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## An Introduction to the Basics of L<sup>A</sup>T<sub>E</sub>X

### 1 What is L<sup>A</sup>T<sub>E</sub>X?

L<sup>A</sup>T<sub>E</sub>X is an open source markup language that uses the T<sub>E</sub>X typesetting engine to compile professionally formatted documents of several varieties. It is useful for weekly assignments, seminar papers, as well as conference and journal submission pieces. L<sup>A</sup>T<sub>E</sub>X allows the use of mathematical equations and symbols as well as automatically formats tables and figures within your document, providing quality results that mainstream word processing software is much less proficient at producing. Many users have made additions to the basic L<sup>A</sup>T<sub>E</sub>X distribution, such as extensive-form game packages for game theoretic models. There are many available text editors for L<sup>A</sup>T<sub>E</sub>X; I like **Texmaker**, a free cross-platform editor with a built-in PDF viewer. The code here is not particular to the editor, but universal to all L<sup>A</sup>T<sub>E</sub>X processors.

### 2 How to get L<sup>A</sup>T<sub>E</sub>X

- L<sup>A</sup>T<sub>E</sub>X for the Mac can be found here: <http://www.tug.org/mactex>
- L<sup>A</sup>T<sub>E</sub>X for Windows can be found here: <http://miktex.org/>

The internet also provides many useful solutions for many of the problems you may observe while using L<sup>A</sup>T<sub>E</sub>X. The following websites are especially helpful:

- L<sup>A</sup>T<sub>E</sub>X FAQ site: <http://www.tex.ac.uk>
- L<sup>A</sup>T<sub>E</sub>X online introduction for beginners: <http://mirrors.ibiblio.org/pub/mirrors/CTAN/info/beginlatex/html>

Additionally, Kopka and Daly (2004) is a great reference volume; searching this PDF for keywords is an excellent remedy for both forgetfulness and new techniques. A persistent link to this volume as a PDF is [http://dl.dropbox.com/u/26262472/a\\_guide\\_to\\_latex.pdf](http://dl.dropbox.com/u/26262472/a_guide_to_latex.pdf) More materials can be made available upon request.

### 3 Document Elements and Basic Techniques

Most documents you will be creating use the “article” class, and the associated *preamble* containing `\usepackage{...}` commands. I have supplied you (on my webpage) with a template that I use for seminar papers. It contains `\maketitle`, which creates a professional header for your paper, and `\begin{abstract}` which is the *environment* that you type in your abstract. L<sup>A</sup>T<sub>E</sub>X will typeset an abstract in the appropriate place for you. Environments require a `\begin{...}` and a `\end{...}` command. Other environments you may use are *table* and *figure*. The command `\section{...}` allows separate sections for different parts of a paper, such as an introduction, theory, method, or the like.

There are a few basic techniques that I encourage you to use while learning the L<sup>A</sup>T<sub>E</sub>X language.

1. Create a folder for each project you begin, as the T<sub>E</sub>X compilation process creates many files.
2. Use a PDF viewer to search the Kopka and Daly (2004) text for keywords. This could be a command such as `\cite` or a word such as “references.” Google searches should begin with “latex” and include keywords or commands.
3. Practice often; use for all types of assignments until you are comfortable with the conventions of L<sup>A</sup>T<sub>E</sub>X, such as quotation marks and the math operator, “ $”$  as well as the new line operator, “`\`”

4.  $\text{\LaTeX}$  documents are great teachers; seeing the result in the PDF of a  $\text{\LaTeX}$  document and referring to the corresponding “code” is a quick way to learn.

## 4 Creating a Bibliography

One of the most useful tools that  $\text{\LaTeX}$  provides is automated bibliography construction. Any time you use the `\cite{...}` or `\citep{...}` or `author \citeyear{...}` it will add that citation to your references list. This only works, however, with an external citations library.

I like JabRef, a free cross-platform program included with the Mac  $\text{\TeX}$  distribution, and keep all of my citations, often with PDF’s attached, in one bibliography file located in my work folder. On the mac, you can place your bibliography file here: `~/Library/texmf/bibtex/bib/` and regardless of where your document is, it will look in this folder for your bibliography file. Otherwise, it will look in the directory where your document lives. On the PC, using MikTeX, you can put your bibliography file in `C:\Program Files\MikTeX 2.9\bibtex\bib\` (or use the appropriate path to where MikTeX lives).

Below is a sample bibliography, calling `\bibliography` for the citation above. Often this is where users run into problems; the most common remedies are ensuring that the file path to your “.bib” file is correct, When using some editors, it is necessary to **typeset in  $\text{\LaTeX}$  once, then BIB $\text{\TeX}$  once, then  $\text{\LaTeX}$  twice more**. This is *really* important. Or, you can “build” in Texmaker by pressing F1 or building the document.

## References

Kopka, Helmut and Patrick W. Daly. 2004. *A Guide to LaTeX and Electronic Publishing*. Fourth ed. Addison-Wesley.

## 5 Tables and Figures

This is likely the most powerful ability of the  $\text{\TeX}$  engine. Tables are rendered with professional journal exactness. The many intricacies of tables are best left for another conversation; in many simpler cases their contents can be directly captured from your statistical package output screen. Tables are created the same way Figures are, so only one example will be given here.

To add a PDF of some figure, be it a pre-assembled table or a linear model graph, the PDF image must be in your project folder. Then, using the `\figure` environment and `\includegraphics` you can bring in your graph, evidenced by Figure 1.

Figure 1: A Simple Sample

