A \LaTeX source file is an ordinary text file with interspersed typography markup. It may be created with any text editor (Notepad, Textedit, gedit, emacs, vim) or with a dedicated \LaTeX editor with syntax highlighting (Texstudio, Texmaker).

This text file will then be processed by a \TeX engine: \latex, pdflatex, lualatex, xelatex

The result is a .pdf file, which may be printed or read on screen.

The most fundamental \LaTeX component is the Environment. Inside an environment the text gets a special layout and/or special commands are defined.

This is a paragraph with some surrounding text.
\begin{itemize}
\item This is the first point.
\item And here comes number two.
\end{itemize}

This is a paragraph with some surrounding text.
\begin{enumerate}
\item This is the first point.
\item And here comes number two.
\end{enumerate}

\item The last point

We also have some text after the different items.

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Multiple command forms

Many commands have multiple forms

- Optional argument:
  \item[$\spadesuit$]
- Star-form:
  \section*(An Unnumbered Section)

They may sometimes be combined.

The meaning of star-forms and optional arguments vary from command to command, but in practice this is not a problem.

Environments

\begin{center}...\end{center}
Centered lines, use \ to separate
\begin{quotation}...\end{quotation}
Narrower than surrounding text
\begin{itemize}...
\item \itemize[description]
\item\itemize[description]...\end{itemize}
Labeled items.

In the last three cases the item is started with an \item command. The description needs an argument: \item[keylabel].

Grouping

A pair of curly braces {...} in the text delimit a \texttt{tex} group. Any change made to a property (size, font, width, etc.) is only valid inside the group.

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A \texttt{tex} environment is an implicit group, so after \begin{center}LARGE ...\end{center} the text size would be back to normal.

Type Styles 1

\texttt{tex} type style is specified by three components: shape, series, family.

- \textit{Italic shape}
- \textbf{Boldface series}
- \textsf{Sans Serif family}
- \sffamily\textsf{Sans Serif family}
- \rmfamily\textsf{Roman family}
- \textttfamily\texttt{Typewriter family}
- \ttfamily\texttt{Typewriter family}
- \itshape\texttt{Small Caps shape}
- \sffamily\texttt{Small Caps shape}
- \bfseries\texttt{Boldface series}
- \texttt{Boldface series}
- \emph{Italic shape}
- \texttt{Bold italic text}

Use \texttt{\boldmath{...}} to get emphasized text inside other text. \texttt{\texttt{...}...} will work properly.

These commands work only in text mode. In math mode, use \texttt{\mathrm}, \texttt{\mathbf}, \texttt{\mathit} etc.

Type Style 2

Each of the commands in the previous slide have a corresponding \texttt{tex} declaration.

- \texttt{\itshape Italic shape}
- \texttt{\sshape Small Caps shape}
- \texttt{\bsfamily Boldface series}
- \texttt{\rsfamily Roman family}
- \texttt{\ssfamily Sans Serif family}
- \texttt{\ssfamilysmall sans serif family}
- \texttt{\ttfamily Typewriter family}

The \texttt{\emph{...}} declaration corresponds to the \texttt{\texttt{...}} command.

The old commands \texttt{\it \bf \ss \tt} should not be used. They may not work in new versions of important classes.

Verbatim

Short verbatim strings: \verb? any $ % & # characters?\nResult: any $ % & # characters. The special marker may be any nonalphabetic character.

Longer verbatim text is created with the \texttt{verbatim} environment.

\begin{verbatim}
\verb{Text with \% \& \# any characters $ \} \{
except the special string
\end{verbatim}

The special string is \end{verbatim}

Result:

Text with \% \& \# any characters $ \} \{
except the special string

Floating Figures and Tables

\begin{verbatim}
\begin{figure}
%insert the graphics here
\centering
\caption{....} \label{taa}
\end{figure}
\end{verbatim}

\begin{verbatim}
\begin{table}
%tabular material here
\caption{....} \label{taa}
\end{table}
\end{verbatim}

Makes a floating insert. Note different placement of \caption. This is a tradition, not a technical requirement. Note also that the \label must come after the \caption.

Both environments can take an optional argument specifying desired position. Do not use this until the really final version of the document. In particular, do not use the [h] variant at all.

Do not confuse the \texttt{\table} environment with the \texttt{\tabular} environment described later.

Inserting Graphics

The modern \texttt{tex} engines, typically \texttt{pdflatex}, can directly process graphics of type \texttt{pdf}, \texttt{jpg}, \texttt{png}, and through auto-conversion \texttt{.eps}.

All known graphics-generating programs can export to one of these formats.

\begin{verbatim}
\usepackage{graphics}
\begin{center}
\includegraphics[width=80mm]{drawing}
\end{center}
\end{verbatim}

Many other options are available. See the documentation for \texttt{Packages in 'The Graphics Bundle'} \texttt{(texdoc graphicx)}
The Tabular Environment

\begin{tabular}{lll}
\hline
\textit{Name} & \textit{Place} & \textit{Weight} \\
O. Olsson & Lund & 73 \\
F. Baby & Varying & 4 \\
P. Persson & Tokholmen & 110 \\
\hline
\end{tabular}

For professional-looking tables, use the package booktabs.

Mathematics

Inline math:
This formula \( f(x) = x^2 \) is an example.
Will give:
This formula \( f(x) = x^2 \) is an example.

Displayed Math
\[
A = \begin{pmatrix}
a_{11} & a_{12} \\
a_{21} & a_{22}
\end{pmatrix}
\]

Matrices and Fractions

\[
a = \frac{1}{x} + \frac{1}{y}
b = \frac{1}{y - 2}
\]

Defining and Redefining Commands

\newcommand{\DRC}{Defining and Redefining Commands} defines a new command \DRC that can be used as an abbreviation for ‘Defining and Redefining Commands’.

The new command must not exist previously. \LaTeX \ will refuse if it does.

\newcommand{\tbd}{\textbf{\texttt{#1}}} defines a command with one parameter, to create \tbd{TBD} text.
Defining and Redefining Environments

\begin{largebold}
The quick brown fox jumps over the lazy dog's back.
\end{largebold}

There is also \renewenvironment{...}. Same rules as for \newcommand and \renewcommand.

Installing or Accessing \LaTeX

On a Mac: MacTeX  http://www.tug.org/mactex/

On Windows: Two possibilities
TexLive  http://tug.org/texlive/
MiKTeX  https://miktex.org/

On Linux: Install through your package manager, or use TeXLive.

In a browser: ShareLatex  https://www.sharelatex.com/
https://sharelatex.control.lth.se/

More Information

\LaTeX Wikibook  https://en.wikibooks.org/wiki/LaTeX
'The Not so Short Introduction to \LaTeX 2\epsilon'. texdoc lshort
\LaTeX Stackexchange  https://tex.stackexchange.com/