Math 290: LaTeXSeminar Week 11

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Outline

Creating Labels

- Two weeks ago, we looked at how to add figures to a document written using the "report" class.
- As part of that week's lesson, we discussed how to label each figure and how to refer to labels in a document.
- This week, we will see that references can be used in a much wider variety of settings. In fact, we can label pretty much any "numbered" object.
- The main reason to use labels and references is so that we do not have to manually type the numerical reference.
- Also, if objects of the same type are ever added or removed, the numbering of the reference will automatically be updated for us when we compile.

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 the syntax: `\label{fig:NameOfFig}` or `\label{chap:NameOfChap}`.
- Using this syntax, the names are just easier to remember (but longer to type).
- The name you use **never** appears in your final document.

Practicing With Labels

- Go to the course website and download the Week 11 Practice Examples File.
- Save this file in the same folder as your other example documents.
- Paste the contents of this file into an empty document in TeXnicCenter.
- Then, go through the document and add labels to:
  - A Chapter
  - A Section
  - A Subsection
  - A Theorem
  - A Figure
  - An enumerated item

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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.

Referencing Labels

- Put references to each of the labels you previously defined in your sample document.
- Add additional text as needed to make the references read reasonably well.
- Notes:
  - References to a subsection will have the form "2.3.2"
  - References don't seem to interact well with "parts" (you may not get the part number as part of your reference).
  - When referencing things in an enumerate environment, you don't get the chapter, section, etc., numbers. Only the part within the enumerate environment.

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The Varioref Package

- In larger documents, we may want to add page numbers to our internal references.
- This would allow us to have references like:
  "In figure 12.2 on page 12..."
- The "varioref" package will allow us to create references with page numbers.
- Exercise:
  - Add the command: `\usepackage{varioref}`
  - Change every `\ref{...}` into `\vref{...}`
  - Note: Control-h brings up the "find and replace" box in TeXnicCenter.

The Varioref Package

Notes: The vref command

- Automatically gives correct and updated page numbers in references.
- For references immediately before or after the current page, it will say "on the previous page" or "on the next page".
- It will not bother to give a page number if the object it is referencing is on the same page.

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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 **citations** search on your favorite author (Goyt).
(3) Click on Goyt's name.
(4) Check all of the boxes.
(5) In the pull-down menu, change it to: Citations (BibTeX).
(6) Choose: Retrieve All.
(7) Copy-and-paste to a separate file in TeXnicCenter.
(8) Save that file as a .bib file, such as Author.bib.

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, Goyt2008 or Goyt2009a.

Note: LaTeX will change capitalizations for you.

- This is why you see Dr. Goyt's paper title including the name: {F}ibbonaci.
- The curly brackets tell LaTeX not to change the capitalization.

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}`
- Practice by adding a citation referencing one of the papers in the .bib file.

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.