Learn LaTeX in 30 Minutes!

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Abstract

This report should help you to understand and learn LaTeXin less that 30 minutes. If you follow the instruction in this paper, you should be able to install and create a sample LaTeXfile with all important features. Please feel free to use this document and simply steal from this document! More information available from [1], [2].

1 Introduction

LaTeX(pronounced La-Tech) is a document mark-up language and document preparation system for the TeX typesetting program. LaTeXis a flexible typesetting package. Various fonts and sizes of font are available. For example `typewriter`, *italic*, *emphasised*, sans serif, **bold** as well as the default roman. Combinations of some are possible ***emphasised san serif***, for example. LaTeXis an excellent package to deal with equations and graphics.

2 What Do I Need?

To start working with LaTeX, you will need LaTeXcompiler and a text editor!

2.1 LaTeXCompiler

To convert your LaTeXsource file, you will need a compiler to make real documents out of your LaTeXsource file. MiKTeX is a free LaTeXcompiler for windows and its installation is extremely simple. LaTeX compiler produces so called DVI file or PDF which can be then inspected and printed by YAP viewer or Adobe Reader.
Download the package from: `http://miktex.org/2.9/setup`

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2.2 LaTeXEditor

You will also need a LaTeXEditor to write your text in, because you cannot just write it in MS Word or OpenOffice Writer and compile it from there. Just to set the record straight, LaTeXis a markup language, which uses commands to make your text look bold, coloured or any other text alignments you want to put it in. Assuming that you are using Windows, you might want to TeXnicCenter available from:
`http://www.texniccenter.org/resources/downloads`

3 Producing a LaTeX LaTeXDocument

The first line of the input file should normally consist of an appropriate `\documentclass` command. If an article (or similar document) is to be produced on A4 paper, and if the main body of the text is to be set with a font whose natural size is '12 point', then the appropriate `\documentclass` command is: `\documentclass[a4,12pt]{article}`

Other forms of the `\documentclass` command can be used for letters, reports or books. If 12pt is omitted from the `\documentclass` command (with the preceding comma), then the document will be set in a '10 point' size. One may also replace 12pt with 11pt.

After the `\documentclass` command and these other optional commands, we place the command `\begin{document}`. This command is then followed by the main body of the text, in the format prescribed by the rules of LaTeX. Finally, we end the input file with a line containing the command `\end{document}`.
Your first LaTeXfile could be something like this:

```
\documentclass[a4,12pt]{article}
\begin{document}
Hello World.
\end{document}
```

3.1 Document Classes

The way your document will look and be structured depends on the `\documentclass` command at the top of the file. Useful classes are: `letter`, `article`, for reports and journal articles and `book` for theses and books. For a specific publication, if you are given a document class, then replace the document-class name to your class file.

3.2 Sections

Articles are usually structured into sections, and books into chapters and chapter sections. To create a new section use `\section{Section Title}`.

Subsection or Sub-sub-section can also be used. Sections can be cross referenced, if you `\label` them. For example the Introduction is section 1 in this document.

If you prefer a section without a number, then you should use * after the section i.e. `\section*{Title}`.

```
\documentclass[a4,12pt]{article}
\begin{document}
\section{Introduction}
Hello World.\\
\section{More Text}
More Text here.
\end{document}
```

3.3 Spaces, Gaps, Breaks, etc.

Sometimes you want to over-ride the default formatting in various ways. Here are a few common examples. If you leave a blank line between two lines of text LaTeXassumes that you want a new paragraph and indents accordingly.
Sometimes you don't want this indentation and the `\noindent` command is useful. Sometimes you may want to
break a line in a different place to the default in which case use `\\` to insert a line break.

`\pagebreak` will start a new page.

4 Equations

The real beauty of LaTeXis equations. For inline equations like, $\mu(x_1, x_2) = 2x_1 + 2x_2$, simply insert the instructions defining the equation between single `$` signs. If you want a display equation without a number put the instructions between `$$`'s like this:

$$\mu(x_1, x_2) = \alpha 2x_1 + 2x_2$$

If you want an equation to have a number then you need to use `begin{equation}` and `\end{equation}` for example

$$\theta = \int Mx \; dx \tag{1}$$

Numbered equations like equation (1) can be referenced using `\ref`.

