

LaTeX - A Tutorial

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What is LaTeX

- How to pronounce LaTeX? (Lah-tek, or Lay-tek)
- A typesetting program, not a word-processor
- Designed for producing beautiful books, thesis, papers, articles... (Springer books)
- De facto standard for writing academic papers

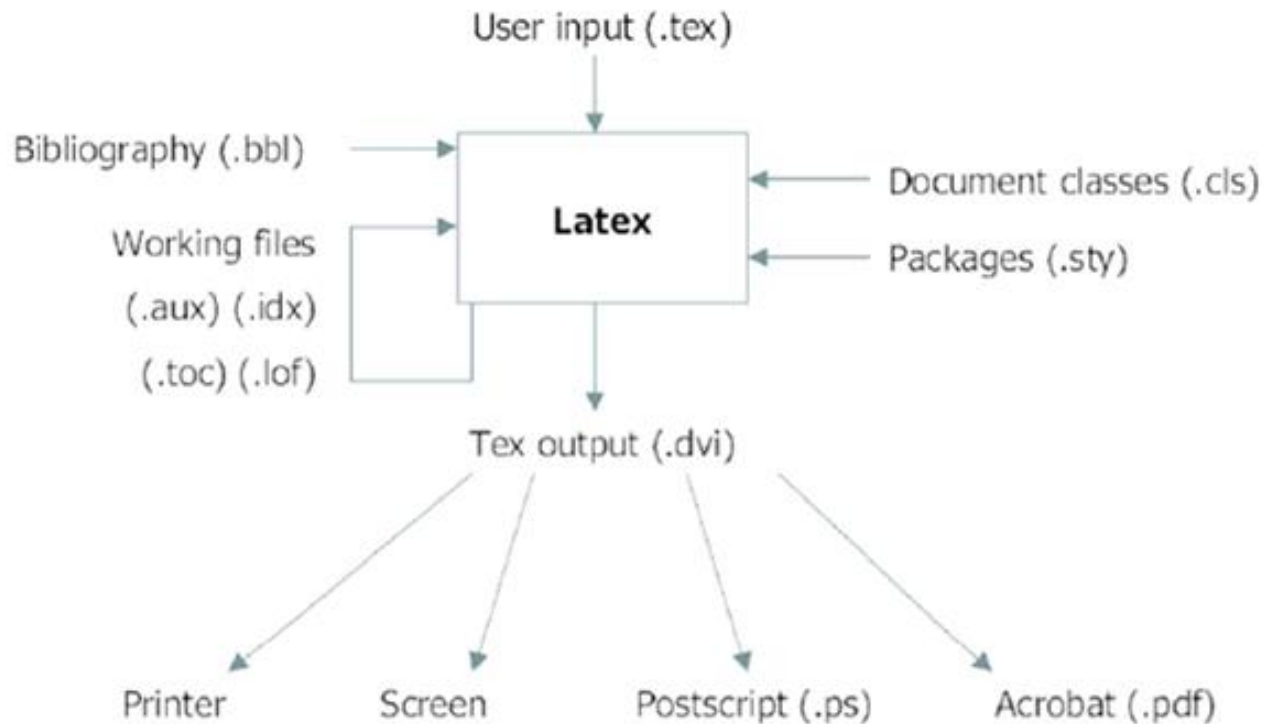
Why LaTeX, not Word?

- Professional, Uniform output (example)
- Platform, version independent (Unix, Windows...)
- Pre-set standard formats (for paper, thesis...)
- Bibliography management
- Fast, professional math equations typesetting
- Portable, compatible, flexible, **free**
- The commands are easy to learn
- Never crash, never lose your file
- Can compile very big books (unless your document is more than 70,000 pages!)
 - You will need it in future, so learn how to use it now!

Where to get LaTeX?

- Get a **Latex distribution:**
- Unix/Linux:
 - **TeXLive:** in Ubuntu- *apt-get install texlive-base*
- Windows
 - **MikTeX** <http://www.miktex.de/>
 - **TeXLive**
- Use an Editor:
 - **L^ED** (Free for windows – recommended)
 - **WinEditor** (Commercial for windows)
 - **Emacs / ispell** for Linux/Windows
 - **Vim** (For all - Free)
 - **TeXMaker** (For all - Free)

The Mechanisms of “TeXing”



LaTeX Skeleton

```
% my first LaTeX file
\documentclass{article}
  % preamble
  \usepackage{graphicx}
\begin{document}
  \section{This is a section}
  \subsection{This is a subsection}
    First paragraph is here.

    Second paragraph is here.
\end{document}
```

