

Introduction to LaTeX

Slides adapted from Byungwon Woo

What is LaTeX?

- LaTeX is pronounced “lay-tech” or “lah-tech,” not “la-teks.”
- LaTeX is a document preparation system for high-quality typesetting.
- LaTeX is most often used to produce technical or scientific documents, but it can be used for almost any form of publishing.

Why Use LaTeX?

- Designed by academics and easily accommodates academic use.
- Professionally crafted predefined layouts make a document really look as if “printed.”
- Mathematical symbols and equations are easily integrated.
- Even complex structures such as footnotes, references, table of contents, and bibliographies can be generated easily.
- Forces author to focus on the content of a document.
- Creates more beautiful documents.
- Portable, compatible, flexible.

fire flower fjörd

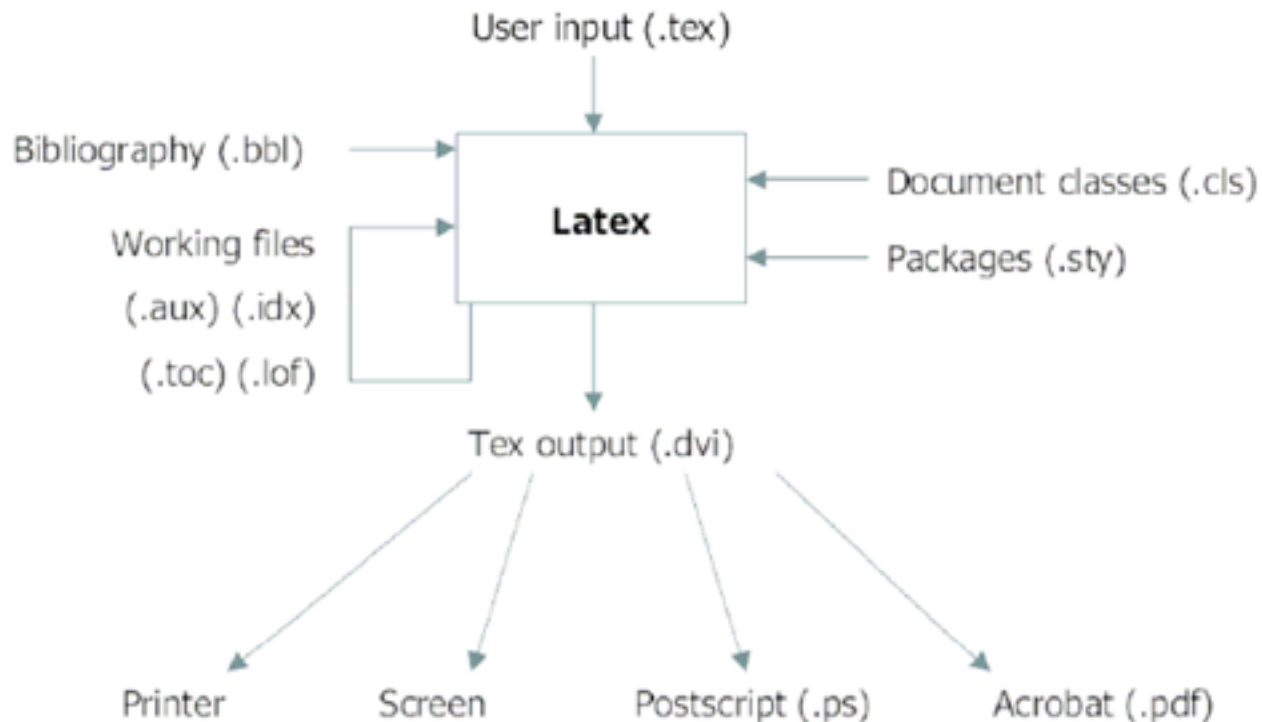
fire flower fjörd

Table

Table

Images from Dario Taraborelli's Blog

The Mechanisms of “TeXing”



Installing LaTeX

- In Windows (CTex, 中文的)
- MiKTeX
 - MiKTeX is a typesetting system for the Windows.
 - Download from www.miktex.org for free
 - It is generally recommended to install MiKTeX first, then WinEdt.
- WinEdt
 - WinEdt is a text editor.
 - WinEdt creates the source file (.tex and others).
 - Download from www.winedt.com for free for 30 days.
 - WinEdt costs \$30.

