Intermediate LaTeX I

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Overview

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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

```
\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

```
$$ \A \quad \NN \quad \RR \quad \Rn \quad \Rnp \quad \Rnm $$
```

would produce

$$\mathcal{A} \quad \mathbb{N} \quad \mathbb{R} \quad \mathbb{R}^n \quad \mathbb{R}^n_+ \quad \mathbb{R}^{n-1}$$

Equation Environments

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

  `ftp://ftp.ams.org/pub/tex/doc/amsmath/amsldoc.pdf`

- Another AMS guide to typesetting math is at:

  `ftp://ftp.ams.org/pub/tex/doc/amsmath/short-math-guide.pdf`

Theorem Environments

- You need to include the `amsthm` package.
- A nice short guide to the AMS theorem environments is at:

  `ftp://ftp.ams.org/pub/tex/doc/amscls/amsthdoc.pdf`

- There are three built in *theoremstyles* (you can design your own if you really get ambitious). These are:
  - plain
  - definition
  - remark

Theorem Env., contd.

- Here is a sample of what I put in my LaTeX documents between the `\usepackage{...}` and the `\begin{document}` statements.

```
\theoremstyle{plain}
\newtheorem{thm}{Theorem}[section]
\newtheorem*{thmn}{Theorem}
\newtheorem{prop}[thm]{Proposition}
\newtheorem{lemma}[thm]{Lemma}

\theoremstyle{definition}
\newtheorem{defn}[thm]{Definition}
\newtheorem*{defnn}{Definition}
\newtheorem{ques}{Question}[section]

\theoremstyle{remark}
\newtheorem{rem}[thm]{Remark}
\newtheorem*{remn}{Remark}
```

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.

Theorem Env., contd.

The following snippet

```
\begin{thm}
The real line $\RR$ 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. □

Theorem Env., contd.

The following snippet

```
\begin{defn}
Two sets are {\em equal} if they contain exactly the
 same elements.
\end{defn}
\begin{remn}
This is the {\bf remark} theorem style (not numbered).
\end{remn}
```

produces

Definition 0.2. Two sets are *equal* if they contain exactly the same elements.

Remark. This is the **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 **c**entered, **l**eft justified, **r**ight justified, or **p**aragraph with word wrap of what width?

Tables, contd.

Are there really special concerns, such as embedding graphics, etc.? Talk to me! Consider the following code segment

```
\begin{center}
\begin{table}[!htb]
\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
\end{tabular}
\caption{Small Table}
\label{tab:1}
\end{table}
\end{center}
```

Tables, contd.

which produces

Left	Right	Par	Center
A	B	This is a paragraph which is long.	C
11	22		44

Table 1: Small Table

It should be noted that preferred table placement is specified in the `\begin{table}[!htb]` command, with *h* meaning try **here**, *t* meaning **top** of page, *b* meaning **bottom** of page. The *!* 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.

`\textrm{...}`	roman	`\textsf{...}`	sans serif
`\texttt{...}`	`typewriter`		
`\textmd{...}`	medium	`\textbf{...}`	**bold face**
`\textup{...}`	upright	`\textit{...}`	*italic*
`\textsl{...}`	*slanted*	`\textsc{...}`	SMALL CAPS
`\emph{...}`	*emphasized*	`\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 .