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Outline

1. Introduction
2. Getting Acquainted
3. Getting Started
4. \LaTeX\ Environments
5. Fonts and Math
6. Macros
7. Designing It Yourself
8. Moving Information Around
TEX [teck, τεχ] is the typesetting system developed by Donald Ervin Knuth at Stanford University. TEX sets standard for typesetting in mathematics, science, and engineering. Typographic quality is comparable with the top craft typesetting.

- pronunciation
- history (1977)
- spirit, status
- principles (batch processing)
“\LaTeX{} adds to \TeX{} a collection of commands that simplify typesetting by letting the user concentrate on the structure of the text rather than on formatting commands. In turning \TeX{} into \LaTeX{}, I have tried to convert a highly-tuned racing car into a comfortable family sedan. The family sedan isn’t meant to go as fast as a racing car or be as exciting to drive, but it’s comfortable and gets you to the grocery store with no fuss. However, the \LaTeX{} sedan has all the power of \TeX{} hidden under its hood, and the more adventurous driver can do everything with it that he can with \TeX{}.”

Leslie Lamport

“\LaTeX{} is \TeX{} for intelectuals.”

Philip Taylor
Advantages of \LaTeX

- There is a bunch of predefined \textit{document styles} and page layouts. This allows beginner to prepare documents of professional look.
- Typesetting of math has special support.
- User is supposed to type only several easy understandable markers to specify \textit{logical structure} of document and leaves the rest (typesetting) to \LaTeX.
- Without much effort we may generate complex structures like table of contents, lists of tables, figures, indexes, tables, cross references etc.
- Many publishers offers \LaTeX style files and accepts submissions in electronic form as a \LaTeX file.
Disadvantages of **\LaTeX**

- Slightly higher demands on the computer hardware than with smaller programs for word processing.
- Created documents may be printed only on graphic output devices.
- Predefined layout can be modified by lots of parameters, but radical changes of style files require deep understanding of the system.
Typographic design is a craft, that has to be learnt. Novice authors are making severe typesetting errors. Laymans errorously think that book design is first of all the question of æsthetics—if the document looks well, it is already well ‘designed’. But documents are supposed to be read and not seen in museums—readability and better understanding are more important than appearance.”

Hubert Partl
Typographic Rules

- Paragraphs
- Line length
- Quotation marks
- Choosing of typefaces, fonts
- Ligatures
- Punctuation marks
- Kerning
- Interword spacing
- Emphasizing
This is my first text in LaTeX (or rather \LaTeX). No worries about justification of lines. It doesn’t matter how many spaces you type. New paragraph is separated by one or more blank lines.
Preparing an Input File

- Local Guide
- Ascii editor
- sample.tex, small.tex
- 0 vs. O, 1 vs. l
- Special characters
  - # $ % & ~ _ ^ \ { } 
- Simple control sequences
- Comments
- Bad habits (underlining)
### Special Symbols I.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$$</td>
<td>dollar sign</td>
</tr>
<tr>
<td>&amp;&amp;</td>
<td>ampersand</td>
</tr>
<tr>
<td>%%</td>
<td>percent sign</td>
</tr>
<tr>
<td>##</td>
<td>hash mark</td>
</tr>
<tr>
<td>__</td>
<td>underscore</td>
</tr>
<tr>
<td>{}</td>
<td>left curly brace</td>
</tr>
<tr>
<td>}}</td>
<td>right curly brace</td>
</tr>
<tr>
<td>~~{}</td>
<td>tilde</td>
</tr>
<tr>
<td>^^{}</td>
<td>caret</td>
</tr>
<tr>
<td>$ackslash$</td>
<td>backslash</td>
</tr>
</tbody>
</table>
## Special Symbols II.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>¶</td>
<td>\p</td>
<td>paragraph sign (pilcrow)</td>
</tr>
<tr>
<td>§</td>
<td>\S</td>
<td>section number sign</td>
</tr>
<tr>
<td>£</td>
<td>\pounds</td>
<td>pound sign</td>
</tr>
<tr>
<td>’</td>
<td>\lq</td>
<td>left quote</td>
</tr>
<tr>
<td>’</td>
<td>\rq</td>
<td>right quote</td>
</tr>
<tr>
<td>[,[,]</td>
<td>\lbrack, [</td>
<td>left square bracket</td>
</tr>
<tr>
<td>],,]</td>
<td>\rbrack, ]</td>
<td>right square bracket</td>
</tr>
<tr>
<td>†</td>
<td>\dag</td>
<td>dagger or obelisk</td>
</tr>
<tr>
<td>‡</td>
<td>\ddag</td>
<td>double dagger or diesis</td>
</tr>
<tr>
<td>©</td>
<td>\copyright</td>
<td>copyright sign</td>
</tr>
<tr>
<td>^</td>
<td>\hat{}</td>
<td>$\hat{}$</td>
</tr>
<tr>
<td>π</td>
<td>\pi</td>
<td>$\pi$</td>
</tr>
<tr>
<td>♥</td>
<td>$\heartsuit$</td>
<td></td>
</tr>
<tr>
<td>α</td>
<td>$\alpha$</td>
<td></td>
</tr>
</tbody>
</table>
Simple Text Generating Commands

\TeX
\LaTeX
\ldots
October 27, 2014
\today
Today is October 27, 2014.