Installing LaTeX

- Other text editors
 - There are other text editors.
 - Winshell for free (<http://www.winshell.de/>)
 - Scientific Workplace
 - Combination of LaTeX and Mathematics program
 - Does a good job of calculating and graphing, very user friendly, but expensive
- In Mac
- TexShop + TexMaker
 - Download for free
<http://www.uoregon.edu/~koch/texshop/>
 - Includes everything!

DIY

Writing My First L^AT_EX Article

Byungwon Woo

June 8, 2009

Abstract

My first article written in L^AT_EX(or L^AT_EX) using WinEdt.

1

1 Introduction

Both ARMA and ARIMA model specifications and technologies have been useful to political scientists.

Economists argue that certain processes “inherit” their fractional integration properties from the exogenous forces that affect them.¹ Such a theory, which begs the question of why the exogenous variables are themselves fractionally integrated, is used in the literature on multivariate models for fractional cointegration in which certain time series are predicted to move together over time (Cheung & Lai 1993).

2 Fractional Integration

To model such long-range persistence, analysts can use an ARFIMA model in which the fractionally integrated time series is represented as:

$$\phi(L)(1-L)^d x_t = \theta(L) \epsilon_t$$

2.1 Diagnostic Tests

Although they cannot precisely pinpoint the degree of integration in a time series, we begin our analysis with a brief look at the conclusions we reached on the basis of diagnostic tests of the macropartisanship, consumer sentiment, and presidential approval² series.

Table 1: Summary of Conclusions from Diagnostic Tests

	Macropartisanship	Consumer Sentiment	Presidential Approval
Joint F test	$d = 1$	$d = 1$	$d = 0$
VR test	$0 < d \leq 1$	$d = 1$	$0 < d \leq 1$

¹If you do not understand the text of this example, that is totally OK.

²Because of the controversy surrounding the properties of presidential approval(Ostrom & Smith 1993, Beck 1993), we emphasize the properties of the untransformed series.

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References

- Beck, Nathaniel. 1993. “The Methodology of Cointegration.” *Political Analysis* 4:237–48.
- Cheung, Yin-Wong & Kon S. Lai. 1993. “A Fractional Cointegration Analysis of Purchasing Power Parity.” *Journal of Business and Economic Statistics* 11:103–12.
- Ostrom, Charles W., Kr. & Renee M. Smith. 1993. “Error Correction, Attitude Persistence, and Executive Rewards and Punishments: A Behavioral Theory of Presidential Approval.” *Political Analysis* 4:127–84.

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Basic Document Structure

- The format of a document is pretty simple.
 - In the preamble
 - Documentclass
 - Packages
 - In the front matter
 - Title/author
 - In the body
 - Contents
 - In the back matter
 - bibliography

In the Preamble

- You specify your document class.
 - Document classes: letter, article, report, book, slides(beamer, prosper)
 - `\documentclass[12pt]{article}`
 - Backslash – at the beginning of text markup command
 - Packages: numerous packages are available
 - `\usepackage[margin=1in]{geometry}`
 - `\usepackage{setspace}`
 - `\usepackage{harvard}`

WinEdt - [C:\Users\woo.54\Desktop\Example.tex]

File Edit Search Insert Document Project Tools Macros Accessories Options Window Help

Math Greek Symbols International Typeface Functions(x) ... { } ... <=> ... +/- ... --> ... AMS AMS =<> AMS NOT =<>

Σ Π \prod f ϕ \cap \cup \hat{a} \check{a} \grave{a} \acute{a} \grave{a} \tilde{abc} \hat{abc} \overleftarrow{abc} \overrightarrow{abc} \overline{abc} \overbrace{abc} x^k **N** **B** **B**
 \sqcup \vee \wedge \odot \otimes \oplus \oplus \tilde{a} \bar{a} \vec{a} \grave{a} \ddot{a} \underbrace{abc} \underline{abc} \sqrt{abc} $\sqrt[3]{abc}$ f' $\frac{abc}{xyz}$ x_k *C* *ℑ* *T*

GlobalizationRights.tex

book.tex Table0430.tex IntroductionMar09.tex Chapter2Mar09.tex Chapter2AppendixMar09.tex Chapter3Mar09.tex Dissertation09.bib Application Letter.

```

\documentclass[12pt]{article}
\usepackage[margin=1in]{geometry}
% setting margins
\usepackage{setspace}
% nice line spacing package
\usepackage{harvard}
% family of seven bibliography styles including APSR
\bibliographystyle{apsr}

