LaTeX
for beginners

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Outline

Introduction
Getting Acquainted
Getting Started
\LaTeX Environments
Fonts and Math
Macros
Designing It Yourself
Moving Information Around
All the Stuff Around
What Is It $\TeX$?

$\TeX$ [teck, $\tau\epsilon\chi$] 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)
What Is It $\LaTeX$?

$\LaTeX$ 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 offer \LaTeX\ style files and accept 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 ist 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 line justification. 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.

\$ \$ dollar sign

\& \& ampersand

\% \% percent sign

\# \# hash mark

_ _ underscore

\{ \{ left curly brace

\} \} right curly brace

\~ \~\{} tilde

\^ \^\{} caret

\ $\backslash$ backslash
Special Symbols II.

¶ \texttt{\textbackslash P} \hspace{2cm} \text{paragraph sign (pilcrow)}
§ \texttt{\textbackslash S} \hspace{2cm} \text{section number sign}
£ \texttt{\textbackslash pounds} \hspace{2cm} \text{pound sign}
‘ \texttt{\textbackslash lq} \hspace{2cm} \text{left quote}
’ \texttt{\textbackslash rq} \hspace{2cm} \text{right quote}
[,,[ \texttt{\textbackslash lbrack,[} \hspace{2cm} \text{left square bracket}
 ],,] \texttt{\textbackslash rbrack,]} \hspace{2cm} \text{right square bracket}
† \texttt{\textbackslash dag} \hspace{2cm} \text{dagger or obelisk}
‡ \texttt{\textbackslash ddag} \hspace{2cm} \text{double dagger or diesis}
© \texttt{\textbackslash copyright} \hspace{2cm} \text{copyright sign}
^ \$\backslash hat{}$ \hspace{2cm} \text{copyright sign}
π \$\backslash pi$
♡ \$\backslash heartsuit$
α \$\backslash alpha$
Simple Text Generating Commands

\TeX \quad \LaTeX
\ldots \quad \cdots \quad \bullet
\today
Macro Syntax

Today is 4th October 2018.
(we used macro \today ).
\documentclass[11pt]{article}
\begin{document}
Today is \today .\texttt{[2mm]}
(we used macro \verb*!\today !.)
\end{document}
Symbols From Those Other Languages I

\begin{itemize}
  \item \texttt{\'{o}} \quad o \text{ grave}
  \item \texttt{\~{o}} \quad o \text{ tilde or squiggle}
  \item \texttt{\textasciicircum{o}} \quad o \text{ acute}
  \item \texttt{\={o}} \quad o \text{ bar or macron}
  \item \texttt{\^{o}} \quad o \text{ circumflex (hat)}
  \item \texttt{"{o}} \quad o \text{ umlaut or dieresis}
  \item \texttt{\u{o}} \quad o \text{ breve}
  \item \texttt{\H{o}} \quad double acute (long Hungarian)
  \item \texttt{\d{o}} \quad o \text{ dot under}
  \item \texttt{\b{o}} \quad bar under o
  \item \texttt{\c{c}} \quad c \text{ caron}
  \item \texttt{\c{c}} \quad c \text{ cedilla}
  \item \texttt{\.{g}} \quad g \text{ dot above}
  \item \texttt{\t{oo}} \quad oo \text{ tie after}
\end{itemize}
Symbols From Those Other Languages II

\[\text{oë} \quad \text{\oe} \quad \text{oe digraph}\]
\[\text{Œ} \quad \text{\OE} \quad \text{OE digraph}\]
\[\text{å} \quad \text{\aa} \quad \text{a ring}\]
\[\text{Å} \quad \text{\AA} \quad \text{A ring}\]
\[\text{æ} \quad \text{\ae} \quad \text{ae digraph}\]
\[\text{Æ} \quad \text{\AE} \quad \text{AE digraph}\]
\[\text{ø} \quad \text{\o} \quad \text{o slash}\]
\[\text{Ø} \quad \text{\O} \quad \text{O slash}\]
\[\text{ł} \quad \text{\l} \quad \text{polish l}\]
\[\text{Ł} \quad \text{\L} \quad \text{suppressed L}\]
\[\text{ß} \quad \text{\ss} \quad \text{German Es-Zet (sharp S)}\]
\[\text{i} \quad \text{\i} \quad \text{dotless i}\]
\[\text{j} \quad \text{\j} \quad \text{dotless j}\]
Quotation Marks

‘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.
Hyphen, Dash, Emdash, Minus Sign

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 $-1$
Punctuation

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

\TeX\_(\LaTeX, etc.)\_are\_worth\_learning, IMHO@.

