An interactive tutorial to typesetting with \LaTeX is presented. The tutorial is aimed at JACoW editors with no previous experience with \LaTeX. As we learn the basic \LaTeX commands, users will be invited to get TeXing as we go along. A laptop with a browser is all that is required. We will use an online \LaTeX tool (overleaf.com) for writing our first \LaTeX document.
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LaTeX is neat, powerful, and cool!

- Created by mathematicians and scientists, for mathematicians and scientists
- Documents are written in plain text, with commands that determine its structure
- Text and commands are processed by latex to produce neatly formatted documents
- Extendable, numerous libraries with packages of extra commands and environments
Where to get help from

Plenty of online help resources, e.g.,

- www.sharelatex.com
- www.tug.org (\LaTeX\ Users Group)
- ...
Hello JACoW!

\documentclass[10pt,a4paper]{article}
\begin{document}
Hello JACoW! %This is a comment
\end{document}

- A backslash \ indicates the start of a command
- \documentclass is the first \LaTeX\ command
- The braces \{\} take a single argument which \LaTeX\ uses for formatting. Standard formats are, e.g., article, book; customized formats are, e.g., jacow
- The square brackets [ ] embrace user supplied options. The above instructs \LaTeX\ to typeset the document as an article, with 10pt base font size for printing on A4
- Text is entered between \begin{document} and \end{document}
- The percentage sign % starts a comment (which \LaTeX\ ignores)
Error Handling

If during compilation, the compiler spits out an error, then: DON’T PANIC!
Just read the first error message, which will also point you to the source of the error (line no.)
Correct the error and recompile.
Typesetting Text

\documentclass{article}

The space between \documentclass and \begin{document} is referred to as the "preamble"

\begin{document}

Spaces between words do not matter as they are collapsed in the output.

Paragraphs are separated by one or more blank lines or by the command \par

Text can be typed in simply like this, using almost any character such as * ( ? < > | However, a few common characters have a special meaning in LaTeX.

\end{document}
To make any of these characters appear in your text you will need to escape the character by preceding it with a backslash:

\{ \} \% \# \& \$

to get:  \{ \}  \%  \#  \&  \$

To make a backslash appear in the text, type \textbackslash

Title, Authors and Abstract

\documentclass{article}

% in "preamble" space
\title{My First \LaTeX\textasciitilde Paper}
\author{J. Trudeau}
\date{\today}

\begin{document}

\maketitle
\begin{abstract}
How to get started with the \LaTeX\textasciitilde text processing package.
\end{abstract}

\end{document}
\documentclass{article}
\begin{document}

\section{Introduction}
An introduction to the \LaTeX\textsuperscript{\textregistered} text processing packages is presented.

\section{Methodology}
\subsection{Experimental Setup}
The experiment \ldots
\subsection{Data Analysis}
The data analysis \ldots
\subsubsection{Procedure}
Subsubsections are rarely used.

\section{Results}

\section{Conclusion}

\section{Acknowledgements}

\end{document}
\LaTeX features numerous commands and environments. In addition to the built-in set, there are hundreds of others libraries with extra commands/environments made available through packages. Packages are loaded in the preamble through `\usepackage`. Expect to load several more as your expertise grows and you want more refined control!

Example: `graphicx` package for the `\includegraphics`
Creating Specific Environments

\begin

and

\end

commands create a special environment or context. Some examples are:

\begin{abstract} \end{abstract}
\begin{itemize} \end{itemize}
\begin{enumerate} \end{enumerate}
\begin{equation} \end{equation}
\begin{figure} \end{figure}
\begin{table} \end{table}
Canadian national hockey league teams:
\begin{itemize} %bullet points
\item Vancouver Canucks
\item Toronto Maple Leafs
\item Montreal Canadians
\end{itemize}

\begin{enumerate} %numbered points
\item Edmonton Oilers
\item Ottawa Senators
\item Winnipeg Jets
\item Calgary Flames
\end{enumerate}
Figures

Requires package \usepackage{graphicx}

To reference a figure in the text, use the \ref{} command which makes reference to the respective figure labeled by \label{} as show below

Figure \ref{fig:frog} illustrates

\begin{figure}
  \centering
  \includegraphics[width=0.9\textwidth]{frog}
  \label{fig:frog}
  \caption{The FROG experimental setup.}
\end{figure}
Tables

