Introduction to \LaTeX

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Overview

1. What is \LaTeX?

2. Building a document
   - Preamble
   - Document body
   - Environments in action
   - Examples

3. Downloading \LaTeX
\LaTeX\ is an immensely powerful, high-quality typesetting language for mathematical, technical, and scientific documents. It leaves formatting up to document designers and the content up to you. \LaTeX\ can be used to create anything from homework assignments to full-length articles and textbooks, including this presentation.
What’s in the preamble?

1. Document Class - article, book, report, letter, etc.
2. Packages - diagrams, special symbols
3. Page setup - specifying margins, font size, paragraph spacing
4. Author info - name, date, title of presentation
A sample preamble

\documentclass{amsart}
\usepackage{amssymb}
\usepackage[margin=2.5cm]{geometry}
\usepackage{diagrams}
\newtheorem{prop}{Problem}[section]
\title{Algebra Homework}
\author{Shelley Kandola}
What’s in a document body?

1. Sections, subsections, and subsubsections
2. Environments - determine formatting of content
   - theorems, propositions, lemmas
   - itemized and enumerated lists
   - tables
   - equations
   - images
3. Of the form
   \begin{environment}
   content!
   \end{environment}
4. Environments may be nested, but cannot overlap
After the preamble, your document should be structured like the following:

\begin{document}
\maketitle
\end{document}
Environments in Action!
\begin{prop}
$\leq$ is a transitive relation.
\end{prop}

\begin{proof}
If $x \leq y$ and $y \leq z$, then $x \leq z$.
\end{proof}
Verbatim
\begin{align}
ax^2+bx+c & = 0 \\
\frac{-b \pm \sqrt{b^2-4ac}}{2a}& = x
\end{align}

TeX-ed
\[ ax^2 + bx + c = 0 \quad (1) \]
\[ -b \pm \sqrt{b^2 - 4ac} \over 2a = x \quad (2) \]
An equivalence relation is:

- **Reflexive:** $x \sim x$
- **Symmetric:** $x \sim y \implies y \sim x$
- **Transitive:** $x \sim y, y \sim z \implies x \sim z$
<table>
<thead>
<tr>
<th>$P$</th>
<th>$Q$</th>
<th>$P \wedge Q$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$T$</td>
<td>$T$</td>
<td>$T$</td>
</tr>
<tr>
<td>$T$</td>
<td>$F$</td>
<td>$F$</td>
</tr>
<tr>
<td>$F$</td>
<td>$T$</td>
<td>$F$</td>
</tr>
<tr>
<td>$F$</td>
<td>$F$</td>
<td>$F$</td>
</tr>
</tbody>
</table>

Verbatim
\begin{tabular}{cc|c}
$P$ & $Q$ & $P \wedge Q$ \\
\hline
$T$ & $T$ & $T$ \\
$T$ & $F$ & $F$ \\
$F$ & $T$ & $F$ \\
$F$ & $F$ & $F$ \\
\end{tabular}
### Useful symbols

Here are some more mini-examples to introduce you to mathmode, delimited by $ ... $, $$...$$ or \((...\)), \([...\]):

<table>
<thead>
<tr>
<th>Command</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\neq$</td>
<td>$\neq$</td>
</tr>
<tr>
<td>$\alpha \circ \beta(x)$</td>
<td>$\alpha \circ \beta(x)$</td>
</tr>
<tr>
<td>$\mathbb{R}^+, \mathbb{Z}_{\geq 0}$</td>
<td>$\mathbb{R}^+, \mathbb{Z}_{\geq 0}$</td>
</tr>
<tr>
<td>$A \subset B \subsetneq C$</td>
<td>$A \subset B \subsetneq C$</td>
</tr>
<tr>
<td>$\bigcup_{i \in \mathcal{I}} U_i$</td>
<td>$\bigcup_{i \in \mathcal{I}} U_i$</td>
</tr>
<tr>
<td>$\forall x \in \mathbb{R}, \exists \epsilon &gt; 0$</td>
<td>$\forall x \in \mathbb{R}, \exists \epsilon &gt; 0$</td>
</tr>
<tr>
<td>$\lim_{x \to 0} \frac{\sin(x)}{x}$</td>
<td>$\lim_{x \to 0} \frac{\sin(x)}{x}$</td>
</tr>
</tbody>
</table>
A homework document might look like...

\begin{document}
\maketitle
\section{\S 12.6}
\begin{enumerate}
\item[2a] Here is the problem.
\begin{proof}
And here is my solution.
\end{proof}
\item[17] Here’s the next problem.
\begin{proof}
And here’s my solution.
\end{proof}
\end{enumerate}
\end{document}
... and display like...

ALGEBRA HOMEWORK

SHELLEY KANDOLA

1. §12.6

2a. Here is the problem.

Proof. And here is my solution.

17 Here’s the next problem.

Proof. And here’s my solution.
What you need

To create $\LaTeX$ documents, you need both a TeX distribution and an editor/compiler to make the PDFs, of which there are dozens to choose from.

**TeX distributions**
- TeX Live
- MacTeX
- proTeXt
- MiKTeX

**TeX Editors**
- TeXworks
- Eclipse (plugin TeXlipse)
- LatexLab
- Notepad++
- Texmaker
- WinShell
The End