(we used macro \today).

\documentclass[11pt]{article}
\begin{document}
Today is \today. \*[2mm]
(we used macro \verb*!\today !.)
\end{document}
Symbols From Those Other Languages I

\ò \'{o} o grave
\õ \~{o} tilde or squiggle
\ó \'{o} o acute
\õ \={o} bar or macron
\ô \^{o} o circumflex (hat)
ö \"{o} o umlaut or dieresis
ô \u{o} o breve
ö \H{o} double acute (long Hungarian)
ô \d{o} o dot underoo tie after
ô \b{o} bar under o
č \v{c} c caron
ć \c{c} c cedilla
ģ \.{g} g dot above
ôô \t{oo} oo tie after
<table>
<thead>
<tr>
<th>Symbol</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>œ</td>
<td>\oe</td>
<td>oe digraph</td>
</tr>
<tr>
<td>Œ</td>
<td>\OE</td>
<td>OE digraph</td>
</tr>
<tr>
<td>å</td>
<td>\aa</td>
<td>a ring</td>
</tr>
<tr>
<td>Å</td>
<td>\AA</td>
<td>A ring</td>
</tr>
<tr>
<td>æ</td>
<td>\ae</td>
<td>ae digraph</td>
</tr>
<tr>
<td>Æ</td>
<td>\AE</td>
<td>AE digraph</td>
</tr>
<tr>
<td>ø</td>
<td>\o</td>
<td>o slash</td>
</tr>
<tr>
<td>Ø</td>
<td>\O</td>
<td>O slash</td>
</tr>
<tr>
<td>ł</td>
<td>\l</td>
<td>polish l</td>
</tr>
<tr>
<td>Ł</td>
<td>\L</td>
<td>suppressed L</td>
</tr>
<tr>
<td>ß</td>
<td>\ss</td>
<td>German Es-Zet (sharp S)</td>
</tr>
<tr>
<td>i</td>
<td>\i</td>
<td>dotless i</td>
</tr>
<tr>
<td>j</td>
<td>\j</td>
<td>dotless j</td>
</tr>
</tbody>
</table>
‘Convention’ dictates that punctuation go inside quotes, like “this,” but I think it’s better to do “this”. “‘\TeX’ or ‘\LaTeX?’” he asked.

‘Convention’ dictates that punctuation go inside quotes, like “‘this,’” but I think it’s better to do “‘this’.” “‘\TeX’ or ‘\LaTeX?’’ he asked.
one-hour lesson, 9–11 am
ano – nebo ne?, yes—or no?
0, 1 and −1

one-hour lesson, 9--11 am
ano~~-- nebo ne?, yes~~--or no?
0, 1 and $-1$
\TeX\ (\LaTeX, etc.) are worth learning, IMHO.

\TeX\ (\LaTeX, etc.) are worth learning, IMHO.

\frenchspacing \nonfrenchspacing ( ? ! )
Mr. Major Figure 5
Chapter 2 U. S. Grant
from 1 to 10 (1) gnats
a clever person
never hyphenate this

Mr.~Major Figure~5
Chapter~2 U.~S.~Grant
from 1 to~10 (1)~gnats
a~clever person
\mbox{never hyphenate this}
\TeX\ is \textit{the} typesetting system. \textit{Try} it!

You can have \textit{emphasized text} within \textit{emphasized text} too.

You \textit{shouldn't} do this!

You \textit{should}n't do this!
Karel Čapek\footnote{1}{Famous Czech writer} has invented the word *Robot* in his drama RUR\footnote{1993}{Rossum’s Universal Robots}.

\footnote{num}{text}

\footnotemark{num}

\footnotetext{num}{text}
Document Styles

- standard \LaTeX (Lamport) [heavily enriched in \LaTeX 3].
  - article for articles in scientific magazines, seminar works
  - report for longer reports, consisting of chapters
  - book for books (parts)
  - letter for letter writing
- supported (journal styles, . . . ) — Local Guide
- unsupported (misc)
<table>
<thead>
<tr>
<th>Document Style Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>[10pt], 11pt, 12pt</strong> selection of normal size of document fonts</td>
</tr>
<tr>
<td><strong>fleqn</strong> mathematical equations are aligned to the left instead of centering them</td>
</tr>
<tr>
<td><strong>leqno</strong> numbering of equations is on the left instead of on the right of every equation</td>
</tr>
<tr>
<td><strong>titlepage</strong> extra title page with article.sty</td>
</tr>
<tr>
<td><strong>proc</strong> proceedings option with article.sty</td>
</tr>
<tr>
<td><strong>twocolumn</strong> option for two column typesetting</td>
</tr>
<tr>
<td><strong>twoside</strong> twosided document (different typesetting (headers, margins, . . .) when on the left page or on the right one)</td>
</tr>
<tr>
<td><strong>ifthen</strong> option for conditionals</td>
</tr>
<tr>
<td><strong>makeidx</strong> option for makeindex support</td>
</tr>
<tr>
<td><strong>bezier</strong> option for bezier curves support</td>
</tr>
</tbody>
</table>
How to prove
Fermat’s Last Theorem

Andrew Wiles

July 1993

\documentclass[11pt]{article}
\title{How to prove\[Fermat’s Last Theorem\]}
\author{Andrew Wiles}
\date{July 1993}
\begin{document}
\end{document}
\begin{titlepage}
\maketitle
\begin{abstract}
...
\end{abstract}
\end{titlepage}
\begin{document}
...
\end{document}
1 Introduction

\LaTeX \ automatically generates the section number (or not).

