Writing a Technical Paper with LaTeX

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1 What is LaTeX?

LaTeX (or Lampert TeX) is a typesetting system commonly used to write various types of academic papers. LaTeX provides an easy to use system for the TeX typesetting program. LaTeX allows the writer to focus less on designing and formatting and more on writing. Getting professional results quickly while handling document design makes LaTeX a powerful tool for anyone.

2 Using LaTeX

There are many ways to get and use LaTeX such as through TeXLive. To make use simple, it's ideal to use a LaTeX editor such as TeXstudio. There are also online options such as Overleaf. LaTeX users are free to use whichever editor they want and switch when they want to. If setting up TeXLive and TeXstudio are hard due to circumstances then the best option is an online editor. It's recommended to become familiar with the interface of the chosen editor.

3 Writing with LaTeX

LaTeX documents are written like a regular text file with commands that dictate how the document should be handled. These can be commands to say what kind of document you're writing, defining your title information, where to put sections, and so on. LaTeX can also be extended with packages to help with various tasks. For simple papers they aren't typically necessary and can be easily learned if needed.

The first step in writing with LaTeX is making your document. If an online editor is used then a document should have been created automatically. Other-

wise using the New button in the File tab at the top of your editor will create it.

Once a document is created a few commands are used to start the LaTeX document. These commands are

```
\title{Your title}
\author{Your name}
\date{the date}
\documentclass{article}
```

All commands are started by a '\'. Commands that take an argument, or a piece of info, are followed by '' with the argument between the two brackets. There are also commands like \today that are automatically replaced. For the command \today it's replaced with today's date. These commands can be put inside commands that take an argument like so:

```
\date{\today}
```

These commands set the date to today automatically.

After those commands the document itself looks like:

```
\begin{document}
\maketitle
Latex (or Lampert TeX) is a...
\end{document}
```

Certain parts of a document are enclosed with matching \begin and \end commands. These are used for the document itself, lists, and other things. Everything that goes inside that part must be put between the two commands. The command \maketitle inside the document tells LaTeX to put your title there in the document.

At this point everything is set up to begin writing your first LaTeX document. There is another command that is useful to know for basic LaTeX documents.

```
\section{Your first section}
\subsection{Your first subsection}
\section*{Your second section}
```

The \section command denotes a section of the paper. It takes the section name as an argument. It may be confusing as to why sections are not done inside \begin and \end commands, but the reason to keep things simple. Sections always last until the next section so instead of requiring a pair of commands for every section, only one is needed.

One thing that may have stood out was the use of the command \section*.

All sections in LaTeX are numbered by default. The asterisk in the command tells LaTeX that the section shouldn't be numbered.

Another thing to note is the use of \subsection. This command creates a subsection. It can also use an asterisk to remove the numbering. Subsections can also be nested like so:

```
\section{Your section}
\subsection{Your subsection}
\subsubsection{Your subsubsection}
```

Subsections are nested by chaining the word 'sub' for each level of subsection.

All of these commands are basic LaTeX commands, but should provide a solid foundation into writing papers with LaTeX and learning to do more with LaTeX. Much more can be done with LaTeX including reports, slideshows, diagrams, and more. More info on LaTeX and further reading material can be found on the LaTeX project's homepage at https://www.latex-project.org. This paper's LaTeX document is provided on the next page as an example.

4 This paper as an example

```
% A command that helps with writing LaTeX properly
\newcommand{\latex}{\LaTeX\xspace}

\title{Writing a Technical Paper with \latex}
\author{Eric Lewis}
\date{\today}
\documentclass{article}

% A package that allows for embedded code (Like this paper)
\usepackage{listings}

% A package to help with the command defined at the beginning of the paper
\usepackage{xspace}

% A package for embedding links
\usepackage{hyperref}

% some rules to make the paper source easier to read while embedded
\lstset
{
  language={[LaTeX]TeX},
  basicstyle=\small,
  %frame=single,
  xleftmargin=\dimexpr\fboxsep+\fboxrule,
  xrightmargin=\dimexpr\fboxsep+\fboxrule,
  breaklines=true,
  tabsize=2,
  columns=flexible,
  backgroundcolor=\color{light grey},
}

\setlength{\parskip}{1em}
\usepackage{helvet}
\usepackage{xcolor}
\definecolor {grey}{RGB}{220,220,220}
\definecolor {light  grey}{RGB}{240,240,240}
\usepackage{titlesec}
\titleformat {name=\section}[block]
  {\large}
  {}
  {0pt}
  {\colorsection }
\titlespacing *{\section}{0pt}{\baselineskip}{\baselineskip}
\newcommand{\colorsection}[1]{\colorbox{grey}{\parbox{\dimexpr\
    textwidth−2\fboxsep}{\thesection\ #1}}}

\begin{document}
```