```

In the Front Matter

- `\begin{document}`
- `\title{}`
- `\author{}`
- `\maketitle`
- `\begin{abstract}`
- `\end{abstract}`
- `\pagebreak`

WinEdt - [C:\Users\woo.54\Desktop\Example.tex]

File Edit Search Insert Document Project Tools Macros Accessories Options Window Help

Math

Greek	Symbols	International	Typeface	Functions(x) ...	{ } ...	<=> ...	+/- ...	---> ...	AMS	AMS =<>	AMS NOT =<>											
Σ	Π	\cup	\int	\oint	\cap	\cup	\hat{a}	\check{a}	\breve{a}	\acute{a}	\grave{a}	\tilde{a}	\bar{a}	\vec{abc}	\overleftarrow{abc}	\overrightarrow{abc}	\overline{abc}	\widehat{abc}	x^k	\mathbb{N}	\mathbb{B}	\mathbb{B}
\sqcup	\vee	\wedge	\odot	\otimes	\oplus	\oplus	\tilde{a}	\bar{a}	\vec{a}	\grave{a}	\ddot{a}	\underbrace{abc}	\underline{abc}	\sqrt{abc}	$\sqrt[3]{abc}$	f'	$\frac{abc}{xyz}$	x_k	\mathcal{C}	\mathcal{S}	\mathcal{T}	

GlobalizationRights.tex

book.tex Table0430.tex IntroductionMar09.tex Chapter2Mar09.tex Chapter2AppendixMar09.tex Chapter3Mar09.tex Dissertation09.bib Application Le

```

\documentclass[12pt]{article}
\usepackage[margin=1in]{geometry}
% setting margins
\usepackage{setspace}
% nice line spacing package
\usepackage{harvard}
% family of seven bibliography styles including APSR
\bibliographystyle{apsr}

\begin{document}
\title{Writing My First \LaTeX Article}
\author{Byungwon Woo}

\maketitle
\singlespacing

\begin{abstract}
\noindent My first article written in LaTeX(or \LaTeX) using WinEdt.
\end{abstract}

```

In the Body

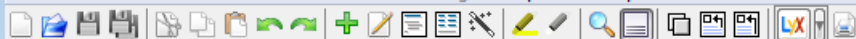
- To begin a new section
- `\section{}`
 - Similarly, `\subsection{}`, `\subsubsection{}`,
`\subsubsubsection{}`
 - LaTeX does automatic numbering. If you don't like it,
use `section*{}`
- `\emph{}`, `\textbf{}`
- `\singlespacing`, `\doublespacing`, `\onehalfspacing`
- `\centering` or `\begin{centering}` & `\end{centering}`

Footnotes/Quotes/Equations

- `\footnote{}`
- `\begin{quote}` & `\end{quote}`
- ` ’ `` ’’ for quotations
- Mathematical Equations
 - Math always in between \$ & \$
 - Alternatively, `\begin{equation}` & `\end{equation}`
 - \$ $1+4=5$ \$
 - `\frac{{}{}}`, `\sqrt{}`, `\sum_{k=1}^n`
 - `^{} , _{}`
 - `\greek` letters (e.g. `\alpha` or `\Alpha`)
 - WinEdt also provides click and type functions.

Citations

- `\cite{bibtexkey}`, `citeyear{bibtexkey}`
- It is more convenient to create a bibliography file, called bibtex file (.bib) and use it as needed.
- WinEdt is capable of creating a bib file, but there are more convenient tools out there.
- JabRef (<http://jabref.sourceforge.net/>)



IMF.bib Example.bib

#	Entrytype	Author	Title	Year	Journal	Owner	Timestamp	Bibtexkey
1	Article	Cheung and Lai	A Fractional Cointegration Analysis of Purchasing Po...	1993	Journal of B...	woo.54	2009.06.08	CheungLai...
2	Article	Ostrom and Smith	Error Correction, Attitude Persistence, and Executive R...	1993	Political Ana...	woo.54	2009.06.08	OstromSmit...
3	Article	Beck	The Methodology of Cointegration.	1993	Political Ana...	woo.54	2009.06.08	Beck1993

Article

Required fields Optional fields General Abstract Review BibTeX source

Author Ostrom, Charles W., Kr., and Renee M. Smith Manage

Title Error Correction, Attitude Persistence, and Executive Rewards and Punishments: A Behavioral Theory of Presidential Approval.