\frenchspacing \nonfrenchspacing

(?!)
Preventing Line Breaks

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}
Emphasizing, Italic Correction

\TeX is \textit{the} typesetting system. \textit{Try} it!

\TeX\ is \textit{the\}/ typesetting system. \begin{em}\textit{Try\}/\end{em} it!

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

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

You \textit{shouldn’t} do this!

You \textit{shouldn’t} do this!
Footnotes

Karel Čapek\footnote{Famous Czech writer} has invented the word *Robot* in his drama *RUR*\footnote{Rossum’s Universal Robots}.

\footnote{Famous Czech writer} Karel Čapek has invented the word *Robot* in his drama *RUR*\footnote{Rossum’s Universal Robots}.

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\footnote{Famous Czech writer}
\footnotemark{Famous Czech writer}
\footnotetext{Famous Czech writer}

\footnotemark{Rossum’s Universal Robots}
\footnotetext{Rossum’s Universal Robots}

\footnotemark{2017}
\footnotetext{2017 Rossum’s Universal Robots}
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, …) — \textit{Local Guide}

- unsupported (misc)

\texttt{mubeamer} document class was used for preparation of these slides.
Document Style Options

[10pt], 11pt, 12pt  selection of normal size of document fonts
  
  fleqn  mathematical equations are aligned to the left instead of centering them
  
  leqno  numbering of equations is on the left instead of on the right of every equation
  
  titlepage  extra title page with article.sty
  
  proc  proceedings option with article.sty
  
  twocolumn  option for two column typesetting
  
  twoside  twosided document (different typesetting (headers, margins, ...) when on the left page or on the right one)
  
  ifthen  option for conditionals
  
  makeidx  option for makeindex support
  
  bezier  option for bezier curves support
How to prove Fermat’s Last Theorem

Andrew Wiles

July 1993
Titlepage II

\documentclass[11pt]{article}
\title{How to prove Fermat’s Last Theorem}
\author{Andrew Wiles}
\date{July 1993}

\begin{document}
\begin{titlepage}
\maketitle
\begin{abstract}
...
\end{abstract}
\end{titlepage}
\end{document}
Basic Sectioning Commands I

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”
Basic Sectioning Commands II

\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{footnote} any \end{footnote} \verb|\heartsuit|

\subsection{My \protect\heartsuit}

1.1 My \heartsuit
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

\begin{itemize}
\item pt \hspace{0.5em} point
\item pc \hspace{0.5em} pica (1pc = 12pt)
\item in \hspace{0.5em} inch (1in = 72.27pt)
\item bp \hspace{0.5em} big point (72bp = 1in)
\item cm \hspace{0.5em} centimeter (2.54cm = 1in)
\item mm \hspace{0.5em} millimeter (10mm = 1cm)
\item dd \hspace{0.5em} didot point (1157dd = 1238pt)
\item cc \hspace{0.5em} cicero (1cc = 12dd)
\item sp \hspace{0.5em} scaled point (65536sp = 1pt)
\end{itemize}

3\_in \hspace{0.5em} 29\_pc \hspace{0.5em} +42,1\_dd \hspace{0.5em} -.01in \hspace{0.5em} 0.mm
Glue

- space, stretch, shrink
- natural width
- \(<\dimen>\) 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
Raising, Lowering, Saving Boxes

You can \emph{raise} or \emph{lower} text. It’s gnats and gnats and gnats, wherever we go.

You can \texttt{\raisebox{.6ex}}{\em raise}
or \texttt{\raisebox{-.6ex}}{\em lower} text.\vrule \texttt{\raisebox{.4ex}[1.5ex][.75ex]{\em text}}%\vrule
\texttt{\newsavebox{\toy}}\texttt{\savebox{\toy}[^.65in]{gnats}}
It’s \texttt{\usebox{\toy}} and \texttt{\usebox{\toy}}
and \texttt{\usebox{\toy}}, wherever we go.
LR Boxes

\textit{gnus} are here ...
\textit{gnus} are here ...
\textit{gnus} are here ...
\textit{gnus} are here ...
There was not a \texttt{gnu} or \texttt{armadillos} in sight.