About Fermat

Blank lines before or after a sectioning command have no effect.

1.0.1 About Fermat’s “proof”
\section{Introduction}
\LaTeX\ automatically generates the section number.

\subsection*{About Fermat}
Blank lines before or after a sectioning command have no effect.

\subsubsection{About Fermat’s ‘‘proof’’}
Sectioning Commands

\part \subsection
\chapter \subsubsection
\appendix \paragraph
\section \subparagraph
Fragile Commands

\( \) \[ \] \begin \end \footnote \verb

any * commands

\subsection{My \protect\(\%\)

\heartsuit\protect\%\}

1.1 My ♥
Structuring Document Input

- `\input`
- `\include`
- `\includeonly`
- `\endinput`
- `\end{document}` trick

```
\documentstyle{seminar}
\includeonly{part2}
\begin{document}
\include{part1}
\include{part2}
\include{part3}
\end{document}
```
### Dimensions

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
<th>Conversion</th>
</tr>
</thead>
<tbody>
<tr>
<td>pt</td>
<td>point</td>
<td></td>
</tr>
<tr>
<td>pc</td>
<td>pica (1pc = 12pt)</td>
<td>1in = 72.27pt</td>
</tr>
<tr>
<td>in</td>
<td>inch (1in = 72.27pt)</td>
<td></td>
</tr>
<tr>
<td>bp</td>
<td>big point (72bp = 1in)</td>
<td></td>
</tr>
<tr>
<td>cm</td>
<td>centimeter (2.54cm = 1in)</td>
<td></td>
</tr>
<tr>
<td>mm</td>
<td>millimeter (10mm = 1cm)</td>
<td></td>
</tr>
<tr>
<td>dd</td>
<td>didot point (1157dd = 1238pt)</td>
<td></td>
</tr>
<tr>
<td>cc</td>
<td>cicero (1cc = 12dd)</td>
<td></td>
</tr>
<tr>
<td>sp</td>
<td>scaled point (65536sp = 1pt)</td>
<td></td>
</tr>
</tbody>
</table>

3\_in 29\_pc +42,1\_dd -.01in 0.mm
Glue

- space, stretch, shrink
- natural width
- \texttt{<dimen> plus <dimen> minus <dimen>}

10pt plus 5pt minus 2pt
Modes

- **Vertical mode** (building the main vertical list)
- **Internal vertical mode** (building vertical list for an vbox)
- **Horizontal mode** (building a horizontal list for a paragraph)
- **Restricted horizontal mode** (building horizontal list for an hbox)
- **Math mode** (building a mathematical formula to be placed in horizontal list)
- **Display mathematical mode** (building a mathematical formula to be placed on a line by itself, temporarily interrupting the current paragraph)
Boxes

- reference point
- baseline
- height, width, depth

Two lines of type.

```
\vbox{\hbox{Two lines}\hbox{of type.}}
\rule{1mm}{5mm}
\rule[.1in]{.25in}{.02in}
\fbox{this box}
\fbox{\rule[-.5cm]{0cm}{1cm}this box}
\hrule % \vrule
```
You can \textit{raise} or \textit{lower} text. It's gnats and gnats and gnats, wherever we go.

You can \raisebox{.6ex}{\em raise} text.
\begin{verbatim}
\vrule \raisebox{.4ex}{[1.5ex][.75ex]} \em text
\vrule
\end{verbatim}
\newsavebox{toy}
\savebox{toy}{gnats}
\usebox{toy} and \usebox{toy} and \usebox{toy}, wherever we go.
gnus are here ...
gnus are here ...
gnus are here ...
gnus are here ...

There was not a gnu or armadillos in sight.

\begin{flushleft}
\makebox[1in]{\em gnus} are here \ldots
\makebox[1in][l]{\em gnus} are here \ldots
\makebox[1in][r]{\em gnus} are here \ldots
\makebox{\em gnus} are here \ldots
\end{flushleft}

There was not a
\framebox[1in][l]{gnu} or
\fbox{armadillos} in sight.
\end{flushleft}
Here is 1 in space.
Here is 1 in space.
Here is 1 in space.

Here \hspace*{1in} is 1\, in space.

Here \hspace{1in} is 1\, in space.

Here \hspace*{1in} is 1\, in space.

left right
leftmiddle right
left\hfill right
left\hfil middle\hfill right
\,, \enspace \quad \qquad \hfill \hss

very small space  
as wide as number  
as wide as a basefont is high  
twice as wide as \quad  
stretchable space (from 0 to $\infty$)  
stretchable and shrinkable space
Here

is 1 in space.

Here

\vspace*{1in} is 1\,in space.