Journal Political Analysis Manage
Toggle abbreviation

Year 1993

Volume 4

Pages 127-84

Bibtexkey OstromSmith1993



Math Greek Symbols International Typeface Functions(x) ... { } ... <=> ... +/- ... --- ... AMS AMS =<> AMS NOT =<>

Σ Π \prod \int \oint \cap \cup \hat{a} \check{a} \breve{a} \acute{a} \grave{a} \bar{a} \tilde{a} \underline{abc} \overline{abc} \overleftarrow{abc} \overrightarrow{abc} \overbar{abc} \overbrace{abc} x^k \mathbb{N} \mathbb{E} \mathbb{B}
 \sqcup \vee \wedge \odot \otimes \oplus \oplus \tilde{a} \bar{a} \breve{a} \acute{a} \grave{a} \underline{abc} \overline{abc} \sqrt{abc} $\sqrt[3]{abc}$ f' $\frac{abc}{xyz}$ x_k \mathcal{C} \mathfrak{S} \mathbb{T}

GlobalizationRights.tex

book.tex Table0430.tex IntroductionMar09.tex Chapter2Mar09.tex Chapter2AppendixMar09.tex Chapter3Mar09.tex Dissertation09.bib Application Letter.tex CV Template.tex Dissertation Summary.tex Chapter3.tex Example.tex

```

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% setting margins
\usepackage{setspace}
% nice line spacing package
\usepackage{harvard}
% family of seven bibliography styles including APSR
\bibliographystyle{apsr}

\begin{document}
\title{Writing My First \LaTeX Article}
\author{Byungwon Woo}

\maketitle
\singlespacing

\begin{abstract}
\noindent My first article written in \LaTeX(or \LaTeX) using WinEdt.
\end{abstract}

\newpage
\doublespacing

\section{Introduction}
Both ARMA and ARIMA model specifications and technologies have been useful to political scientists.

Economists argue that certain processes ``inherit'' their fractional integration properties from the exogenous forces that affect them.\footnote{If you do not understand the text of this example, that is totally OK.} Such a theory, which begs the question of why the exogenous variables are themselves fractionally integrated, is used in the literature on multivariate models for fractional cointegration in which certain time series are predicted to move together over time \cite{CheungLai1993}.

\section{Fractional Integration}
To model such long-range persistence, analysts can use an ARFIMA model in which the fractionally integrated time series is represented as:\\
%\[
%\phi(L)(1-L)^d x_t = \theta(L)\epsilon_t
%\]


$$\phi(L)(1-L)^d x_t = \theta(L)\epsilon_t$$


```

Creating a Table

- Add numbered table
 - `\begin{table} \caption{}`
- Creating a table
- Simple tables can be produced by
 - `\begin{tabular}[pos]{tablespec}`
 - Within the `{tablespec}` section, one details the number of columns, the alignment, and the number of vertical lines of the table.
 - `{lrc}`, `{||r|c}`
 - Then type in from left to right, the values for each cell with `&` in between.
 - Put “`\\`” at the end of each row, then input another row of values if needed.
 - `\hline`
 - For STATA users, after downloading the “`outtex`” package online, one can simply type “`outtex`” after any estimation and STATA will spit out LaTeX code for the results table presented.

