

Math 491: Sectioning, Figures, Labels, References and Bibliographies

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Outline

- 1 Sectioning
- 2 Adding Figures
- 3 Adding a Title Page, a Table Contents, and a List of Figures
- 4 Labels
- 5 Referencing Labels
- 6 Bibliographies

Adding Sectioning to a Document

\LaTeX has several commands built in that help to organize longer documents into different sections. The most common of these commands are as follows:

- `\part{name of part}`
- `\chapter[shorter name]{full name of chapter}`
- `\section{name of section}`
- `\subsection{name of subsection}`
- `\subsubsection{name of subsubsection}`
- `\paragraph{paragraph heading}`
- `\subparagraph{subparagraph heading}`

Adding Sectioning to a Document

Notes:

- Parts, chapters, section, subsections, and subsections are numbered within the document.
- Paragraphs and subparagraphs are not numbered, but, like the other categories, they are given a bold heading. Smaller categories get smaller heading fonts.
- All these commands are built into the article document class, with the exception of the chapter command, which is used in the report document class.



Theorem-Like Environments

- \LaTeX has several pre-defined *environments* that allow us to quickly typeset theorems or theorem-like structures, without having to manually set the typeface and numbering ourselves.
- Environments start with the command:
 $\text{\begin\{environment name\}}$
and end with the command:
 $\text{\end\{environment name\}}$.



Theorem-Like Environments

- One such command in \LaTeX is:
`\newtheorem{Theorem name}{theorem title}`
- In this command, ‘Theorem name’ is the name used to call the environment.
- ‘Theorem title’ is the title or name that is actually printed (along with with a “counter”) when the document is compiled.



Theorems, continued

- \LaTeX keeps track of the numbering Theorems (and other similar environments) for you.
- When you add or remove theorems, the numbering throughout the document is automatically updated when you recompile.
- When used, reference labels will also be automatically updated.



Theorems, continued

- There is an optional argument that gives theorems titles of the form **Theorem 4.2** (here the 4 refers to some outside counter, like a chapter, and the 2 means that it is the second numbered theorem within that chapter).
- The syntax is:
`\newtheorem{thm2}{Theorem}[enumi]`
where `enumi` is the counter being used
(in this case, the first level of an enumerate environment).



Theorems, continued

If you don't want to take the time to define environments yourself, you can use the `amsthm` package.

- Along with the standard environments, this package defines a `newtheorem*` version, used for unnumbered theorems
- It also defines three environment styles:
 - plain (bold title, then italics in the body)
 - definition (bold title, then normal text in the body)
 - remark (italicized title, then normal text in the body)
- You can still manually define other theorem styles beyond those defined by the `amsthm` package.



Theorems, continued

- The “amsthm” package also defines the `\swapnumbers` command (in preamble before any `\newtheorem` commands), which puts the numbers *before* the theorem (as in: **1 Theorem**).
- Finally, it defines a proof environment (`\begin{proof}` `\end{proof}`). This environment:
 - is unnumbered
 - it starts with *Proof*
 - it ends with: □.

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Placing Labeled Figures in a Document:

- Another nice feature that is built into \LaTeX is the ability to include figures in the body of a document.
- The the `\includegraphics` command can be used include image files of various types into a document (be sure to call the `graphicx` package in the preamble of your document).
- Designating an image file as a figure allows the \LaTeX compiler some flexibility in where the figure is placed within the final compiled page.
- It also allows us to give the figure a label and to include it in list of figures at the beginning of the document.
- Here is the syntax for inputting a figure:

```

\begin{figure}[location: h, t, b, or p]
\begin{center}
\includegraphics[sizing command]{name of image file}
\end{center}
\caption{whatever caption you want underneath the figure}
\label{fig:<reference name for figure>}
\end{figure}

```

Placing Labeled Figures in a Document:

Notes:

- The location designations are as follows:
 - h (“here”): place the figure as close to the current location as possible.
 - t (“top”): place the figure toward the top of the page.
 - b (“bottom”): place the figure toward the bottom of the page.
 - p (“page”): place the figure on its own page.
- The caption can also be placed above the figure. Just move the caption commands so it is before the centering command.
- A figure can also be placed flushleft or flushright on a page, although this often ends up looking a bit silly.