\vspace{1cm} 
\vspace*{1cm}
\vspace{1cm}
\texttt{\smallskip} \quad about \( \frac{1}{4} \) of lineskip
\texttt{\medskip} \quad about \( \frac{1}{2} \) of lineskip
\texttt{\bigskip} \quad about 1 lineskip
\texttt{\vfill} \quad stretchable space (from 0 to \( \infty \))
\texttt{\vss} \quad stretchable and shrinkable space
Grouping

- Global/local parameters
- Nesting
- Syntax

\begin{environmentname}
\end{environmentname}

\begingroup
\endgroup
From the Time magazine:

In 1637 a French lawyer, poet and mathematician Pierre de Fermat wrote in the margin of a book:

“I have found a truly wonderful proof, which this margin is too small to contain.”

\begin{quote}
In 1637 a French lawyer, poet and mathematician Pierre de Fermat wrote in the margin of a book:

```
```
\end{quote}

\begin{quotation}
```
```
\end{quotation}
Czechoslovakia has spread into

- The Slovak Republic
- The Czech Republic. It consists of
  - Bohemia
  - Moravia
  - Silesia

\begin{itemize}
  \item The Slovak Republic
  \item The Czech Republic.
  \item It consists of
    \begin{itemize}
      \item Bohemia
      \item Moravia
      \item Silesia
    \end{itemize}
\end{itemize}
Three animals you should know about are:

- **gnat**: A small animal, found in the North Woods, that causes no end of trouble.
- **gnu**: A large animal, found in crossword puzzles, that causes no end of trouble.
- **armadillo**: A medium-sized animal, named after a medium-sized Texas city.

Three animals you should know about are:

\begin{description}
\item gnat: A small animal, found in the North Woods, that causes no end of trouble.
\item gnu: A large animal, found in crossword puzzles, that causes no end of trouble.
\item armadillo: A medium-sized animal, named after a medium-sized Texas city.
\end{description}
Lists
Enumerate

1 level one
   1 level two
      1 level three

\begin{enumerate}
\item level one
   \begin{enumerate}
   \item level two
      \begin{enumerate}
      \item level three
      \end{enumerate}
   \end{enumerate}
\end{enumerate}
Is there something between Conservative and Labour Party? Yes.

\centerline{Is there something between}
\begin{flushright} Conservative \end{flushright}
\begin{center} and \end{center}
\begin{flushleft} Labour \end{flushleft}
\begin{center}
\end{center}
Party?\[1mm]
Yes.
\end{center}
Simulating Typed Text

Command \texttt{\input} is very useful.

Command \texttt{\verb+\input+} is very useful.

\begin{verbatim}
Command \texttt{\verb+\input+} is very useful.
\end{verbatim}

\obeylines
\obeyspaces
\verb*
\begin{verbatim*}

Petr Sojka
\textit{\LaTeX \ for beginners}
If it’s raining
    then put on boots,
    take hat;
else smile.
Leave house.

\begin{tabbing}
If \= it’s raining \\ \\
\> then \= put on boots, \\ \\
\> \> take hat; \\ \\
\> \> else \> smile. \\ \\
Leave house. \\
\end{tabbing}
Gnat: swatted by: men cows and gnus not very filling
Armadillo: not edible (note also the: aardvark éèé albatross eton)
Gnu: eaten by gnats
\begin{tabbing}
Armadillo: \= \kill
Gnat: \> swatted by: \= men \+\+ \\
cows \\
and \’ gnus \- \\
not very filling \- \\
Armadillo: \> not edible \\
\pushtabs
(note also the: \= aardvark \a’e\a’e\a=e\\
\> albatross \’ eton) \\
\poptabs
Gnu: \> eaten by \> gnats
\end{tabbing}
# GG&A Hoofed Stock

<table>
<thead>
<tr>
<th>Year</th>
<th>Price</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>97–245</td>
<td>Bad year for farmers in the west.</td>
</tr>
<tr>
<td>72</td>
<td>245–245</td>
<td>Light trading due to a heavy winter.</td>
</tr>
<tr>
<td>73</td>
<td>245–2001</td>
<td>No gnus was very good gnus this year.</td>
</tr>
</tbody>
</table>
\begin{tabular}{|r||c|p{.4\textwidth}|}
\hline
\multicolumn{3}{|c|}{\sc GG\&A Hoofed Stock} \\
\hline\hline
\multicolumn{1}{|c||}{\bf Year} & \bf Price & \multicolumn{1}{c|}{\bf Comments} \\
\hline
\it 1971 & 97--245 & Bad year for farmers in the west. \\
\it 72 & 245--245 & Light trading due to a heavy winter. \\
\it 73 & 245--2001 & No gnus was very good gnus this year. \\
\end{tabular}
Tabular Parameters

\begin{tabular}{\textwidth}[t]
  @{\extracolsep{\fill}}|l|*{3}{r}|%
p{3cm}@{--}r|
\end{tabular}
In figure 1 (page 55) you see \LaTeX{} in action.

\begin{figure}[htbp]
\centerline{\framebox{\Lion}}
\caption{\LaTeX{} in action}
\label{lion}
\end{figure}
Table 1 gives the overview of the presidents of parts of the former Czechoslovakia.