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 \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 \uplus \tilde{a} \bar{a} \vec{abc} \overleftarrow{abc} \overrightarrow{abc} \overline{abc} \widehat{abc} x_k \mathbb{C} \mathfrak{S} \mathbb{T}

GlobalizationRights.tex

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

```

\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}

```

Basics of LaTeX – Commands

- Always begin with a backslash `\`
- Case sensitive
- Consist of letters only
- Some have parameters
 - Square brackets `[]` after the command name are for optional parameters
 - Curly braces `{ }` after the command name are for required parameters

Environments

- Many environments available in TeX
- Used to help format parts of your document
- Always need **`\begin{environment name}`** and **`\end{environment name}`**

Environments

- **Itemize** environment
 - `\begin{itemize}` and `\end{itemize}`
 - Creates an outline using bullet points
 - Items within the section are created by `\item`
 - Can nest itemize environments within one another

Environments

- **Enumerate** environment
 - `\begin{enumerate}` and `\end{enumerate}`
 - Creates an outline using numbers and letters
 - Items within the section are created by `\item`
 - Can nest enumerate environments within one another
- **Centered** environment
 - `\begin{center}` and `\end{center}`
 - To end a line, use `\\`

Referencing Using Labels

- May want to reference a section, theorem, figure, example, etc. somewhere else in the document
- To label a section:
 - `\section{Title}\label{Label for section}`
- To reference a section:
 - `\ref{Label for section}`
 - Only gives the section number – you'll need to type Section separately

Typesetting Math

- Mathematical text is placed between $\$$
- Math mode is normally displayed inline
 - Can make some expressions look funny
- For text within math mode, use $\text{\texttt{\textbf{\textit{...}}}}$
- Math mode uses italics and no spaces between words

Add a squared and b squared to get c squared. Or, using a more mathematical approach:
 $c^2 = a^2 + b^2$

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Or, using a more mathematical approach:
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Useful Mathematical Commands

- Superscripts and Subscripts
 - x^2
 - x_2
 - Use curly braces to group items together
 - x_{i_2} or x_{\min}
 - Can have a superscript and a subscript on the same character
 - x_i^3

Other Important Characters

- Quote marks
 - For left-hand quote marks, use ``
 - For right-hand quote marks, use "" or ""
- Comments
 - Can comment out sections of file
 - Allows you to not display text without deleting it
 - Use % at the beginning of any lines you want to comment out

Mathematical Environments

- **Equation environment**
 - `\begin{equation}` and `\end{equation}`
 - Automatically numbers equations
 - For no numbers, use `equation*`
 - Can label equations by `\label{name}`
 - Centers equation on page
 - Do not need `$` within equation environment

Math Examples

```
\begin{displaymath}
x^2 \geq 0 \quad \text{for all } x \in \mathbb{R}
\end{displaymath}
```

$$x^2 \geq 0 \quad \text{for all } x \in \mathbb{R}$$

```
\begin{equation}
a^x + y \neq a^{x+y}
\end{equation}
```

$$a^x + y \neq a^{x+y} \quad (3.4)$$



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}	\grave{a}	\ddot{a}	\overline{abc}	\widehat{abc}	\overleftarrow{abc}	\overrightarrow{abc}	\overbar{abc}	\overbrace{abc}	x^k	\mathbb{N}	\mathbb{B}	\mathbb{B}	
\sqcup	\vee	\wedge	\odot	\otimes	\oplus	\oplus	\tilde{a}	\bar{a}	\breve{a}	\acute{a}	\grave{a}	\ddot{a}	\overline{abc}	\widehat{abc}	\overleftarrow{abc}	\overrightarrow{abc}	\overbar{abc}	\overbrace{abc}	\sqrt{abc}	$\sqrt[3]{abc}$	f'	$\frac{abc}{xyz}$	x_k	\mathcal{C}	\mathfrak{F}	\mathbb{T}

GlobalizationRights.tex
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\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:\\
%\[
%\phi(L)(1-L)^{d}x_{t}=\theta(L)\epsilon_{t}
%\]


$$\phi(L)(1-L)^{d}x_{t}=\theta(L)\epsilon_{t}$$


```

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
- Google "latex sth" e.g. "latex citation", "latex table".

Reference Cards

AMS-L^AT_EX Reference Card #1

See the T_EX Reference Card for additional commands.
Required packages are indicated as (package).

Document Structure

• Preamble

```
\documentclass[option(s)]{class}
\usepackage[option(s)]{package(s)}
\begin{document}
```

• Body

• **Front Matter** (\frontmatter in book classes)

• Top Matter

