

# $\text{\LaTeX}$ Lecture for UNIST

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October 28, 2019

# Overview

- 1 Introduction myself
- 2 What is  $\text{\LaTeX}$ ?
- 3 Hello World Example
- 4 Introduction to  $\text{\LaTeX}$
- 5 Advanced typesetting of  $\text{\LaTeX}$
- 6 Equation, Figure and Table
- 7 Reference Control

I am...

- Jaewoong Lee
- Senior at UNIST
- $\text{\LaTeX}$  user since 2014
- Graduated Gyeonggi Science High School for the Gifted in 2016
- Full Member of GSHS TeX User Association



Figure: GSHS TeX User Association

# What you could with $\text{\LaTeX}$ ?

From a simple report to a presentation.  
This presentation file is also made by  $\text{\LaTeX}$ .  
You can do almost everything in written form.

`https://fumire.moe/Lecture/latex/`

You can easily get TeX code in this lecture from here!

You can get a installation guide, also!

- LAH-tekh or LAY-tekh
- TeX-like editing tool
- In simple, that which is making a paper.
- Donald Knuth made TeX  $\Rightarrow$  L<sup>A</sup>T<sub>E</sub>X: a macro for TeX
- WYSIWYM

# WYSIWYG vs. WYSIWYM

## WYSIWYG

- What you see is what you get
- MS Word or HWP

## WYSIWYM

- What you see is what you mean
- HTML,  $\text{\LaTeX}$

- You write the contents, then L<sup>A</sup>T<sub>E</sub>X makes it!
- Useful to write an equation
- As an equation editor, L<sup>A</sup>T<sub>E</sub>X is a *de facto* standard
- Convenient labeling & referencing
- After initial setting, you only think about contents; not design
- Table of contents, List of figures?  $\Rightarrow$  Only one line command!
- Cross-referencing: 'As figure 8a'  $\Rightarrow$  You can see 'Big Picture'
- Easily attach vector image like SVG & PDF



# $\text{\LaTeX}$ vs. MS word

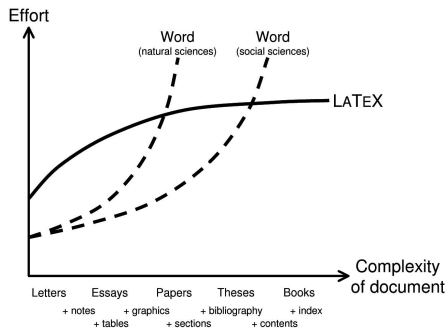


Figure:  $\text{\LaTeX}$  vs. MS word

- $\text{\LaTeX}$  users were slower than Word users.
- $\text{\LaTeX}$  users wrote less text in the same amount of time.
- $\text{\LaTeX}$  users produced more typesetting, orthographical, grammatical, and formatting errors.
- $\text{\LaTeX}$  users more often report enjoying using their respective software.

According to Knauff, M., & Nejasmic, J. (2014). An efficiency comparison of document preparation systems used in academic research and development. PloS one, 9(12), e115069.

## Example (Hello World)

```
\documentclass{article}  
\title{Hello world}  
\author{John Doe}  
\date{September 2019}  
\begin{document}  
\maketitle  
Lorem ipsum dolor sit amet.  
\end{document}
```

- 1 This is an article.
- 2 The title is 'Hello world'.
- 3 The author is 'John Doe'.
- 4 Written in September 2019.
- 5 This document contains a title and a sentence.

## Preamble

- In simple, a header of document.
- Declare class of document, packages, *et cetera*.
- Make a declaration of settings, also.

## Body

- Whole thing after `\begin{document}`
- Similar as editing mode in Wikipedia.

# Hierarchy of Document

- ① `\document`
- ② `\part`
- ③ `\chapter`
- ④ `\section`
- ⑤ `\subsection`
- ⑥ `\subsubsection`
- ⑦ `\paragraph`
- ⑧ `\subparagraph`

# Table of Contents

Only one line command is required to make 'Table of Contents'.

## Example (ToC code)

```
\documentclass{article}
\begin{document}
  \tableofcontents
  \section{one}
  \subsection{two}
\end{document}
```

As the example, just add `\tableofcontents` command where you want.

# Special Characters

You cannot use these character directly:

## Special Characters

`\, \#, \$, \%, \&, \{, \}, -`

As following block, this problem has been solved by adding backslash in front of the character:

## Using Special Characters

`\textbackslash, \#, \$, \%, \&, \{, \}, \-`

Moreover, `%` means one line comment in  $\text{\LaTeX}$ . Please refer here<sup>1</sup> when you want multiple line comment.