<table>
<thead>
<tr>
<th>State</th>
<th>President</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Czech Republic</td>
<td>V. Havel</td>
</tr>
<tr>
<td>The Slovak Republic</td>
<td>M. Kováč</td>
</tr>
</tbody>
</table>
Table~1 gives the overview of the presidents of parts of the former Czechoslovakia.

\begin{table}[tbp]
\caption{Presidents}
\label{presidents}
\begin{tabular}{|l|r|}
\hline
State & President \\
\hline
The Czech Republic: & V. Havel \\
The Slovak Republic: & V. Kov\'ač \\
\hline
\end{tabular}
\end{table}
Parameters of Float Placement

\topfraction
\bottomfraction
\textfraction
\floatpagefraction
\dbltopnumber
\dblfloatpagefraction
\floatsep
\textfloatsep
\intextsep
\dblfloatsep
\dbltextfloatsep
\dbltextfloatsep
\setlength{\unitlength}{1mm} \thicklines
\begin{picture}(130,70)
\put(0,0){\dashbox(130,10){\sf Marriage triangle}}
\multiput(0,15)(5,0){27}{\circle*{1}}
\multiput(0,70)(5,0){27}{\circle*{1}}
\multiput(0,15)(0,5){11}{\circle*{1}}
\multiput(130,15)(0,5){11}{\circle*{1}}
\put(65,25){\oval(60,10)}
\put(65,20){\makebox(0,10){\normalsize\bf John}}
\put(35,35){\line(1,0){60}}
\put(35,35){\line(1,1){30}}
\end{picture}
\begin{picture}(100,80)
\put(95,35){\line(-1,1){30}}
\put(65,47){\circle{15}}
\put(65,42){\vector(0,1){10}}
\put(5,55){\framebox(40,10){{\normalsize\bf Mary}}}
\put(85,55){\framebox(40,10){{\normalsize\bf Eve}}}
\end{picture}
Fonts
Basic Concepts

- Shape
- Series
- Size
- Family
- font table, testfont.tex
- NFSS, oldlfont
Fonts

Shapes

\texttt{\textbackslash rm} \hspace{1cm} roman
\texttt{\textbackslash bf} \hspace{1cm} \textbf{boldface}
\texttt{\textbackslash it} \hspace{1cm} italic
\texttt{\textbackslash sl} \hspace{1cm} slanted
\texttt{\textbackslash sf} \hspace{1cm} ‘sans serif’
\texttt{\textbackslash sc} \hspace{1cm} ‘\textsc{caps and small caps}’
\texttt{\textbackslash tt} \hspace{1cm} typewriter
\texttt{\textbackslash boldmath} \hspace{1cm} bold type in math formulæ
\texttt{\shape{sc}\selectfont}\hspace{1cm} \texttt{\normalshape}
## Fonts

### Series

<table>
<thead>
<tr>
<th>Weight</th>
<th>Width</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultra Light</td>
<td>ul</td>
</tr>
<tr>
<td>Extra Light</td>
<td>el</td>
</tr>
<tr>
<td>Light</td>
<td>l</td>
</tr>
<tr>
<td>Semilight</td>
<td>sl</td>
</tr>
<tr>
<td>Medium (normal)</td>
<td>m</td>
</tr>
<tr>
<td>Semibold</td>
<td>sb</td>
</tr>
<tr>
<td>Bold</td>
<td>b</td>
</tr>
<tr>
<td>Extra Bold</td>
<td>eb</td>
</tr>
<tr>
<td>Ultra Bold</td>
<td>ub</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Width</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>uc</td>
<td>Ultra Condensed</td>
</tr>
<tr>
<td>ec</td>
<td>Extra Condensed</td>
</tr>
<tr>
<td>c</td>
<td>Condensed</td>
</tr>
<tr>
<td>sc</td>
<td>Semicondensed</td>
</tr>
<tr>
<td>m</td>
<td>Medium</td>
</tr>
<tr>
<td>sx</td>
<td>Semiexpanded</td>
</tr>
<tr>
<td>x</td>
<td>Expanded</td>
</tr>
<tr>
<td>ex</td>
<td>Extra Expanded</td>
</tr>
<tr>
<td>ux</td>
<td>Ultra Expanded</td>
</tr>
</tbody>
</table>

\texttt{\series{bx}\selectfont}  
\texttt{\mediumseries}
Fonts

Sizing

\tiny tiny
\scriptsize scriptsize
\footnotesize footnotesize
\small small
\normalsize normalsize
\large large
\Large Large
\LARGE LARGE
\huge huge
\Huge Huge
\size{14}{18pt}\selectfont
## Fonts

### Families

<table>
<thead>
<tr>
<th>Font file name</th>
<th>Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>cmr10, cmti10, cmsl10, cmcsc10, cmu10, cmbx10, cmbxti, cmbxsl, cmb10</td>
<td>Computer modern roman (cmr)</td>
</tr>
<tr>
<td>cmss10, cmssi10, cmssbx10, cmssdc10</td>
<td>Computer modern sans serif (cmss)</td>
</tr>
<tr>
<td>cmtt10, cmitt10, cmsltt, cmtcsc10</td>
<td>Computer modern typewriter (cmtt)</td>
</tr>
</tbody>
</table>

\renewcommand{\rmdefault}{pstr}
\renewcommand{\sfdefault}{pshel}
\renewcommand{\sldefault}{it}
\newfont{\lion}{lion scaled\magstep1}
\newcommand{\Lion}{\lion
  \symbol{65}
  \symbol{`102}
  \symbol{"A3}
  \symbol{68}
  \symbol{69}
}
For the equation $x^n + y^n = z^n$ where $n$ is an integer greater than 2, there is no solution in positive integers.

