Intermediate \LaTeX\ I

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Overview

- The \texttt{geometry} Package
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- Equation Environments
- Theorem Environments
- List Environments
- Tabular Environments
- Miscellaneous Packages
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The geometry Package

- The geometry package is used to easily set margins in a LaTeX document.
- The complete documentation is available online in:
  `/usr/share/texmf/doc/latex/geometry/geometry.dvi`
- The simplest use is:
  ```latex
  \usepackage{geometry}
  \geometry{left=1in,right=1in,top=1in,bottom=1in}
  ```
- This will set up 1 inch margins for the whole document.
- Note that this package has problems working with ams* document classes.
Aliases

- You have the capability to redefine complicated LaTeX expressions so they can be accessed with a simpler command.
- I usually define a group of these commands, put them between the `\usepackage{...}` and the `\begin{document}` statements.
- Note that defining commands like this, one has to be judicious in choice of names so as not to conflict with existing LaTeX commands.
Aliases, contd.

- For example

\newcommand{\A}{{\mathcal A}}
\newcommand{\D}[1]{{\mathbb #1}}% Doubled -Blackboard bold
\newcommand{\NN}{{\D{N}}}
\newcommand{\RR}{{\D{R}}}
\newcommand{\Rn}{{\D{R}^n}}
\newcommand{\Rnp}{{\D{R}^n_+}}
\newcommand{\Rnm}{{\D{R}^{n-1}}}

- The following \LaTeX snippet

\begin{verbatim}
\newcommand{\A}{{\mathcal A}}
\newcommand{\D}[1]{{\mathbb #1}}% Doubled -Blackboard bold
\newcommand{\NN}{{\D{N}}}
\newcommand{\RR}{{\D{R}}}
\newcommand{\Rn}{{\D{R}^n}}
\newcommand{\Rnp}{{\D{R}^n_+}}
\newcommand{\Rnm}{{\D{R}^{n-1}}}
\end{verbatim}

would produce

\[ \mathcal{A} \quad \mathbb{N} \quad \mathbb{R} \quad \mathbb{R}^n \quad \mathbb{R}_+ \quad \mathbb{R}^{n-1} \]
Equation Environments

If you are going to typeset mathematics of any kind, you should be familiar with these documents. I defer discussion of Equation Environments to these documents.

- Chapter 8 of the \LaTeX{} Companion. Note that a postscript version of this chapter only exists online and can be found at:
  
  http://www.loria.fr/services/tex/texbib/ch8.ps.gz

- AMS \LaTeX{} Users Guide is available at:
  

- Another AMS guide to typesetting math is at:
  
Theorem Environments

• You need to include the `amsthm` package.

• A nice short guide to the AMS theorem environments is at:


• There are three built in `theoremstyles` (you can design your own if you really get ambitious). These are:
  • plain
  • definition
  • remark
Here is a sample of what I put in my \LaTeX documents between the `\usepackage{...}` and the `\begin{document}` statements.

<table>
<thead>
<tr>
<th>Environment</th>
<th>Command</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theorem</td>
<td><code>\newtheorem{thm}{Theorem}[section]</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem*{thmn}{Theorem}</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem{prop}[thm]{Proposition}</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem{lemma}[thm]{Lemma}</code></td>
</tr>
<tr>
<td>Definition</td>
<td><code>\newtheorem{defn}[thm]{Definition}</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem*{defnn}{Definition}</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem{ques}{Question}[section]</code></td>
</tr>
<tr>
<td>Remark</td>
<td><code>\newtheorem{rem}[thm]{Remark}</code></td>
</tr>
<tr>
<td></td>
<td><code>\newtheorem*{remn}{Remark}</code></td>
</tr>
</tbody>
</table>
Theorem Env., contd.

- Note that after each theoremstyle statement, the theorem environments which are going to use that particular style are then defined.
- Note that non numbered theorem environments are indicated by the `\newtheorem*` commands.
- Note that numbering of the `thm` is tied to sections, i.e., whenever a new section is defined the counter for the next `thm` will be set to 1.
- Note that other theorem environments can be tied to the `thm` numbering (within section) or can be numbered independent of other theorem environments.
The following snippet

\begin{thm}
The real line $\mathbb{R}$ is a complete metric space.
\end{thm}
\begin{proof}
Exercise.
\end{proof}

produces

**Theorem 0.1.** *The real line $\mathbb{R}$ is a complete metric space.*

*Proof.* Exercise. \qed
The following snippet

\begin{defn}
Two sets are \emph{equal} if they contain exactly the same elements.
\end{defn}

\begin{remn}
This is the \textbf{remark} theorem style (not numbered).
\end{remn}

produces

**Definition 0.2.** Two sets are \textit{equal} if they contain exactly the same elements.

**Remark.** This is the \textbf{remark} theorem style (not numbered).
List Environments

- There are three main list environments one uses in LaTeX.
  - itemize
  - enumerate
  - description
- List environments can be nested (Don’t go more than 4 levels though).
- The itemize environment does not number the items.
- The enumerate environment does number the items. In addition, the style of the numbering can be changed at specific numbering levels.


Lists, contd.

The following snippet

\begin{itemize}
\item First Item
  \begin{itemize}
  \item First Subitem
  \end{itemize}
\item Second Item
\end{itemize}

produces

- First Item
  - First Subitem
- Second Item
Lists, contd.