\texttt{\begin{flushleft}
\makebox[1in]{\texttt{em gnus}} are here \ldots
\makebox[1in][l]{\texttt{em gnus}} are here \ldots
\makebox[1in][r]{\texttt{em gnus}} are here \ldots
\mbox{\texttt{em gnus}} are here \ldots
There was not a
\framebox[1in][l]{\texttt{gnu}} or
\fbox{\texttt{armadillos}} in sight.
\end{flushleft}}
Horizontal Spacing I

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
leftmiddle
cellmiddle

left\hfill right

left\hfil middle\hfill right
Horizontal Spacing II

-, \enspace very small space
\quad as wide as number
\quad as wide as a basefont is high
\qquad twice as wide as \quad
\hfill stretchable space (from 0 to \infty)
\hss stretchable and shrinkable space
**Vertical Spacing I**

Here

is 1 in space.

Here

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

\vspace{1cm}
\vspace*{1cm}
Vertical Spacing II

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

- Global/local parameters
- Nesting
- Syntax

 `{ }`

`\begin{environmentname}`
`\end{environmentname}`

`\begin{group}`
`\end{group}`
Quotation, \textit{Quote}

From the Time magazine:

\begin{quote}
In 1637 a French lawyer, poet and mathematician Pierre de Fermat wrote in the margin of a book:
\begin{quotation}
``I have found a truly wonderful proof, which this margin is too small to contain.''
\end{quotation}
\end{quote}

From the Time magazine:
\begin{quote}
In 1637 a French lawyer, poet and mathematician Pierre de Fermat wrote in the margin of a book:
\begin{quotation}
``I have found a truly wonderful proof, which this margin is too small to contain.''
\end{quotation}
\end{quote}
Lists—Itemize

Czechoslovakia has spread into

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

Czechoslovakia has spread into

\begin{itemize}
  \item The Slovak Republic
  \item The Czech Republic. It consists of
    \begin{itemize}
      \item Bohemia
      \item Moravia
      \item Silesia
    \end{itemize}
\end{itemize}
Lists—Description

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
   1.1 level two
      1.1.1 level three

\begin{enumerate}
\item level one
    \begin{enumerate}
    \item level two
        \begin{enumerate}
        \item level three
        \end{enumerate}
    \end{enumerate}
\end{enumerate}
Between Left and Right

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 `\input` is very useful.

Command `\verb+\input+` is very useful.

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

```
\obeylines
\obeyspaces
\verb*
\begin{verbatim*}
Petr Sojka · \LaTeX{} for beginners · 2018-10-04
```

```
\begin{verbatim*}
```

```
\end{verbatim*}
```
Tabbing Environment

If it’s raining
    then put on boots,
    take hat;
else smile.
Leave house.

\begin{tabbing}
If \= it’s raining \\\n\> then \= put on boots, \\\n\> \> take hat; \\\n\> else \> smile. \\\nLeave house. \\
\end{tabbing}
Tabbing Environment I

Gnat: swatted by: men cows and gnus not very filling
Armadillo: not edible (note also the: aardvark éèé albatross eton)
Gnu: eaten by gnats
Tabbing Environment II

\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}
## Tabular Environment I

<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>
# Tabular Environment II

\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. \\
\hline 
\it 72 & 245--245 & Light trading due to a heavy winter. \\
\hline 
\it 73 & 245--2001 & No gnus was very good gnus this year.
\end{tabular}
Tabular Parameters

\arraycolsep \tabcolsep \arrayrulewidth \doublerulesep \arraystretch

\begin{tabular}{\textwidth}[t]
{@{\extracolsep{\fill}}l|*{3}{r}|p{3cm}@{--}r}
\hline
Petr Sojka
\hline
\end{tabular}
# Floats—Figure

In Figure 1 (page 55) you see Czechia.

![Map of Czechia](image.png)

**Figure 1: Map of Czechia**

In Figure~\ref{czechia} (page~\pageref{czechia}) you see Czechia.

\begin{figure}
\centerline{\framebox{{\CountriesOfEuropeFamily\EUCountry{136}}}}
\caption{Map of Czechia}
\label{czechia}
\end{figure}
Tables

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: Presidents
Floats II

Tables

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. Kováč \\
\hline
\end{tabular}
\end{table}
Parameters of Float Placement

\topfraction
bottomnumber
\bottomfraction
totalnumber
\textfraction
\floatpagefraction
dbltopnumber
\dblfloatpagefraction
\floatsep
\textfloatsep
\intextsep
\dblfloatsep
\textfloatsep
\intextsep
\dblfloatsep
\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)}
\end{picture}
Picture Environment II