For the equation $x^n + y^n = z^n$ where $n$ is an integer greater than $2$, there is no solution in positive integers.

or

For the equation
\[
\begin{math}
x^n + y^n = z^n
\end{math}
\] where $(n)$ is an integer greater than $2$, there is no solution in positive integers.
Math Styles

\displaystyle
\textstyle
\scriptstyle
\scriptscriptstyle

$\frac{1^1}{2^2}$

\mathindent
\abovedisplayskip
\belowdisplayskip
\abovedisplayshortskip
\belowdisplayshortskip

\frac{\frac{1^1}{2^2}}{\textstyle\frac{1^1}{2^2}}$

\textstyle\frac{1^1}{2^2}$
For the equation

\[ x^n + y^n = z^n \]

where \( n \) is an integer greater than 2, there is no solution in positive integers.

For the equation

\begin{displaymath}
    x^n + y^n = z^n
\end{displaymath}

where \( \lfloor n \rfloor \) is an integer greater than \( 2 \), there is no solution in positive integers.
Math Symbols

\begin{itemize}
\item \texttt{\det_i, \gcd_i, \inf_i, \lim_i, \limsup_i, \max_i, \min_i, \Pr_i, \sup_i}
\item \texttt{a \bmod b, a \pmod{10}, \aleph, \forall, \infty, \hbar}
\item \texttt{\emptyset, \exists, \Box, \imath, \nabla, \neg, \Diamond, \ldots}
\end{itemize}
For the equation

\[ x^n + y^n = z^n \]  \hspace{1cm} (1)

where \( n \) is an integer greater than 2, there is no solution in positive integers.

For the equation
\[
\begin{equation}
x^n + y^n = z^n
\end{equation}
\]
where \((n)\) is an integer greater than \$2\$, there is no solution in positive integers.
Exponents and indexes

\[ x^5 \quad x_1 \]

\[ x^5 \quad \text{quad} \quad x_1 \]

Square roots

\[ \sqrt{x^2 + \sqrt[3]{y}} \]

\[ \sqrt{x^2 + \sqrt[3]{y}} \]

\[ \sqrt{x^2 + \sqrt[3]{y}} \]
Fractions

\[ \frac{1}{x^2+y^2+z^2} \frac{x+y}{x+y} \]

\texttt{\textbackslash frac\{1\}\{\textbackslash frac\{x^2+y^2+z^2\}\{x+y\}\}}

Binomic coefficients

\[ \binom{n}{n-k} \]

\texttt{\textbackslash \{n\textbackslash choose\ \{n-k\}\}}
Math Formulæ III

**Integrals**

\[ \int_{-\infty}^{\infty} x^3 \, dx \]

\[ \int \limits_{-\infty}^{\infty} x^3 \, dx \]

**Sums**

\[ \sum_{i=1}^{n} a_i \]

\[ \sum_{i=1}^{n} a_i \]
Parentheses

\[(x + 1)(x - 1)^2\]

\[
\Bigl( (x+1) (x-1) \Bigr)^2
\]

\[
\left( (x+1) (x-1) \right)^2
\]
Arrays

\[ x = \begin{pmatrix} x_{11} & x_{12} & \ldots \\ x_{21} & x_{22} & \ldots \\ \vdots & \vdots & \ddots \end{pmatrix} \]

\{\mathcal{X}\} = \left( \begin{array}{ccc} x_{11} & x_{12} & \ldots \\ x_{21} & x_{22} & \ldots \\ \vdots & \vdots & \ddots \end{array} \right)
System of Equations

\[ f(x) = \cos x \] \hspace{2cm} (2)
\[ f'(x) = -\sin x \]
\[ \int_{0}^{x} f(y)dy = \sin x \] \hspace{2cm} (3)

\begin{eqnarray}
\begin{align*}
  f(x) &= \cos x \\
  f'(x) &= -\sin x \\
  \int_{0}^{x} f(y)dy &= \sin x
\end{align*}
\end{eqnarray}
**Spacing in Math Mode I**

<table>
<thead>
<tr>
<th>Name</th>
<th>Command</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double quad</td>
<td>\qquad</td>
<td></td>
</tr>
<tr>
<td>Quad</td>
<td>\quad</td>
<td></td>
</tr>
<tr>
<td>Space</td>
<td>,</td>
<td></td>
</tr>
<tr>
<td>Thick space</td>
<td>;</td>
<td></td>
</tr>
<tr>
<td>Medium space</td>
<td>&gt;</td>
<td></td>
</tr>
<tr>
<td>Thin space</td>
<td>,</td>
<td></td>
</tr>
<tr>
<td>Negative thin space</td>
<td>!</td>
<td></td>
</tr>
</tbody>
</table>

$\int\int z \ dx \ dy$ vs. $\int\int z dx dy$

$\sqrt{2} x$ vs. $\sqrt{2}x$

`different` vs. `{\em different}`
Math Mode Accents

\hat{a} \check{a} \breve{a} \acute{a} \grave{a} \tilde{a} \bar{a} \vec{a} \dot{a} \ddot{a}

Here are two sizes of wide hat: $\widehat{1-x} = \widehat{-y}$.

Here are two sizes of wide hat: $\widehat{1-x} = \widehat{-y}$.

There are no dots in $\vec{i} + \tilde{j}$.