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<sup>1</sup><http://bit.ly/2iZi3yn>

# Spacing & Line Break

Even if there are so many spaces in  $\text{\LaTeX}$  code, there is only one space in the result. If you want to use many spaces, use ' $\backslash$ ' instead.

In the same way, there are so many line breaks in  $\text{\LaTeX}$  code, there is only one line break. When you want to line breaks, use ' $\backslash\\$ ' instead.

Furthermore, twice of line break start new paragraph in  $\text{\LaTeX}$ .



Use `\newpage` or `\clearpage`.

When make a book, use `\cleardoublepage`.

# Text Aligning

Align Text Left. Use `flushleft`.

Justify Text. Use `center`.

Align Text Right. Use `flushright`.

In using `flushleft`, `center` or `flushright`, please refer following:

## Text Aligning

```
\begin{flushright}
Right Aligned Text is here.
\end{flushright}
```

This example shows different examples on how to use the `xcolor` package to change the color of elements in  $\text{\LaTeX}$ .

## Example (xcolor code)

```
\documentclass{article}
\usepackage{xcolor}
\begin{document}
\textcolor{green}
  {Hello,}
\colorbox{orange}
  {world!}
\end{document}
```

## Example (color showing)

Hello, world!

<sup>1</sup>Reference: <http://bit.ly/2UssO6a>

- **Bold:** `\textbf{...}`
- *Italic:* `\textit{...}`
- *Sans-serif:* `\textsf{...}`
- Underline: `\underline{...}`
- SMALL CAPITALS: `\textsc{...}`

# Strikethrough

There are two ways to add strikethrough.  
First, use ulem package.

## Example (ulem code)

```
\documentclass{article}  
\usepackage{ulem}  
\begin{document}  
\sout{Hello, world!}  
\end{document}
```

## Example (ulem showing)

~~Hello, world!~~

# Strikethrough (*cont.*)

Second, use cancel package.

## Example (cancel code)

```
\documentclass{article}
\usepackage{cancel}
\begin{document}
\[ x + \cancel{y}=0 \]
\[ x + \bcancel{y}=0 \]
\[ x + \xcancel{y}=0 \]
\[ x + \cancelto{0}{y}=0 \]
\end{document}
```

## Example (cancel showing)

$$x + \cancel{y} = 0$$

$$x + \bcancel{y} = 0$$

$$x + \xcancel{y} = 0$$

$$x + \cancelto{0}{y} = 0$$

Suppose you have to create a document in a4paper and text should not exceed 18 cm in width and 20 cm in height. To create it with geometry package is easy, include this one line in the preamble.

## geometry Example

```
\usepackage[a4paper, total={18cm, 20cm}]{geometry}
```

If you need detailed page setting, you can do like this:

## geometry Detailed Example

```
\usepackage{geometry}  
\geometry  
    {a4paper, left=20mm, right=25mm, top=3cm, bottom=4in}
```

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<sup>1</sup>Reference: <http://bit.ly/34nbbJC>

# Multi-Column

In  $\text{\LaTeX}$ , you can use multi-column as:

## Example (Multi-column Example)

```
\documentclass[twocolumn]{report}
```

If you want to change columns in the document, you can use

## Example (Multi-column Example 2)

```
\twocolumn  
\onecolumn
```

However, this commands always starts new pages.



# Multi-Column (*cont.*)

In case of that problem, use `multicol` package.

## Example (`multicol` code)

```
\documentclass{article}
\usepackage{multicol}
\setlength{\columnseprule}
{0.4pt}
\begin{document}
  \begin{multicols}{2}
    Lorem ipsum
    \newpage
    dolor sit amet,
    \newline
    consectetur
  \end{multicols}
\end{document}
```

## Example (`multicol` showing)

Lorem ipsum

dolor sit amet,  
consectetur

# Text Box

You can add text box with `tcolorbox` package.

## Example (tcolorbox code)

```
\documentclass{article}
\usepackage{tcolorbox}

\begin{document}
  \begin{tcolorbox}
    The quick brown fox
    jumps right over
    the lazy dog.
  \end{tcolorbox}
\end{document}
```

## Example (tcolorbox showing)

The quick brown fox jumps  
right over the lazy dog.

# Equation

For entering equation, `amsmath` package is required.