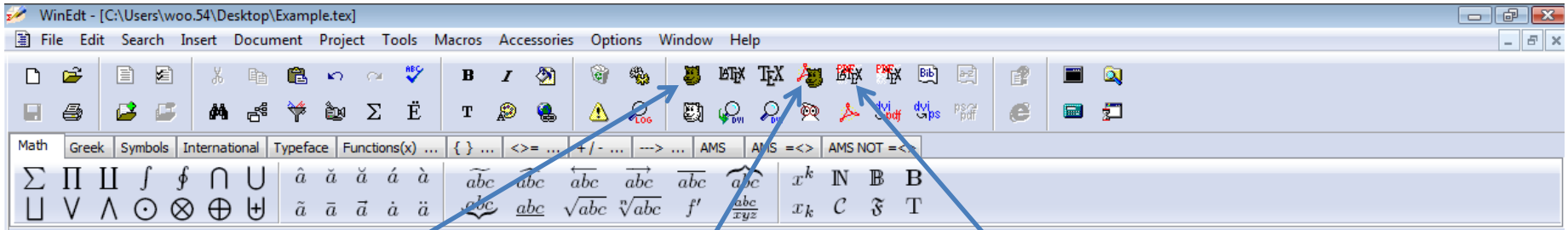
Creating a 4*3 Table

- `\begin{table}[h]`
- `\caption{Summary of Conclusions from Diagnostic Tests}`
- `\begin{tabular}{llll}`
- `\hline`
- `\hline`
- `& Macropartisanship & Consumer Sentiment & Presidential Approval\\`
- `\hline`
- `Joint F test & $d=1$ & $d=1$ & $d=0$ \\`
- `VR test & $0 < d \leq 1$ & $d=1$ & $0 < d \leq 1$ \\`
- `\hline`
- `\end{tabular}`
- `\end{table}`

In the Back Matter

- Don't forget `bibliography{filename}`
 - Make sure that the bibtex file is saved in the same location where the main tex file is saved.
- Don't forget `end{document}`