\put(65,20){\makebox(0,10){{{\normalsize\bf John}}}\\}
\put(35,35){\line(1,0){60}}\\
\put(35,35){\line(1,1){30}}\\
\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

\textit{roman} \textbf{boldface} \textit{italic} \textit{slanted} \textit{sans serif} \textit{Caps and Small Caps} \textit{typewriter} \textit{bold type in math formulæ}

\textbf{Petr Sojka • \LaTeX{} for beginners • 2018-10-04}
## 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) m</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>
<tr>
<td>Ultra Condensed uc</td>
<td>uc</td>
</tr>
<tr>
<td>Extra Condensed ec</td>
<td>ec</td>
</tr>
<tr>
<td>Condensed c</td>
<td>c</td>
</tr>
<tr>
<td>Semicondensed sc</td>
<td>sc</td>
</tr>
<tr>
<td>Medium m</td>
<td>m</td>
</tr>
<tr>
<td>Semiexpanded sx</td>
<td>sx</td>
</tr>
<tr>
<td>Expanded x</td>
<td>x</td>
</tr>
<tr>
<td>Extra Expanded ex</td>
<td>ex</td>
</tr>
<tr>
<td>Ultra Expanded ux</td>
<td>ux</td>
</tr>
</tbody>
</table>

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

### Sizing

- `\tiny` tiny
- `\scriptsize` scriptsize (indexes)
- `\footnotesize` footnotesize (footnotes)
- `\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,</td>
<td>Computer</td>
</tr>
<tr>
<td>cmu10, cmbx10, cmbxti, cmbxsl,</td>
<td>roman (cmr)</td>
</tr>
<tr>
<td>cmb10</td>
<td></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}
Loading Fonts

\newfont{\EUmapf}{CountriesOfEurope scaled 10000 }
\newcommand{\Czechoslovakia}{{\EUmapf
  \symbol{136} and \symbol{162}}}\\
\Czechoslovakia

and
Math in text

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

\textstyle
\scriptstyle
\scriptscriptstyle

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

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

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

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

\jot
\mathindent
\abovedisplayskip
\belowdisplayskip
\abovedisplayshortskip
\belowdisplayshortskip
\belowdisplayshortskip
Math Formulae
On separate line

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

\[ \text{det}, \gcd, \inf, \lim, \limsup, \max, \min, \Pr, \sup_i \]
\[ a \mod b, a \pmod{10}, \aleph, \forall, \infty, \hbar \]
\[ \emptyset, \exists, \Box, \imath, \nabla, \neg, \Diamond, \ldots \]

\[ \text{\det}_i, \text{\gcd}_i, \text{\inf}_i, \text{\lim}_i, \text{\limsup}_i, \text{\max}_i, \text{\min}_i, \text{\Pr}_i, \text{\sup}_i \]
Numbered Equations

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.
Math Formulæ I

Exponents and indexes

\[ x^5 \quad x_1 \]

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

Square roots

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

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

**Fractions**

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

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

**Binomic coefficients**

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

\[
\binom{n}{n-k}
\]
Math Formulae III

Integrals

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

\text{\LaTeX} \quad \int \limits_{-\infty}^{\infty} x^3 \, dx

Sums

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

\text{\LaTeX} \quad \sum_{i=1}^{n} a_i
Math Formulæ IV

Parentheses

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

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

\[
\left( (x+1) (x-1) \right)^2
\]
Math Formulae V

Arrays

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

\( \{\text{cal } X\} = \left( \begin{array}{ccc} x_{11} & x_{12} & \ldots \\ x_{21} & x_{22} & \ldots \\ \vdots & \vdots & \ddots \end{array} \right) \)
Math Formulae VI

System of Equations

\begin{align*}
  f(x) &= \cos x \\
  f'(x) &= -\sin x \\
  \int_{0}^{x} f(y)dy &= \sin x
\end{align*}

\begin{eqnarray}
  f(x) &= \cos x \\
  f'(x) &= -\sin x \\
  \int_{0}^{x} f(y)dy &= \sin x
\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>\quad</td>
</tr>
<tr>
<td>Quad</td>
<td>\quad</td>
<td>\quad</td>
</tr>
<tr>
<td>Space</td>
<td>\space</td>
<td>\space</td>
</tr>
<tr>
<td>Thick space</td>
<td>;</td>
<td>;</td>
</tr>
<tr>
<td>Medium space</td>
<td>&gt;</td>
<td>&gt;</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>

\[
\int\int z \, dx \, dy \text{ vs. } \int\int zd\!x\!d\!y
\]

\[
\sqrt{2}x \text{ vs. } \sqrt{2}x
\]