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Creating a Title Page:

- To create a Title Page do the following:
 - Use the “title” command to add a title for your document.

```
\title{title text}
```

- Use the “author” command to add the author information.

```
\author{name (or add \\ name 2, etc)}
```

- Use the “date” command to add a date other than the current date (If this step is skipped, the current date will be supplied).

```
\date{enter desired date}
```

- Then type the following command at the very beginning of your document:

```
\maketitle
```

Creating a Table of Contents and a List of Figures:

- To create a table of contents, just type the following command at the beginning of your document:

```
\tableofcontents
```

- To create a list of figures in the document, just type the following command at the beginning of your document:

```
\listoffigures
```


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Creating Labels

The syntax for labeling a numbered object is: `\label{NameOfLabel}`

- Labeling can be done anywhere within the body of the environment you are labeling.
- Labels for objects at lower (or higher) “levels” must be placed at the appropriate “level”.
- You are **Strongly** encouraged to put the labels **immediately** after the command that makes the object you are labeling.
- The name you give you label can be whatever you want it to be.
- It is common, especially in long documents, to use something like: `\label{Fig:NameOfFigure}` or `\label{Chap:NameOfChapter}`.
- Using this syntax, the names are just easier to remember (but longer to type).
- The name you use **never** appears in your final document.

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Referencing Labels

- When we reference a label, the compiler will insert the number associated with the object we previously labeled in the place where we type the reference command.
- Note that **only** the number will be inserted. We will usually add our own accompanying text to smooth out the phrasing of the reference. For example, we may want to use phrases like:
 - “In Chapter 1,…”
 - “...back in Section 4.2, ...”
 - “...as we see in Figure 4.3...”
 - “...using Theorem 1.2 ...”
 - “...as in part (b) above ...”

Referencing Labels

- Specific labels are referenced using the command: `\ref{NameOfLabel}`.
- Note that you will need to run \LaTeX **twice** in order for the labels to appear correctly.
- \LaTeX will show *warnings* (**not** errors) when the labeling doesn't work.
- For this reason, when we compile, we may need to read the log file a bit more carefully when we are using labels and references.
- If a reference is bad, ?? will appear in place of the label in your final document.

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Building Bibliographies

- \LaTeX has a related program called BibTeX that will automatically build bibliographies, including their references within a document.
- BibTeX requires both a *separate* file with a .bib extension and using the BibTeX build command as well as \LaTeX .
- The BibTeX entries look somewhat complicated, but mathematicians, being who we are, have worked to make life easier...

Creating the .bib file

One nice way to get .bib entries in the correct format is to obtain them from MathSciNet:

MathSciNet is a fairly comprehensive reference archive for articles in mathematical journals. (Use it on campus – it is not free!)

(1) Go to MathSciNet:

<http://www.ams.org/mathscinet/search.html>

(2) Do a **publications** search by typing in the name of your favorite author (Fulghesu).

(3) Check the first box (for an article published in 2018).

(4) In the pull-down menu, change it to: Citations (BibTeX).

(5) Choose: Retrieve Marked.

(6) You can then copy and paste this into your .bib file.

Creating .bib entries

There are several different types of bibliographic entries. Standard ones are:

- article (requires: author, title, journal, year)
- book (requires: author or editor, title, publisher, year)
- inbook (requires: author or editor, title, chapter and/or pages, publisher, year)
- misc (optional: author, title, howpublished, month, year, note, key (for alphabetizing))

For a fuller list, and other detailed information, see:

<http://bibliographic.openoffice.org/bibtex-defs.html>

Hints for the .bib file

The Citation Key

- The Key comes after the typed entry. (`@ARTICLE{CitationKey}`)
- MathSciNet gives each article a unique key, but it is not very handy reference.
- Typically, we will change this to a tag that is easier to remember and reference. For example, Fulghesu2018.

Any field in a .bib reference that is neither required nor optional is ignored - so you may include whatever you want in your .bib entries.

Using the .bib file

- To refer to one of our bibliographic references in a document, we use the command:
 - `\cite{CitationKey}`

To generate a bibliography, at the very end of your .tex file (just prior to the `\end{document}`), add the following commands:

```
\bibliographystyle{plain}
```

```
\bibliography{NameOfBibFile} (Do not include the .bib extension in the file name.)
```

Running BibTeX

- You will need to compile your main document four times:
 - 1 Run \LaTeX (regular build)
 - 2 Run BibTeX (from the pull-down menus: Build - Current File - BibTeX)
 - 3 Run \LaTeX
 - 4 Run \LaTeX

Running BibTeX, continued

- Note that in the bibliography in your final document, only those papers actually cited appear.
- Your .bib file can contain (and often does) any paper you've ever referenced. You just continue adding references as needed.
- Try bibliographystyles of plain, alpha, etc.
- More bibliographystyles, and examples of how they format the various types of documents, can be found on the web.
- You might also want to investigate the commands `\begin{thebibliography}` and `\bibitem` for use without a .bib file.