Pragmatic LaTeX

Nicholas Lantz

CSM Linux User's Group

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What is LaTeX?

- A typesetting and document preparation system
- Looks better than Word
- Written especially for writing technical reports

Ligatures
LaTeX Vs. Word

- Certain character combinations look awkward together, for example...

find vs. find
fly vs. fly
efficient vs. efficcient

Typesetting Math
LaTeX Vs. Word

- We go to Mines, we all need to typeset mathematical equations for projects, lab reports, etc.
- LaTeXsupports these very nicely, and the output looks much better than the Word equivalent.
- We will discuss how to typeset mathematics later.

$$-\int_0^{2\pi} \frac{kQd\theta}{2\pi\left(a^2+x^2\right)^{3/2}}\left(a\sin\theta\ \hat{j}\right) \quad =0$$

$$-\int_0^{2\pi} \frac{kQ\,d\theta}{2\pi(a^2+x^2)^{3/2}}(a\sin\theta\,\hat{j}) = 0$$

Structure of LaTeX Document

```
\documentclass[letterpaper]{article}

% Package includes here
\usepackage[margin=1in]{geometry}

% Header info here
\title{Example}
\author{Nicholas Lantz}
\date{\today} % Outputs today's date

\begin{document}
\maketitle % Creates title based on header info
% Document goes here....
\end{document}
```

- LaTeX considers all spaces between words equally, so adding extra spaces between words will not increase the spacing in the document.
- Two ways to create a new paragraph in LaTeX
  1. Two newlines (\n)
  2. \par
- Generally, use the two newlines, looks better.
- However, the two wacks can look better inside of the author declaration at the top of the document, or in tables (discussed later).

```
\section{Top-level Section}
\subsection{Sub-section}
\section{Yet Another Section}
```

There are other kinds of sections, like

- part
- chapter
- section
- subsection
- subsubsection
- paragraph
- subparagraph

Document Classes
Writing LaTeX

- Remember the \documentclass{article}?
- "article" is the most common document class I use. Used for short documents
- "Report" has access to the "chapter" section dicussed in the last slide
- "book" has access to the "part" section
- Generally, the document class will change the basic structure of your document and the style of headings, but it will not change much.
- Generally, use "article" for short documents and "report" for long ones.

Common Packages
Writing LaTeX

```
\usepackage[margin=1in]{geometry}
% Used to adjust margins
\usepackage{verbatim}
% adds "comment" environment for long comments
% Allows the displaying of text "verbatim" that the LaTeX p
% will not process
\usepackage{amsmath}
% Allows expanded math features
\usepackage{times}
% Uses Times New Roman font for LAIS classes
\usepackage{setspace}
% Easy double spacing between lines in paragraphs
\usepackage{graphicx}
% Includes images (discussed later)
```

Any other *common* packages I missed?

For all of the below commands, just use the control word and then place the text you want to appear inside of the {}.

Bold Face	\textbf{}
Italics	\textit{}
Emphasized	\emph{}
Roman Text	\textrm{}
Sans Serif Text	\textsf{}
`Monospace Text`	\texttt{}

Ordered	\begin{enumerate}
Unordered	\begin{itemize}
Description	\begin{description}

- Use \item to create new item in the list
- For descriptions, add the description in [] after the \item

Example of Lists
Writing LaTeX

```
\begin{enumerate}
    \item Item 1
    \item Item 2
    \item Item 3
        \begin{enumerate}
            \item
                These can be nested!
        \end{enumerate}
    \item Item 4
\end{enumerate}

\begin{description}
    \item[My Description] Informative Text
\end{description}
```

- Different pieces of the document are placed in different *environments*
- The lists above each began an environment which causes LaTeX to handle commands differently.
- Everything in the document is placed in the document environment
  - That's why it begins with \begin{document}
- Use \begin{} to open an environment and \end{} to close it.

- Math has its own special environment in LaTeX.
- For the most part, it behaves like normal
  - Except, there are different functions than normal text
  - And the typesetting system is different for math
- Two ways to write math:
  1. Inline: Use \(\)
  2. Displayed: Use \[\]

You can also embed math in text...

```
Let \(x=1\) and \(y=2\). As \(t \to \infty\),
\(z\) goes to \(0\).
```

Let $x = 1$ and $y = 2$. As $t \to \infty$, z goes to 0.

```
\begin{displaymath}
    \int_{1}^{\infty} \frac{\pi}{y^2}dy
\end{displaymath}
```

$$\int_1^\infty \frac{\pi}{y^2} dy$$

Nested Fractions

Writing LaTeX

```
\[\frac{\frac{1}{x} \cdot \frac{y}{2}}{(x+y)^2}\]
```

$$\frac{\frac{1}{x} \cdot \frac{y}{2}}{(x+y)^2}$$

```
\[\neg (P \wedge Q) = (\neg P) \vee (\neg Q)\]
\[\neg (P \vee Q) = (\neg P) \wedge (\neg Q)\]
```

$$\neg(P \wedge Q) = (\neg P) \vee (\neg Q)$$

$$\neg(P \vee Q) = (\neg P) \wedge (\neg Q)$$

Getting LaTeX

Arch:	`# pacman -S texlive-most`
Debian/Mint/Ubuntu:	`# apt-get install texlive-full`
Fedora:	`# yum install texlive`
Windows/OS X:	`Follow instructions at https://tug.org`