- `\( ... \)`: In-line equation.  $e^{i\pi} + 1 = 0$
- `\[ ... \]`: Equation without number.

$$e^{i\pi} + 1 = 0$$

- `\begin{equation} ... \end{equation}`: Equation with number.

$$e^{i\pi} + 1 = 0 \tag{1}$$

You can reference the number of equation. (In advance)

# Equation (*cont.*)

- `\sin{...}`:  $\sin\{...\}$
- `\log {...}`:  $\log\{...\}$  To avoid italic style.
- `\frac {num}{den}`:  $\frac{num}{den}$
- `\sqrt[n]{x}`:  $\sqrt[n]{x}$
- `\begin{pmatrix} x & y \\ z & v \end{pmatrix}`:  $\begin{pmatrix} x & y \\ z & v \end{pmatrix}$
- `dt \operatorname{d}t`, `\partial t`, `\nabla \psi`:  $dt, dt, \partial t, \nabla \psi$
- `f'`, `f''`, `f^{(3)}`, `\dot y`, `\ddot y`:  $f', f'', f^{(3)}, \dot{y}, \ddot{y}$
- `\int_{-N}^{\hat{N}} e^x \, dx`:  $\int_{-N}^{\hat{N}} e^x dx$
- `\oint_C x^3 \, dx`:  $\oint_C x^3 dx$

<sup>1</sup>Reference: <http://bit.ly/2UALRLP>

# Equation\*

When you do not want number while using `\begin{equation}`, using `equation*` instead:

## Example (`equation*` example)

```
\begin{equation*}
e^{i \pi}+1=0
\end{equation*}
```

Or, add `\nonumber` just after equation:

## Example (`\nonumber` example)

```
\begin{equation}
e^{i \pi}+1=0
\nonumber
\end{equation}
```

# Figure

Basic example of figure is following:

## Example (Basic Figure Example)

```
\usepackage{graphics, graphicx}  
\begin{figure}[htbp]  
\centering  
\includegraphics[width=5cm]{example.png}  
\end{figure}
```

htbp means Here  $\Rightarrow$  Top  $\Rightarrow$  Bottom  $\Rightarrow$  Page. The ordering means priority of figure location. You can change figure location setting.

You can add JPG, GIF, PNG, PDF, and more.

# Table

Use online L<sup>A</sup>T<sub>E</sub>X table generator. <sup>2</sup>

## Example (Table code)

```
\begin{table}[htbp]
\centering
\begin{tabular}{l||c|r}
No. & Name & Sex \\ \hline
1 & John & M \\
2 & Jane & F
\end{tabular}
\end{table}
```

## Example (Table example)

No.	Name	Sex
1	John	M
2	Jane	F

<sup>2</sup><https://www.tablesgenerator.com>

# Caption

All figures and tables can be attached with caption. You can explain what a meaning of figure or table.

## Example (Table code)

```
\begin{table}[htbp]
\centering
\caption{Example Table}
\begin{tabular}{l||c|r}
No. & Name & Sex \\ \hline
1 & John & M \\
2 & Jane & F
\end{tabular}
\end{table}
```

## Example (Table example)

**Table:** Example Table

No.	Name	Sex
1	John	M
2	Jane	F



# Label

A label can be attached to equations, figures, tables and section. Also, the number of label is automated increasing.

A label is added by `\label` command:

## Example (Add label)

```
\label{tb:example}
```

Moreover, you can refer specific label with `\ref` command:

## Example (Refer label)

```
\ref{tb:example}
```

As same as 'Table of Contents', you can easily add 'List of Figures' and 'List of Tables'. Just add one line command, `\listoftables` and `\listoffigures` where you want.

BibTeX is reference management software for formatting lists of references. As you know, BibTeX is came from bibliography and  $\text{\LaTeX}$ .

# How can I get BibTeX?

Google Scholar gives BibTeX citation. You can copy and paste it.

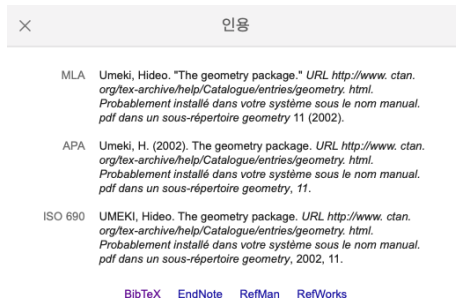


Figure: Google Scholar gives BibTeX

# How can I cite?

Only one line command is enough:

Example (Citation example)

```
\cite{ref:label}
```

If you want multiple citation at once, use this command instead:

Example (Multiple citation example)

```
\cite{ref:label1, ref:label2}
```

# How can I cite? (*cont.*)

For a list of references, add these commands where you want:

## Example (Reference example)

```
\bibliographystyle{apalike}  
\bibliography{BibTex_Name}
```

Moreover, these styles can be used:

- ① abbrv
- ② acm
- ③ alpha
- ④ apalike
- ⑤ ieeeetr
- ⑥ plain
- ⑦ siam

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<sup>2</sup>Reference: <http://bit.ly/34of80o>