*different* vs. *different*
Spacing in Math Mode II

\[ \int \int z \, dx \, dy \] vs. \[ \int \int z \, dx \, dy \]
\[ \sqrt{2} \, x \] vs. \[ \sqrt{2} \, x \]
\[ \text{different} \] vs. \[ \text{different} \]
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 $\vec{i} + \vec{j}$.

There are no dots in $\vec{\mathit{i}} + \tilde{\mathit{j}}$. 
Over- and Underlining

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

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

\[
a + b + \cdots + y + z
\]

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

\( A \stackrel{a'}{\rightarrow} B \stackrel{b'}{\rightarrow} C \xdef x_1, \ldots, x_n \)

\( ( \vec{x} \defeq (x_1, \ldots, x_n) \) \)
New Commands—Macros I

1. first item
2. second item
   2.1 first item in second item
   2.2 ...

\newcommand{\be}{\begin{enumerate}}
\newcommand{\ee}{\end{enumerate}}
\be
\item first item
\item second item
   \be
   \item first item in second item
   \item \ldots
\ee
\ee
New Commands—Macros II

It’s a bit boring to write \textbf{Popocatepetl} again and again.

\newcommand{\sw}{\textbf{Popocatepetl}}

It’s a bit boring to write \sw \textbf{Popocatepetl} 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 ...:

\newcommand{\fvec}[2]{$f((#1_1, \ldots, #1_n), (#2_1, \ldots, #2_n))$}
Let \fvec{a}{b} be $\ldots$: \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 now have new environment:

\begin{emphit}
\item We use italics.
\item It’s OK, isn’t it?
\end{emphit}
New Environments with Parameters

We can now define new environment with parameters:

Example: *Environment quote with emphasized beginning.*

\begin{descit}{Example}
Environment \emph{quote} with emphasized beginning.
\end{descit}

\begin{quote}
\emph{#1}: \\
\end{quote}
New Theorem Environments

Conjuncture (Fermat)

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

\newtheorem{guess}{Conjuncture}
\begin{guess}[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:

**Axiom 2.1**

*The only thing two \TeXers can agree on is what the third \TeXer has no need of.*
Theorem Numbering II

\newtheorem{axiom}{Axiom}[section]
\section{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}
Macro Definitions I
\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\6\6\9\9\9\6\6\9\6\6\6\6\8
\ldots
8\9\8\8\7\7\4\7\7\8\7\8\7\8\8\8\8
\end{picture}
Business Card Example I

RNDr. Petr Sojka, Ph.D.
associate professor

Faculty of Informatics  
Masaryk University  
Botanická 68a, 602 00 Brno  
phone: +420-54949 6966

privat:  
Pod mostem 15, 635 00 Brno  
phone: +420-12345 6789
Business Card Example II

\newfont{\fnt}{cmssbx10 scaled \magstep 1}
\newcommand{\foren}{\,+420-}
\newcommand{\card}[9]{
   \fboxrule .3mm \fboxsep 3mm
   \framebox[79mm][l]{
      \vbox{ \footnotesize\rm
         \vskip 8mm
         \makebox[71mm][c]{\normalsize\fnt #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}
      }
   }
}
Business Card Example III

\newcommand{\mycard}
{\card{RNDr. \ Petr Sojka, Ph.D.}\{associate professor\}
  \{Faculty of Informatics\}\{Masaryk University\}
  \{Botanická 68a, 602\,00 Brno\}
  \{phone:\foren 54949,6966\}
  \{privat:\}
  \{Pod mostem 15, 635\,00 Brno\}
  \{phone:\foren 12345,6789\}
}

\centerline{\mycard}
Length Parameters

\setlength{\parindent}{0pt}
\setlength{\parskip}{5pt plus 2pt minus 1pt}
\addtolength{\textwidth}{60pt}
\addtolength{\baselineskip}{0pt plus 0.1pt minus 0.1pt}

Petr
\newlength{\mylength}
\setlength{\mylength}{1cm}
\addtolength{\mylength}{1cm}
\settowidth{\mylength}
{\rm Petr}\hspace*{.5\mylength}
\hbox{\strut\vrule\hspace*{\mylength}\vrule}
\rule{1cm}{0.4pt}
Counters

