gives you $\vec{a}$. Often the additional arrow above is not wanted as it can get confusing in combination with indices and other markings, one often and well known way to represent vectors is making them boldface. This is also our recommended way. Making a vector boldface in the easiest way is a small exception from the general idea of not saying boldface but vector. Use bf to do it. Example: $\alpha\mathbf{a} = \mathbf{b}$. You have to put the bf in brackets, otherwise everything after the bf would be boldface.

If you labeled the equation you can refer to it before or after it using the ref command. In (1) we have Pythagoras law.

There is a lot to know about mathematics in LaTeX. For example how to display fractions, avoid the numbering of equations and so on. You can also define your own commands to make your life with boldface vectors easier. Have a look at books or online resources as explaining all this would be way to much here.

5 Images

Images can be included in a floating area. Floating area means that tex moves the area so that it looks nice.

If you label a image you can later or even before the image refer to it by using the ref command, just as we refer here to figure 1. This has the advantage that the number is automatically generated and therefore changed if you add or delete other images.

6 Compiling

There are two major ways to create your document. One way is to use the command `latex document.tex` which creates a `document.dvi` from which you can create a postscript document via `dvips document.dvi -o document.ps`.

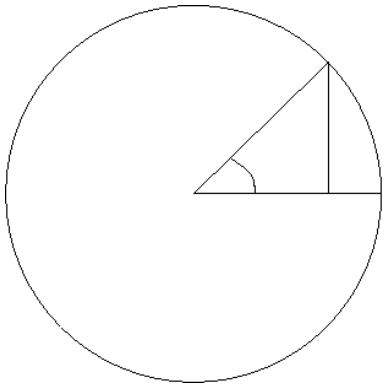

Figure 1: With caption we can create some description for the image

The other way is to use pdflatex to create a pdf file. The results of the two ways will look a bit different. Do whatever you prefer. You can create a pdf file from your ps file by using `ps2pdf`.

Remember that the supported image formats are different in `pdflatex` and `latex`. `latex` supports only ps and eps images, where `pdflatex` does *not* support ps and eps images.

If you are using labels and references we recommend running `pdflatex` and `latex` respectively twice or three times, as LaTeX creates first a file with all the references stored and in the next run uses this references. Have a look at what LaTeX tells you (it will tell you if the references may be incorrect, if so, run it again).

By the way, you can also label sections, chapter, subsections, etc. Refering to them is than again done via `\ref`.

7 Have a Look at a Book

This is a very short introduction, a lot of things are not covered or just mentioned or not explained in detail. Have a look at a book for LaTeX to get more understanding, there are a lot of them out there.