There are no dots in $\vec{\imath} + \tilde{\jmath}$. 
Over- and Underlining

You can have nested overlining: $\overline{x^2 + 1}$.

You can have nested overlining:
\[
\overline{\overline{x^2 + 1}}
\]

\[
\underbrace{a + \overbrace{b + \cdots + y}^{24} + z}_{26}
\]
Stacking Symbols

\( A \xrightarrow{a'} B \xrightarrow{b'} C \stackrel{\text{def}}{=} x_1, \ldots, x_n \)

\[
\begin{align*}
A & \xrightarrow{a'} B \xrightarrow{b'} C \\
\vec{x} & \equiv x_1, \ldots, x_n
\end{align*}
\]
New Commands I

Macros

1. first item
2. second item
   1. first item in second item
   2. ... 

\newcommand{\be}{\begin{enumerate}}
\newcommand{\ee}{\end{enumerate}}

\be
\item first item
\item second item
   \be
   \item first item in second item
   \item ... 
\ee
\ee
It’s a bit boring to write \textbf{Popocatepetl} again and again.

\newcommand{\sw}{\textbf{Popocatepetl}}
It’s a bit boring to write \sw again and again.
Macros with Parameters

This text will be typeset in *italics*.

\newcommand{\emcorr}[1]{{\em #1/}}
This text will be typeset in \emcorr{italics}.

Let \( f((a_1, \ldots, a_n), (b_1, \ldots, b_n)) \) be \ldots:

\newcommand{\fvec}[2]{$f((#1_1, \ldots, #1_n), (#2_1, \ldots, #2_n))$}
Let \fvec{a}{b} be \ldots:
Simple New Environments

We now have new environment:

- *We use italics.*
- *It’s OK, isn’t it?*

\begin{emphit}
\item We use italics.
\item It’s OK, isn’t it?
\end{emphit}
We can now define new environment with parameters:

Example: *Environment* *quote* with *emphasized beginning*.

\newenvironment{descit}[1]
{\begin{quote}{\em #1\}/}:
{\end{quote}}

We can now define new environment with parameters:

\begin{descit}{Example}
Environment {\tt quote} with emphasized beginning.
\end{descit}
Conjuncture (Fermat)

There do not exist integers \( n > 2 \), \( x \), \( y \), and \( z \) such that \( x^n + y^n = z^n \).

\begin{guess}
\[\text{Fermat}\]
There do not exist integers \( n > 2 \), \( x \), \( y \), and \( z \) such that
\( x^n + y^n = z^n \).
\end{guess}
2 New Theorem, New Joy

We start this section with one of the basic axiom:

\begin{axiom}
The only thing two \TeX ers can agree on is what the third \TeX er has no need of.
\end{axiom}
\newcounter{xx} \newcounter{yy}
\def\step(#1,#2){\put(\value{xx},\value{yy}){.}%%
  \addtocounter{xx}{#1} \addtocounter{yy}{#2}}
\def\1{\step(-1,-1)}  \def\2{\step(0,-1)}
\def\3{\step(1,-1)}  \def\4{\step(-1,0)}
\def\6{\step(1,0)}   \def\7{\step(-1,1)}
\def\8{\step(0,1)}   \def\9{\step(1,1)}
\fbox{ .......}
\begin{picture}(188,95)
\setcounter{xx}{0}\setcounter{yy}{70}
6\setcounter{yy}{70}6\setcounter{yy}{70}9\setcounter{yy}{70}9\setcounter{yy}{70}6\setcounter{yy}{70}9\setcounter{yy}{70}6\setcounter{yy}{70}9\setcounter{yy}{70}6\setcounter{yy}{70}9\setcounter{yy}{70}6\setcounter{yy}{70}9\setcounter{yy}{70}6\setcounter{yy}{70}6\setcounter{yy}{70}8
\end{picture}
RNDr. Petr Sojka, Ph.D.
associate professor

Faculty of Informatics
Masaryk University
Pod mostem 15, 635 00 Brno
Botanická 68a, 602 00 Brno
phone:+42-5-12345 6789
phone:+42-5-54949 6966

\newfont{\fnt}{cmssbx10 scaled \magstep 1}
\newcommand{\b}{+42-5-}
\newcommand{\card}[9]{
  \fboxrule .3mm \fboxsep 3mm
  \framebox[79mm][l]{
    \vbox{ \footnotesize\rm
      \vskip 8mm
      Petr Sojka
      \vskip 8mm
    }
  \vskip 8mm
}

\makebox[71mm][c]{\normalsize\textit{#1}}
\makebox[71mm][c]{#2}[1.5mm]
\sf \rule[0mm]{71mm}{0.1mm}[1mm]
\makebox[35mm][l]{#3} \hbox{#7} \makebox[35mm][l]{#4} \hbox{#8} \makebox[35mm][l]{#5} \hbox{#9} \makebox[35mm][l]{#6}
\setlength{\parindent}{0pt}
\setlength{\parskip}{5pt plus 2pt minus 1pt}
\addtolength{\textwidth}{60pt}
\addtolength{\baselineskip}{0pt plus 0.1pt minus 0.1pt}