Multi-line equations (without numbering) are produced like this:

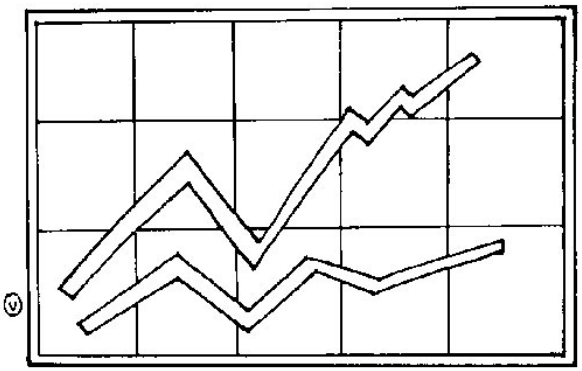


Figure 1: Figure Caption.

$$\begin{aligned}(af_{\theta_1} + bf_{\theta_2})(x) &:= af_{\theta_1}(x) + bf_{\theta_2}(x) \\ &= x^t(a\theta_1 + b\theta_2).\end{aligned}$$

or with numbering like this:

$$\begin{aligned}\Theta(n,T) &= B(n,T) \times \Sigma(n,T) \\ &= \{\mu \mid \mu = X\beta,\ \beta^{nT}\} \times \{\Sigma_\epsilon \mid i \neq j\}\end{aligned} \tag{2}$$

Often you may want something like this:

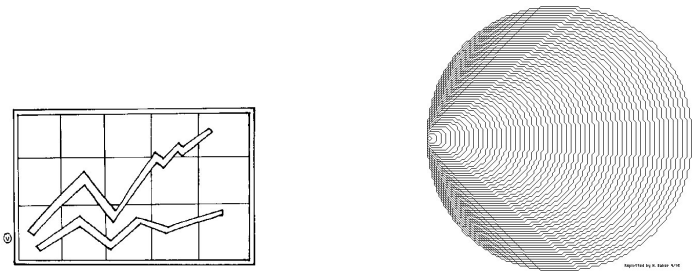
$$f(x_i) = \begin{cases} (\beta+1)x_i^\beta & 0 < x_i < 1 \\ 0 & \text{otherwise} \end{cases}$$

the large { is achieved using the bracketing commands `\left` and `\right` along with the null bracket symbol '`.`'.

5 Figures

You will need to include figures. It is best to use `.jpg`, `.eps` or `.pdf` files. Save images in a folder and include them into your document.

```
\begin{figure}[h]
\centering
\includegraphics[width=8cm]{images/image1}
\caption{Figure Caption.}
\label{fig:image1}
\end{figure}
```



(a) Rectangle (b) Circle

Figure 2: Image caption. a) Rectangle, b) Circle.

You can control size of figure and by adding a label, they can be referenced any any point. Figure 1 is saved in folder images.
Before using `\includegraphics` you should add graphics package. To add a package, add the following line after `\documentclass`.

```
\documentclass[a4,12pt]{article}
\usepackage{graphicx,epsfig,subfig}
\begin{document}
Hello World.
\end{document}
```

To add sub-figures use the following format which and the results are shown in Figure 2.

```
\begin {figure}
\centering
\subfloat[Rectangle]{\includegraphics [height=3cm]{images/image1}}
\hspace{2cm}
\subfloat[Circle]{\includegraphics [height=3cm]{images/image2}}
\caption{Image caption. a) Rectangle, b) Circle.}
\label {fig:image2}
\end {figure}
```

6 Tables

Nicely placed tables with captions, numbers and labels like table 1, can be produced with `\begin{table}` and `\end{table}`.

7 Lists

Devotees of the bullet point:

- Should use the `\begin{itemize}` command to start a bulleted list.

- Should use the `\item` command to add items to the list.
- Should use the `\end{itemize}` command to end a bulleted list.

Numbered lists can be useful and use `\begin{enumerate}` and `\end{enumerate}` to generate the list.

1. the first item.
2. the second item.
3. the third item and possibly some sub-items.
   (a) examination questions.
   (b) algorithms.
   (c) er.

8 Including Computer Code

Computer code represents a special problem, because it often uses characters that have a special meaning in LaTeXand is often carefully laid out in a way that the author does not want messed around by automatic text processing.