```
\title{...}
\title[running head]{...} alternative headline
\date{...}
\date{\today} gives current date
\author{...}
```

```
\maketitle (not in book classes)
```

• Additional items — ams classes only

```
\translator{...}
\dedicatory{...}
\address[optional name]{...}
\curraddress{...}
\email[optional name]{...}
\thanks{...}
\subclass{Primary: XXX; Secondary: XXX}
\keywords{...}
\thanks{...}
```

```
\tableofcontents
```

```
\chapter{Introduction} (in book classes)
```

• Abstract (not in book classes)

```
\begin{abstract}... \end{abstract}
```

• **Main Matter** (\mainmatter in book classes)

```
\chapter{...}
\section{...}
\subsection{...}
\appendix
```

• **Back Matter** (\backmatter in book classes)

```
\begin{thebibliography}{99}... \end{...}
```

```
\end{document}
```

Page Style

```
\pagestyle{style} set page style to one of:
plain empty header, page number in footer
empty empty header and footer
headings header filled by doc class, empty footer
myheadings empty footer, fill header with info in
\markboth{lefthead}{righthead}
```

Bibliography (see also BIBT_EX)

```
\begin{thebibliography}{99}... \end{...}
bibliography with widest label specified
\bibitem{name} named bibliography item
\bibitem[label]{name} with alternative label to print
\byname use long line for same author
\renewcommand{\bibname}{title} use custom title
\cite{name} print number of named bib item
\cite[text]{name} with extra text
```

Classes and Packages

```
\documentclass[option(s)]{class}
\usepackage[option(s)]{package(s)}
\NeedsTeXFormat{LaTeX2e}[1994/12/01]
```

• Document Classes

article, book, letter, report, slides
amsart, amsbook, amsproc (all autoload amsmath)

• Useful Packages

amsmath, amsthm, amscd, amsymb
latexsym, graphics
fancyheadings allows custom headers and footers
alltt all teletype, even \.{.}
makeidx, showidx create index, show in margin
graphics inclusion of graphics
enumerate extends the enumerate environment
layout shows page layout of doc class
multicol flexible multicolumn typesetting
showkeys print label keys in margin
verbatim extends verbatim environment

• Document and Package Options

Font Size
8pt, 9pt, 10pt, 11pt, 12pt
Paper Size
a4paper, a5paper, b5paper, legalpaper, letterpaper
Document Preparation
draft, final, notitlepage, titlepage
Page Formatting
onecolumn, twocolumn, oneside, twoside, openany, openright
Equation Numbering
fleqn, leqno, reqno, centertags, tbtags
Equation Limits
intllimits, sunlimits, nonamlimits
AMS (Postscript) Fonts
psamsfonts, noamsfonts

Cross Referencing and Numbering

```
\label{name} assign label name to numbered item
\ref{name} print number of named item
```

Sectioning and Table of Contents

• Sectioning commands

```
\command{title} sectioning command with title
\command[head]{title} with alternative running head
\command*{title} with number suppressed
\part \section \paragraph
\chapter \subsection \subparagraph
\subsubsection
```

```
\appendix start appendix
```

• Table of Contents

```
\tableofcontents create and print contents
filename.toc contents associated to filename.tex
\addcontentsline{toc}{section}{line to add}
\addtocontents{toc}{material to add}
```

Tables and Figures

```
\begin{table} ... \caption{text} \label{name} \end{table}
\listoftables create and print list of tables
\begin{figure} ... \caption{text} \label{name} \end{figure}
\includegraphics{filename} include image (graphics)
\scaledbox{.5}{\includegraphics{filename}} scaled graphics
\listoffigures create and print list of figures
```

Lists

```
\item item within list
\item[label] item with label
\begin{enumerate}... \end{...} numbered items
\begin{itemize}... \end{...} bulleted items
\begin{description}... \end{...} captioned items
enumerate package extends enumerate
```

Displayed Text Material

```
\begin{center}... \end{...} centered material
\begin{flushright}... \end{...} flush right material
\begin{flushleft}... \end{...} flush left material
\begin{quote}... \end{...} short quote
\begin{quotation}... \end{...} long quote
\begin{verse}... \end{...} poetry
\begin{verbatim}... \end{...} verbatim material
\verb[... ] verbatim material
\verb*[... ] verbatim with spaces marked
verbatim package extends verbatim
```

Footnotes, Comments, Other Stuff

```
\footnote{text} numbered footnote
% comment out a line
\begin{comment}... \end{...} long comment (verbatim)
\typeout{text} print to terminal
```