Seeing the Document

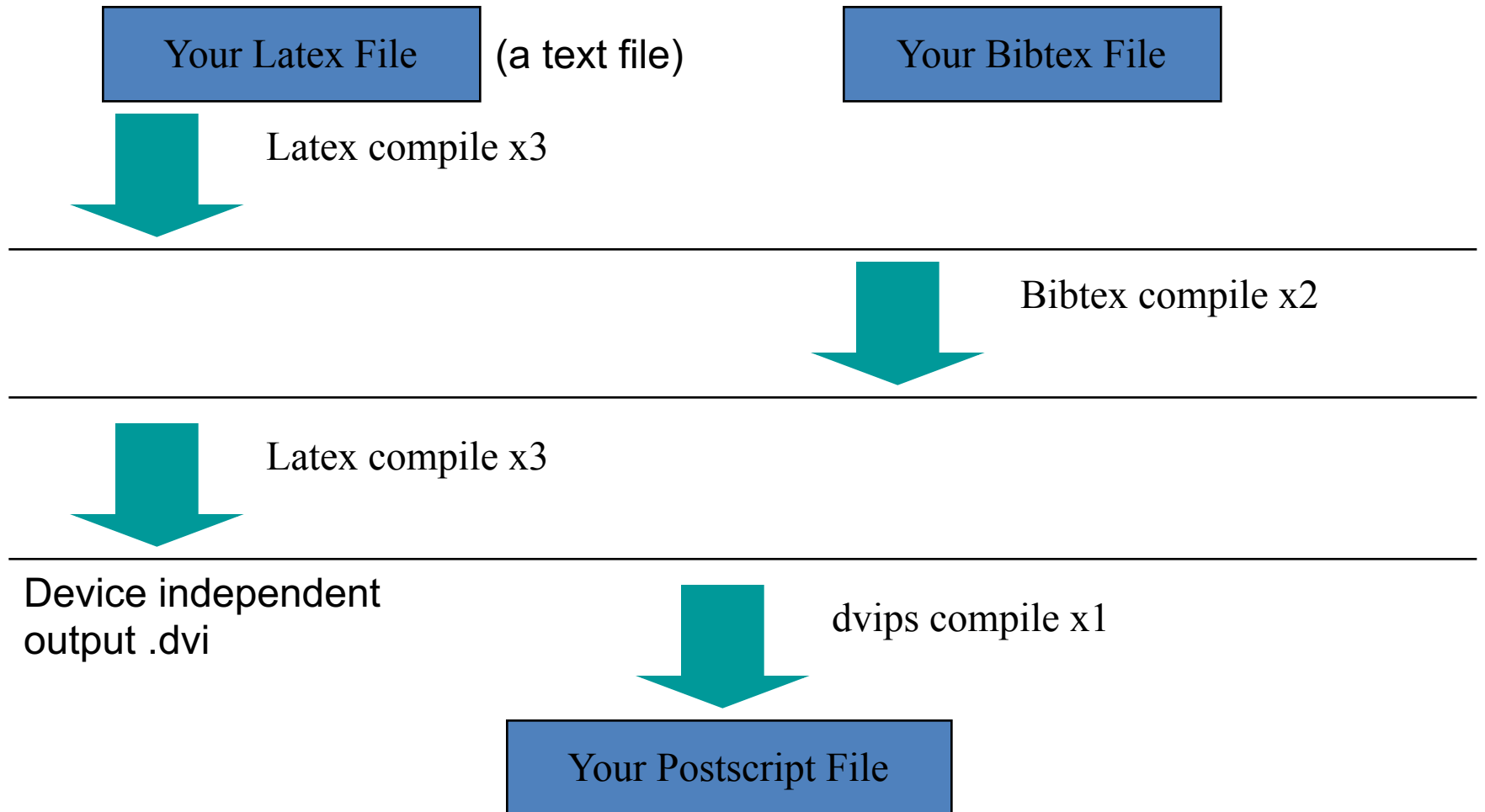


Press on the
smiling bear to
convert to .dvi

Press on the
PDF+happy bear
to convert to
.pdf and open it

Press on the
PDF/LaTeX to
convert to .pdf

Creating Latex Files



Latex File Structure

- Document Class

Predefined Formats (article, report, book,..).

- Packages used

Added Functionality (graphics, reference style,...).

- Main Body

Text and Bibliography References.

The Basics

- Document Class

```
\documentclass[options]{class}
```

```
options = a4paper, 11pt, 12pt, 10pt, twocolumn, landscape,...
```

```
class = article, report, book,...
```

- Packages

```
\usepackage{package name}
```

```
epsfig = insert PS pictures into the document
```

```
fancyhdr = easy definition of footer and  
header
```

Body of Text

- Start with `\begin{document}`
- End with `\end{document}`
- Typesetting Text
 - `\\` or `\newline` and `\newpage`
 - Quotations
 - Bold `\textbf{.....}` or `\bf`
 - Italics `\emph{.....}` or `\textit{.....}` or `\it`
 - Underline `\underline{.....}` or `\ul`

Body of Text cont...

- Including Multiple Files
 - `\input{filename.tex}`

Format

- Sections
 - `\section{...}` = 1. Latex is Great
 - `\subsection{...}` = 1.1 Why Latex is Great
 - `\subsubsection{...}` = 1.1.1 Reason One
 - `\appendix` - changes numbering scheme
 - `\chapter{...}` - To be used with book and report document classes
- Titles, Authors and others
 - `\title{...}` `\author{...}`
 - `\footnote{...}`

Format Contd.

- `\maketitle` - Display Title and Author
- `\tableofcontents` - generates TOC
- `\listoftables` - generates LOT
- `\listoffigures` - generates LOF
- **Labels**
 - `\label{marker}` - Marker in document.
 - `\pageref{marker}` - Displays page no. of marker.
 - `\ref{marker}` - Displays section location of marker.
- **Itemize**
 - Use either *enumerate*, *itemize* or *description*.
 - *see handout for example.*

Lists

- **Source**

- `\begin{itemize}`
 - `\item Apple`
 - `\item Orange`
 - `\end{itemize}`

- **Result**

- Apple
 - Orange

Lists

- `Enumerate` instead of `itemize` gives a numbered list
- Lists can be recursive

Environment

- Something between
 - `\begin{name}`
 - `\end{name}`
- Many command, for example `\bf` affect the text until the end of environment
- Environments can be recursive
- Examples:
 - `itemize`, `center`, `abstract`

Group

- Group is some text between { and }
- Many commands work until the end of the group
- Code
 - put {one word \bf in bold} here
- Result
 - put one word **in bold** here

Alignment

- **Environments** `center`, `flushleft`, `flushright`

- **Example**

- `\begin{flushright}`

- `Right aligned`

- `\end{flushright}`

- **Result**

`Right aligned`

Font size

`\tiny` `\scriptsize` `\footnotesize`

`\small` `\normalsize`

`\large` `\Large`

`\LARGE` `\huge`

`\Huge`

Example of Latex document

```
\documentclass{article}  
\title{Simple Example}  
\author{Andrei Gurtov}  
\date{March 2000}  
\begin{document}  
\maketitle  
Hello world!  
\end{document}
```

Tabular

- Columns

- `\begin{tabular}{|...|...|}`
- `\end{tabular}`

Two Columns

- Rows

- `&` - Split text into columns
- `\\` - End a row
- `\hline` - Draw line under row
- e.g. `123123 & 34.00\\ \hline`

l = automatically adjust size, left justify
r = automatically adjust size, right justify
p = set size
 e.g `p{4.7cm}`
c = centre text

Example of table

```
\begin{tabular}{|l|r|c|} \hline
Date & Price & Size \\ \hline
Yesterday & 5 & big \\ \hline
Today & 3 & small \\ \hline
\end{tabular}
```

Date	Price	Size
Yesterday	5	Big
Today	3	Small

Floating Objects

- Floating objects can stop splitting of tables and images over pages.

```
\begin{figure} [options]
```

```
\end{figure}
```

```
\begin{table} [options]
```

```
\end{table}
```

- They will now appear in the
 - List of Figures (LOF) and
 - List of Tables (LOT).