- Little snippets can be included with the `\verb` command. The first character after `\verb` is taken as a marker for the beginning of the characters to be reproduced verbatim, the second occurance of this character is taken as the end of the verbatim text. For example `\verb+q1<-1:4+` will yield `q1<-1:4`.
- Bigger sections of code require the use of `\begin{verbatim}` and `\end{verbatim}` like this:

Table 1: Orbits of S_n in Ω^3 (with $n > 3$) and in Ω^4 (with $n > 4$)

Orbits in Ω^3		Orbits in Ω^4	
Orbit type	multiplicity	Orbit type	multiplicity
$\{(i)\}$	1	$\{(i,i)\}$	1
$\{(i)\}$	3	$\{(i,j)\}$	4
$\{(i)\}$	1	$\{(i,j)\}$	3
		$\{(i,i)\}$	6
		$\{(i,l)\}$	1
Total	5	Total	15

```
gam<-function (formula, family = gaussian(), data = list(),
     min.sp = NULL, H = NULL, gamma = 1, ...)
{
    gp <- gam.parser(formula)
    mf <- match.call(expand.dots = FALSE)
        ff1 <- paste(gp$v.names[2:n], collapse = "+")
        ff <- paste(ff, "+", ff1)
    }
        .
}
```

9 Bibliography and references

Quite nice bibliography creating facilities are available using the BibTex program. Basically you create a separate file ('mybib.bib') containing all your references, cite them using `\cite{ref1}` in the document using standard commands and then place a command at the end of you document to create the reference list - only references that you actually cited will appear on this list. For example a few references added here [3], [4].

If you want to list all your references in the 'bib' file, use `\nocite{*}` just before `\end{document}`.

```
\bibliographystyle{plain}
%You can aslo use alpha, unstr, abbrv, IEEE, ...
%You can aslo use IEEEE.bst or Springer.bst or any other publisher.
\bibliography{mybib}
%mybib.bib is your bibliography file.
%Use mybib.bib as your
```

To create a 'bib' file, use your RefWorks and export references in BibTex format. You can format your references using different publishers style. You need a 'bst' file and you have to replace the default plain style with the publisher bibliography style file.

9.1 Harvard Citation Style

If you want to use citation styles other than numerical, then you need an extra package. The first job is to add the following to your preamble in order to get Latex to use the Natbib package:

```
\usepackage{natbib}
```

Also, you need to change the bibliography style file to be used, so edit the appropriate line at the bottom of the file so that it reads: `\bibliographystyle{plainnat}`. Once done, it is basically a matter of altering the existing `\cite` commands to display the type of citation you want.

```
\citet{lotfi09} for  Lotfi et al. (2009)
\citep{lotfi09} for  (Lotfi et al., 2009)
\citet*{lotfi09} for Lotfi and Langensiepen (2009)
```

The main commands simply add a *t* for 'textual' or p for 'parenthesised', to the basic `\cite` command. You will also notice how Natbib by default will compress references with three or more authors to the more concise 1st surname et al version. By adding an asterisk (*), you can override this default and list all authors associated with that citation. There is a command called `\bibpunct` that can be used to override the defaults and change certain settings.

```
\bibpunct{(}{)}{;}{a}{,}{,}
```

In summary, you need to add the following:

1. Add the following to your preamble of your tex file.

   ```
   \usepackage{natbib}
   \bibpunct{(}{)}{;}{a}{,}{,}
   ```

2. Replace `\cite` with `\citep` or `\citet`.

3. Add the following to the end of your document.

   ```
   \bibliographystyle{plainnat} % or abbrvnat or unsrtnat
   \bibliography{myBib}
   ```

10 Misc.

A table of contents can be inserted anywhere with the command `\tableofcontents`. You can also use `\listoffigures` or `\listoftables`.

Contents

References

[1] Wikipedia, "Latex — Wikipedia, the free encyclopedia", 2010, [Online; accessed 15-Dec-2010].

[2] Wikibooks http://upload.wikimedia.org/wikipedia/commons/2/2d/LaTeX.pdf, "Latex", 2010, [Online; accessed 15-Dec-2010].

[3] M. J. Akhlaghinia, A. Lotfi, C. Langensiepen, and N. Sherkat, "A fuzzy predictor model for the occupancy prediction of an intelligent inhabited environment", in *2008 IEEE 16th International Conference on Fuzzy Systems (FUZZ-IEEE)*, Piscataway, NJ, USA, 1-6 June 2008 2008, pp. 939–46, IEEE.

[4] M. J. Akhlaghinia, A. Lotfi, C. Langensiepen, and N. Sherkat, "Occupancy monitoring in intelligent environment through integrated wireless localizing agents", in *2009 IEEE Symposium on Intelligent Agents*, Piscataway, NJ, USA, 30 March-2 April 2009 2009, p. 7, IEEE.