The tabular environment requires package:
\usepackage{tabularx}
\SI{<number>}{<unit>} requires:
\usepackage{siunitx}
To reference the table, use Table~\ref{table:margin}
<table>
<thead>
<tr>
<th>Margin</th>
<th>A4</th>
<th>US Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top</td>
<td>37 mm</td>
<td>0.75 in</td>
</tr>
<tr>
<td>Bottom</td>
<td>19 mm</td>
<td>0.75 in</td>
</tr>
<tr>
<td>Left</td>
<td>20 mm</td>
<td>0.79 in</td>
</tr>
<tr>
<td>Right</td>
<td>20 mm</td>
<td>1.02 in</td>
</tr>
</tbody>
</table>

\begin{table}[hbt]
  \centering
  \caption{Margin Specifications}
  \begin{tabular}{lcc}
    \toprule
    Margin & A4 & US Letter \\
    \midrule
    Top & SI\{37\}\{mm\} & SI\{0.75\}\{in\} \\
    Bottom & SI\{19\}\{mm\} & SI\{0.75\}\{in\} \\
    Left & SI\{20\}\{mm\} & SI\{0.79\}\{in\} \\
    Right & SI\{20\}\{mm\} & SI\{1.02\}\{in\} \\
    \bottomrule
  \end{tabular}
  \label{table:margin}
\end{table}
Typesetting Maths

Inline math mode: The maths is surrounded by single dollar signs. For example, $x^2 + y^2 = z^2$

The single dollar signs surrounding the mathematical expression cause \TeX{} to enter and exit math mode.
Typesetting Maths cont.

Display math mode: The maths surrounded by escaped brackets
("\[" and "\]"),

For example:

\[ x^2 + y^2 = z^2 \]

is given by:

\[
\begin{align*}
  x^2 & + y^2 = z^2 \\
\end{align*}
\]
Basic Maths

Elementary maths, $a \leq 6,$

$a \leq 6$

Fraction, $\frac{3}{4}$

\[\frac{3}{4}\]

Square root, $\sqrt{2}$

\[\sqrt{2}\]

Superscripts and subscripts are indicated by carets and underscores:

\(^n\) \(_x\), e.g. $2^n$, $x_1$, $a^{x+y}$

which gives $2^n$, $x_1$, $a^{x+y}$

Greek Letters, $\alpha, \beta, \gamma, \delta, \Delta$

$\alpha, \beta, \gamma, \delta, \Delta$
Basic Maths Cont.

Sums and Integrals, $\sum$, $\int$

\[ \sum, \int \]

Functions, sin, cos,

\[ \sin, \cos \]

\[ \sin(x + y) = \sin x \cos y + \cos x \sin y \]

\[
\sin(x+y) = \sin x \cos y + \cos x \sin y
\]
**Equations**

\[ f(\alpha, \beta) = \sqrt{\alpha^2 + \beta^2} \]  \hspace{1cm} (1)

\[ \sum_{n}^{(n+1)} = (\gamma_{1}^{(n+1)} + \gamma_{2}^{(n+1)}) \]  \hspace{1cm} (2)

\begin{equation}
  f(\alpha, \beta) = \sqrt{\alpha^2 + \beta^2}
\end{equation}

\begin{equation}
  \sum_{n}^{(n+1)} = (\gamma_{1}^{(n+1)} + \gamma_{2}^{(n+1)})
\end{equation}

Use \{equation*\} to remove numbering
Aligning Equations

\begin{align}
  f(\alpha, \beta) &= \sqrt{\alpha^2 + \beta^2} \\
  \sum_{n}^{(n+1)} &= (\gamma_1^{(n+1)} + \gamma_2^{(n+1)})
\end{align}

Use \{align*\} to remove numbering
References

A. Alpha, B. T. Beta, C. Gamma, and D. Delta, “An overview of control systems”, in *Proc. ICALEPCS'15*, Melbourne, Australia, Oct. 2015, pp. 89–91,

\url{doi:10.18429/JACoW-ICALEPSCS2015-WEB3O04}

Requires `\usepackage{cite}` `\usepackage{url}`

See Ref. `\cite{icalppecs11:alpha}`

\begin{thebibliography}{9} %or {99} if > than 9 refs.
\bibitem{icalppecs11:alpha}
\end{thebibliography}
Fun Stuff

Ready-made coffee stains!
Let’s get \TeXing!

www.overleaf.com