Options (recommendations)


h = place table here

t = place at top of page

b = place at bottom of page

Example of floating figure

- `\begin{figure}[ht]`
- `\centering\epsfig{file=uni.ps, width=5cm}`
- `\caption{University of Helsinki}`
- `\label{uni}`
- `\end{figure}`



Figure~\ref{uni}
shows...

Images

- Use epsfig package
- `\usepackage{epsfig}`
- Including images in main body
- `\epsfig{file=filename.eps, width=10cm, height=9cm, angle=90}`
- Creating EPS - Use xv and/or xfig.
- MS Power Point, save as GIF and convert to EPS.

Bibliography by hand

```
\begin{thebibliography}{}  
\bibitem[Come95]{Come95} Comer,  
D. E., {\it Internetworking with TCP/IP:  
Principles, Protocols and Architecture},  
volume 1, 3rd edition. Prentice-Hall,  
1995.  
\end{thebibliography}
```

Bibliography using Bibtex

- Bibliography information is stored in a *.bib file, in Bibtex format.
- Include chicago package
 - `\usepackage{chicago}`
- Set referencing style
 - `\bibliographystyle{chicago}`
- Create reference section by
 - `\bibliography{bibfile with no extension}`

Bibliography using Bibtex

```
@book{Come95,  
author="D. E. Comer",  
title={Internetworking with TCP/IP: Principles, Protocols  
and Architecture},  
publisher="Prentice-Hall",  
year=1995,  
volume=1,  
edition="Third"}
```

Bibliography contd.

- Citing references in text
 - `\cite{cuc98}` = (Cuce 1998)
 - `\citeN{cru98}` = Crud (1998)
 - `\shortcite{tom98}` = (Tom, et. al. 1998)
- Creating Bibtex Files
 - Use Emacs with extensions.
 - or copy Bibtex entries from bibliography database.

Some Math

```
\begin{center}
{\large
\frac{a^3+2c_x}{1+\sqrt{b_x}}}
\end{center}
\begin{center}
\sum_{i=1}^j \int_{\mu}^{\infty} f(x_i)
dx
\end{center}
\begin{center}
\Psi = \int_{-\infty}^{\infty} f_{xy} \left( \frac{\partial Q_x}{\partial Q_y} \right) \mathcal{R}_x
\end{center}
```

$$y = \frac{a^3 + 2c_x}{1 + \sqrt{b_x}}$$

$$Q = \sum_{i=1}^j \int_{\mu}^{\infty} f(x_j) dx$$

$$\Psi = \int_{-\infty}^{\infty} f_{xy} \left(\frac{\partial Q_x}{\partial Q_y} \right) \mathcal{R}_x$$

Tools

UNIX based systems

- xdvi, ghostview, fixps, emacs with latex/bibtex support.

Windows 98/NT

- Ghostview, Acrobat Distiller, Acrobat Reader, Scientific Workplace (not the best), the Bibtex viewer is good. Paint Shop Pro, Latex and Emacs

Conclusions

- Latex is optimal for master and phd thesis?
- Mathematical formulae are easy.
- Use bibtex search engines
- Consider converting Postscript files to PDF (more widespread in Windows world) and to conserve space.

Common Mistakes

- Often times, you make a mistake when creating a document. You will notice the log file reporting a problem.
- There are some common mistakes:
 - “end” doesn’t follow “begin”
 - \$ doesn’t follow \$
 - Using commands from packages not defined in the preamble
 - Don’t forget “\”s.

Other Resources

- Books
 - Leslie Lamport. 1994. LaTeX: A Document Preparation System.
 - Helmut Kopta and Patrick W. Daly. 2004. Guide to LaTeX
 - Frank Mittelbach et al. 2004. The LaTeX Companion
- Online Guides
 - <http://en.wikibooks.org/wiki/LaTeX>
 - <http://tobi.oetiker.ch/lshort/lshort.pdf>
 - CV and dissertation templates are available on line