\newlength{\mylength}
\setlength{\mylength}{1cm}
\addtolength{\mylength}{1cm}
\settowidth{\mylength}
{\{\rm Petr\} hspace*{.5\mylength}}
\hbox{\strut vrule hspace*{\mylength} vrule} \hfill
Petr\rule{1cm}{0.4pt}
\setcounter{page}{0}
\addtocounter{page}{-2}

It was \textbf{Gnats$^2$ and Gnus$^3$} as we trekked through Africa

\footnotetext{Small insects.}
\footnotetext{Large mammals.}

\begin{minipage}{.7\textwidth}
It was \fbox{Gnats\footnotemark\ and Gnus\footnotemark} as we trekked through Africa
\end{minipage}
\linebreak\[num\]
nolinebreak\[num\]
\[\\[len\]
newline
\-
\hyphenation{words}
\sloppy
\fussy
\begin{sloppypar} pars \end{sloppypar}
Page Breaking

\pagebreak[\textit{num}]
\nopagebreak[\textit{num}]
\samepage
\newpage
\clearpage
\cleardoublepage
The wines of France and California may be the best known, but they are not the only fine wines. Spanish wines are often underestimated, and quite old ones may be available at reasonable prices. For Spanish wines the vintage is not so critical, but the climate of the Bordeaux region varies greatly from year to year. Some vintages are not as good as others, so there years ought to be specially noted: 1962, 1964, 1966. 1958, 1959, 1960, 1961, 1964, 1966
\newcounter{myctr}
\setcounter{myctr}{\value{page}}
\arabic{myctr},
\setcounter{myctr}{2}
\stepcounter{myctr}
\roman{myctr}, \Roman{myctr}
$\fnsymbol{myctr}$,
\addtocounter{myctr}{-1}
\refstepcounter{myctr}
\alph{myctr}, \Alph{myctr}

2, iii, III †, b, B
\documentclass[12pt]{letter}
\makelabels
\address{My address\\
My home, my castle}
\signature{me}
\begin{document}
\begin{letter}{Address}
\opening{Dear ...}
\closing{Best regards}
\cc{ }
\encl{ }
\ps{P.S. }
\end{letter}
\end{document}
\marginpar{This is a marginal note}
\marginpar[\$\Rightarrow\$]{$\Leftarrow$}
\makeatletter
\marginparwidth
\marginparsep
\marginparpush
\reversemarginpar
\normalmarginpar
\makeatother
Structuring a Document

- \tableofcontents
- \listoffigures
- \listoftables
- \nofiles
\clearpage \thispagestyle{empty}
\begin{figure}[p]
\begin{center}
\huge\bf \LaTeX
\par
\LARGE\bf PC course\par
\normalsize Aston, August 2--5, 1993
\par
\vspace{3mm}
\footnotesize
\end{center}
\end{figure}
\begin{tabular}{c@{}p{1cm}@{}c}
\multicolumn{3}{c}{\bf Lecturers:} \\
& \rule{0pt}{5pt} & \\
Ji\v{r}\'\i\ Zlatu\v{s}ka & & Petr Sojka \\
\multicolumn{3}{l}{Masaryk University Brno,} \\
& & The Czech Republic \\
\end{tabular}
\end{center}
\end{figure}  \
\clearpage
\documentclass{article}
\typein[\answer]{Name of your style file (without .sty)}
\makeatletter
\title{\answer}
\author{Unknown}
\input{\answer.sty}
\typeout{I’ll be typesetting using \answer.sty}
\makeatother
\begin{document}
\maketitle
...
\end{document}
Definitive guides to \TeX{} and \LaTeX{} are [Knuth84] and [Lamport86].

- L. Lamport: \emph{A Document Preparation System \LaTeX{}}. Addison-Wesley, 1986.

\begin{thebibliography}{Lamport86}
\bibitem{texbook}[Knuth84]
\bibitem{latexbook}[Lamport86]
L.~Lamport: \emph{A Document Preparation System \LaTeX{}}. Addison-Wesley, 1986.
\end{thebibliography}
Definitive guides to \TeX\ and \LaTeX\ are [1] and [2].


L. Lamport: \textit{A Document Preparation System \LaTeX}. Addison-Wesley, 1986.

Definitive guides to \TeX\ and \LaTeX\ are \cite{texbook} and \cite{latexbook}.

\begin{thebibliography}{9}
\bibitem{texbook}
D.~E.~Knuth: \textit{\TeX\ book}.
Addison-Wesley, 1984.
\bibitem{latexbook}
L.~Lamport: \textit{A Document Preparation System \LaTeX}.
Addison-Wesley, 1986.
\end{thebibliography}
\cite{text}\{key_list\}
\nocite{key_list}
\bibliography{bib_files}
\textbf{Index and Glossary}

- \texttt{\index} and \texttt{\glossary} \texttt{commands}
- \texttt{\makeindex}, \texttt{\makeglossary}
- \texttt{\theindex} \texttt{environment} (defines \texttt{\item}, \texttt{\subitem}, \texttt{\subsubitem} \texttt{commands})
Figure Insertions

- `graphicx` package with `\includegraphics` command to include external graphics in PDF (pdf\TeX\ or Xe\LaTeX\) or EPS (\LaTeX), `epsf.sty`
- `METAFONT`, `METAPOST`, `mfpic`, `tikz`, `jfig` and many other possibilities
- already obsolete: `bm2font`, `epic.sty`, `eepic.sty`