\maketitle

section{What is \latex?}

\latex (or Lampert TeX) is a typesetting system commonly used to write various types of academic papers. \latex provides an easy to use system for the TeX typesetting program. \latex allows the writer to focus less on designing and formatting and more on writing. Getting professional results quickly while handling document design makes \latex a powerful tool for anyone.

section{Using \latex}

There are many ways to get and use \latex such as through TeXLive. To make use simple, it's ideal to use a \latex editor such as TeXstudio. There are also online options such as Overleaf. \latex users are free to use whichever editor they want and switch when they want to. If setting up TeXLive and TeXstudio are hard due to circumstances then the best option is an online editor. It's recommended to become familiar with the interface of the chosen editor.

section{Writing with \latex}

\latex documents are written like a regular text file with commands that dictate how the document should be handled. These can be commands to say what kind of document you're writing, defining your title information, where to put sections, and so on. \latex can also be extended with packages to help with various tasks. For simple papers they aren't typically necessary and can be easily learned if needed.

The first step in writing with \latex is making your document. If an online editor is used then a document should have been created automatically. Otherwise using the New button in the File tab at the top of your editor will create it.

Once a document is created a few commands are used to start the \latex document. These commands are

begin{lstlisting}
    title{Your title}
    author{Your name}
    date{the date}
    documentclass{article}
end{lstlisting}

All commands are started by a '**textbackslash**'. Commands that take an argument, or a piece of info, are followed by '{}' with the argument between the two brackets. There are also commands like \lstinline{**today**} that are automatically replaced. For the command \lstinline{**today**} it's replaced with today's date. These commands can be put inside commands that take an argument like so:

begin{lstlisting}
  date{**today**}
end{lstlisting}

These commands set the date to today automatically.

After those commands the document itself looks like:

```
\begin{lstlisting}
  \begin{document}
  \maketitle
  Latex (or Lampert TeX) is a...
  \end{document}
\end{lstlisting}
```
Certain parts of a document are enclosed with matching \lstinline{\begin} and \lstinline{\end} commands. These are used for the document itself, lists, and other things. Everything that goes inside that part must be put between the two commands. The command \lstinline{\maketitle} inside the document tells \latex to put your title there in the document.

At this point everything is set up to begin writing your first \latex document. There is another command that is useful to know for basic \latex documents.
```
\begin{lstlisting}
  \section{Your first section}
  \subsection{Your first subsection}
  \section*{Your second section}
\end{lstlisting}
```
The \lstinline{\section} command denotes a section of the paper. It takes the section name as an argument. It may be confusing as to why sections are not done inside \lstinline{\begin} and \lstinline{\end} commands, but the reason to keep things simple. Sections always last until the next section so instead of requiring a pair of commands for every section, only one is needed.

One thing that may have stood out was the use of the command \lstinline{\section*}. All sections in \latex are numbered by default. The asterisk in the command tells \latex that the section shouldn't be numbered.

Another thing to note is the use of \lstinline{\subsection}. This command creates a subsection. It can also use an asterisk to remove the numbering. Subsections can also be nested like so:
```
\begin{lstlisting}
  \section{Your section}
  \subsection{Your subsection}
  \subsubsection{Your subsubsection}
\end{lstlisting}
```
Subsections are nested by chaining the word 'sub' for each level of subsection.

All of these commands are basic \latex commands, but should provide a solid foundation into writing papers with \latex and learning to do more with \latex. Much more can be done with \latex including reports, slideshows, diagrams, and more. More info on LaTeX and further reading material can be found on the LaTeX project's homepage at \href{https://www.latex-project.org/}{https://www.latex-project.org}. This paper's \latex document is provided on the next page as an example.
```
\newpage
\section{This paper as an example}
\lstinputlisting{instructions.tex} % Embeds the source for this paper into the
```

```
    paper
\end{document}
```