The following snippet

\begin{enumerate}
\item First Item
  \begin{enumerate}
  \item First Subitem
  \end{enumerate}
\item Second Item
\end{enumerate}

produces

1. First Item
   (a) First Subitem
2. Second Item
Lists, contd.

The following snippet

\renewcommand{\theenumi}{\Roman{enumi}}
\renewcommand{\theenumii}{\Alph{enumii}}
\renewcommand{\labelenumi}{\bf \theenumi.}
\renewcommand{\labelenumii}{\bf \theenumii).}
\begin{enumerate}
\item First Item
  \begin{enumerate}
  \item First Subitem
  \end{enumerate}
\item Second Item
\end{enumerate}

produces

I. First Item
   A). First Subitem
II. Second Item
Lists, contd.

The following snippet

\begin{description}
\item[Tip] Don’t go out in the rain without an umbrella.
\item[Soaked] Ignore the previous tip.
\end{description}

produces

**Tip**  Don’t go out in the rain without an umbrella.

**Soaked**  Ignore the previous tip.
Tabular Environments

- There are various forms of tables one can create in \LaTeX, where one needs to keep in mind the following:
  - Is the table going to be referenced in the document? If so, nest the `tabular` environment within the `table` environment and include a label and optionally a caption.
  - Is the table going to extend longer than one page? If so, use either the `supertabular` or `longtable` packages.
  - How are the columns going to be formatted? Is a column going to be centered, left justified, right justified, or paragraph with word wrap of what width?
Are there really special concerns, such as embedding graphics, etc.? Talk to me! Consider the following code segment

```
\begin{center}
\begin{table}
\begin{tabular}{|l|r|p{1in}|c|}
\hline
{\bf Left} & {\bf Right} & {\bf Par} & {\bf Center} \\
\hline
A & B & This is a paragraph which is long. & C \\
\hline
11 & 22 & & 44 \\
\hline
A & B & This is a paragraph which is long. & C \\
\hline
11 & 22 & & 44 \\
\hline
A & B & This is a paragraph which is long. & C \\
\end{tabular}
\caption{Small Table}
\label{tab:1}
\end{table}
\end{center}
```
Tables, contd.

which produces

<table>
<thead>
<tr>
<th>Left</th>
<th>Right</th>
<th>Par</th>
<th>Center</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>This is a paragraph which is long.</td>
<td>C</td>
</tr>
<tr>
<td>11</td>
<td>22</td>
<td></td>
<td>44</td>
</tr>
</tbody>
</table>

Table 1: Small Table

It should be noted that preferred table placement is specified in the \begin{table}[!htb] command, with \textit{h} meaning try \textbf{here}, \textit{t} meaning \textbf{top} of page, \textit{b} meaning \textbf{bottom} of page. The \texttt{!} means ignore most default restrictions.
Miscellaneous Packages

The following packages are quite nice for specific purposes:

- **float** - allows more specific placement of floats (tables and figures).
  
  `/usr/share/texmf/doc/latex/styles/float.dvi`

- **array** - enhances existing *array* and *tabular* environments.
  
  `/usr/share/texmf/doc/latex/tools/array.dvi`

- **multicol** - allows multiple columns.
  
  `/usr/share/texmf/doc/latex/tools/multicol.dvi`

- **algorithms** - typeset algorithms in a nice manner.
  
  `/usr/share/texmf/doc/latex/styles/algorithms.dvi`
Miscellaneous Packages

- **fancyhdr** - control over page headers and footers.
  /usr/share/texmf/doc/latex/fancyhdr/fancyhdr.dvi

- **fancyvrb** - improves on *verbatim* environment.
  /usr/share/texmf/doc/latex/fancyvrb/fancyvrb.ps

- **seminar** - slide presentations (nice and simple).
  /usr/share/texmf/doc/latex/seminar/sem-user.dvi

- **prosper** - slide presentations (almost Powerpoint, built on seminar package).
  http://prosper.sourceforge.net/prosper.html

A very comprehensive list of packages exists at:
http://tex.loria.fr/english/packages.html and
http://www.ctan.org/
Font Sizes

Table 2: Fonts.

| \textit{...} | roman | \textsl{...} | sans serif |
| \texttt{...} | typewriter | \textbf{...} | bold face |
| \textmd{...} | medium | \textit{...} | italic |
| \textup{...} | upright | \textsc{...} | SMALL CAPS |
| \textsl{...} | slanted | \textnormal{...} | document font |

Table 3: Font Sizes.

| \tiny | tiny font | \Large | larger font |
| \scriptsize | very small font | \LARGE | very large font |
| \footnotesize | quite small font | \huge | huge |
| \small | small font | \Huge | largest |
| \normalsize | normal font | |
| \large | large font | |

Table 4: Absolute Point Sizes in Standard Classes.

| size | 10pt (default) | 11pt option | 12pt option |
| \tiny | 5pt | 6pt | 6pt |
| \scriptsize | 7pt | 8pt | 8pt |
| \footnotesize | 8pt | 9pt | 10pt |
| \small | 9pt | 10pt | 11pt |
| \normalsize | 10pt | 11pt | 12pt |
| \large | 12pt | 12pt | 14pt |
| \Large | 14pt | 14pt | 17pt |
| \LARGE | 17pt | 17pt | 20pt |
| \huge | 20pt | 20pt | 25pt |
| \Huge | 25pt | 25pt | 25pt |
Loose Ends

- There is much I have not covered, yet there are many references on the web. I suggest downloading and reading one of the many. A couple of good ones are:
  - http://www.loria.fr/services/tex/general/lshort2e.pdf
  - http://www.loria.fr/services/tex/general/gentle.dvi
Loose Ends

- When faced with a LaTeX problem, go to google and do a search with first word latex, followed by other keywords. Depending on what google finds, I may click on the groups tab to go to newsgroup articles and discussions related to my initial query. Someone else may have already solved my problem!
- Use brackets \{ \} extensively when working with LaTeX.
- Next workshop will cover graphics and bibliographies in LaTeX.