Appendix E

LaTeX

LaTeX is a program to typeset text and mathematical formulae. The text is written in a normal text file (usually the file name ends with .tex) with any text editor (for instance Emacs). In addition to the text, a LaTeX document contains a set of commands. Commands start with a \ (backslash). An example of a LaTeX command is \section{"section name"}, which will start a new section with the name "section name". LaTeX will automatically format the text with newlines, new pages etc. Sections are given a number, and LaTeX automatically keeps track of the section number.

A LaTeX document starts with a preamble, followed by the body. The first line will be the command \documentclass[*options*]{*class*}, standard classes are article, book, report, and slides. The *options* regulate the behaviour of the class, for instance by indicating the character size. The next lines can contain \usepackage[*options*]{*package*}. A package can enhance the capabilities of LaTeX, for instance by including graphics. The body of the document starts with the command \begin{document} and ends with the command \end{document}. In between these two commands, all text, figures, mathematical expressions etc that goes into the document is written. A sample LaTeX document and the .tex file is shown in Fig. E.1 and Section E.2.

LaTeX will do all formatting of the text, including placing figures. This means that it is very difficult to get a figure at one specific location in the document. Rather it will end up on the next suitable location. The reason for this is that one might find it convenient to have a figure just after some text at the bottom of a page. However, if one later adds a couple of lines of text earlier in the document, all of a sudden the figure will get pushed to the next page, and there is a big empty space on the previous page. This is largely avoided when LaTeX places the figures on its own. LaTeX automatically gives figures a number. When discussing figures in the text, it is therefore important to refer to the figure number. See the example in Section E.2 for an example.

E.1 Some important LaTeX commands

E.1.1 Sections and subsections

- Sections are made with the \section{} command.
- Subsections are made similarly with \subsection{}.
- There is also something called \subsubsection{}.

Sections and subsections ends when the next section or subsection starts. There is no need to end it with a command.

E.1.2 Mathematical expressions

Important mathematical expression that should stand on a separate line are made with the \begin{equation} and ends with \end{equation}. Mathematical expression that goes into the text is placed between two dollar signs ($ $). The examples shows some frequently used:

- exponent: use the hat (^) symbol
- fraction: use \frac{numerator}{denumerator}
- sum sign: use \sum_{lower limit}^{upper limit}

Equations are automatically numbered by LaTeX. A \label{} can go inside the equation environment, and can be refered to in the text using this label. Mathematical expressions in the text is not numbered.

E.1.3 Figures

Figures are inserted in the following way: \begin{figure}
\includegraphics[*options*]{filename}
\caption{figure caption}
\label{label}
\end{figure}

LaTeX will automatically number the figure, and when refering to a figure using \ref{label} this number is inserted.

E.2 A LaTeX example

The following is an example of a LaTeXfile. The resulting .dvi file after LaTeXhas compiled the LaTeXfile is seen in Fig. E.1:

```
\documentclass[12pt]{article}

\usepackage{amsmath,amssymb,epsfig}

\begin{document}

\section{Introdcution}

\subsection{First blurb}

We first discuss sections and subsections.

\section{Math}

If you are doing physics, you sometimes have to write mathematical
expressions.  With \LaTeX, this can easily be done:

\begin{equation}
e^x = \sum_{n=0}^\infty \frac{x^n}{n!}
\end{equation}
or if you just want some math in your text, this: $E=mc^2$ is another way.

\section{Figures}

eps figures are easily inserted into \LaTeX.

\begin{figure}
\centering\includegraphics[scale=0.5]{football.eps}
\caption{A football}
\label{figure}
\end{figure}

The figure will not necessarily end up where the code is in the text, but
rather at some place that \LaTeX find suitable. It is therefore important to
refer to the figure with $\backslash$ref and label your figure with
$\backslash$label.

\end{document}
```

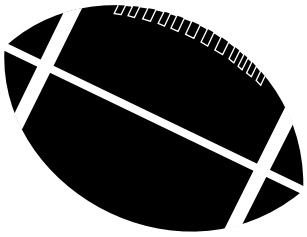

Figure 1: A football

1 Introdcution

1.1 First blurb

We first discuss sections and subsections.

2 Math

If you are doing physics, you sometimes have to write mathematical expressions. With LaTeX, this can easily be done:

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \tag{1}$$

or if you just want some math in your text, this: $E = mc^2$ is another way.

3 Figures

eps figures are easily inserted into LaTeX.

The figure will not necessarily end up where the code is in the text, but rather at some place that LaTeXfind suitable. It is therefore important to refer to the figure with \ref and label your figure with \label.

Figure E.1: The output of the LaTeX source shown in section E.2.

E.3 Compiling a LaTeXdocument

Once a LaTeX file has been written, it must be compiled using the command "latex filename.tex" from the command prompt. This will create a dvi file with the name "filename.dvi". A dvi file can be viewed using the program "xdvi", or it can be compiled into a postscript file using dvips: "dvips -o filename.ps filename.dvi". A postscript file is suitable for printing. The result of running latex on the LaTeX example in section E.2 is shown in Fig. E.1.

E.4 More information on LaTeX

There are many documents on how to use LaTeX available on the internet. We suggest "The not so short introdcution to LaTeX 2_ε" by Tobias Oetiker, Hubert Partl, Irene Hyna and Elisabeth Schlegl. This document can be found in Section0 via the course webpage.