\setcounter{page}{0}
\addtocounter{page}{-2}

It was \textbf{Gnats} and \textbf{Gnus} as we trekked through Africa

\begin{minipage}{.7\textwidth}
\textbf{It was} \fbox{Gnats} and \fbox{Gnus} as we trekked through Africa
\end{minipage}

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

\begin{minipage}{.7\textwidth}
\begin{verbatim}
\begin{minipage}{.7\textwidth}
\begin{verbatim}
\textbf{It was} \fbox{Gnats} and \fbox{Gnus} as we trekked through Africa
\end{verbatim}
\end{minipage}
\end{verbatim}
\end{minipage}
Line Breaking

\linebreak[num]
\nolinebreak[num]
\\[len]
\newline
\-
\hyphenation{words}
\sloppy
\fussy
\begin{sloppypar} pars \end{sloppypar}
Page Breaking

\pagebreak[num]
\nopagebreak[num]
\samepage
\newpage
\clearpage
\cleardoublepage
Page Layout
Parshape command
\parshape \n i_1 \ l_1 \ i_2 \ l_2 \ \ldots \ i_n \ l_n
\parshape 30 \ 0pt \ 120pt \ 1pt
118pt \ 2pt \ 116pt \ 4pt \ 112pt \ 6pt
108pt \ 9pt \ 102pt \ 12pt \ 96pt \ 15pt
90pt \ 19pt \ 84pt \ 23pt \ 77pt \ 27pt
68pt \ 30.5pt \ 60pt \ 35pt \ 52pt \ 39pt
45pt \ 43pt \ 36pt \ 48pt \ 27pt \ 51.5pt
21pt \ 53pt \ 16.75pt \ 53pt \ 16.75pt \ 53pt
\ldots

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:
Good luck finding them!
Numbering

\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\nMy home, my castle}
\signature{me}
\begin{document}
\begin{letter}{Address}
\opening{Dear ...}
\closing{Best regards}
\cc{ }
\encl{ }
\ps{P.S. }
\end{letter}
\end{document}
Marginal Notes

\marginpar{This is a marginal note}
\marginpar[{$\Rightarrow$}]{${\Leftarrow}$}

\marginparwidth
\marginparsep
\marginparpush
\reversemarginpar
\normalmarginpar
Structuring a Document

- `\tableofcontents`
- `\listoffigures`
- `\listoftables`
- `\nocontents`
Titlepage Example I

\LaTeX

PC course

Aston, August 2–5, 1993

Lecturers:

Jiří Zlatuška  Petr Sojka
Masaryk University Brno, The Czech Republic
Titlepage Example II

\clearpage \thispagestyle{empty}  
\begin{figure}[p]  
\begin{center}  
\huge\bf \LaTeX\\[3mm]  
\LARGE\bf PC course\par\vspace{3mm}  
\normalsize Aston, August 2--5, 1993\par\vspace{3mm}  
\par\vspace{3mm}  
\footnotesize  
\begin{tabular}{c@{}p{1cm}@{}c}  
\multicolumn{3}{c}{\bf Lecturers:}\par\vspace{3mm}  
& \rule{0pt}{5pt} & \par\vspace{3mm}  
Ji\v{r}í Zlatu\v{s}ka & & Petr Sojka\par\vspace{3mm}  
\multicolumn{3}{l}{Masaryk University Brno, The Czech Republic}\par\vspace{3mm}  
\end{tabular}  
\end{center}  
\end{figure}  
\clearpage
Keyboard Input and Screen Output

\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}
The Bibliography I

Definitive guides to \TeX\ and \LaTeX\ are [Knuth84] and [Lamport86].


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

\begin{thebibliography}{Lamport86}
\bibitem[Knuth84]{texbook} D.~E.~Knuth: {\it \TeX\ book}. Addison-Wesley, 1984.
\bibitem[Lamport86]{latexbook} L.~Lamport: {\it A Document Preparation System \LaTeX}. Addison-Wesley, 1986.
\end{thebibliography}
Definitive guides to \TeX\ and \LaTeX\ are [1] and [2].


\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}
Bibtex

\cite[text]{key_list}
\nocite{key_list}
\bibliography{bib_files}
Index and Glossary

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

- `graphicx` package with `\includegraphics` command to include external graphics in PDF, PNG, JPEG, (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`