

# LaTex for Dummies

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# What is LaTex?

- A document preparation system for **high-quality typesetting**, which has
  - Stylistic uniformity
  - Bibliography support
  - Sophisticated structuring abilities
  - Reference tracking
  - Multi-lingual typesetting support
  - High extendible capabilities

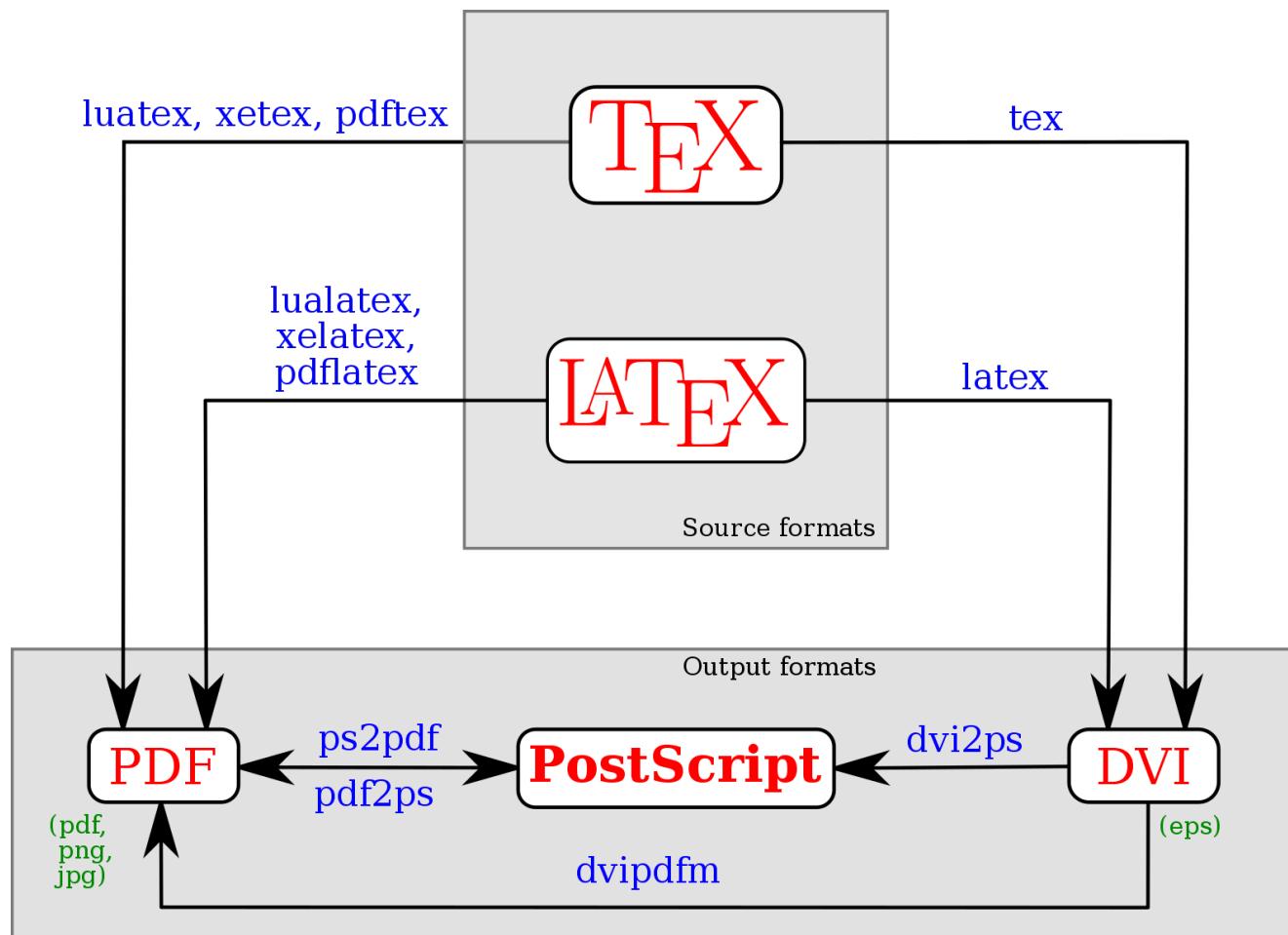
Author will take care the content, LaTex will take care the formatting!

# Latex vs. Word Processors

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- De facto standard for scientific publishing
- Very few bugs
- Good for large documents
- Can run even on **386 PC**
- Not very easy to learn

# LaTex workflow



# Required software

- Needing: LaTeX Software and Editor
- LaTeX Softwares
  - MikTex for Windows -- <https://miktex.org/>
  - proTeXt -- <http://www.tug.org/protext/>
  - TeX Live -- <http://www.tug.org/texlive/>
  - MacTex for macOS -- <http://www.tug.org/mactex>
- Editors
  - LyX
  - **TeXmaker (for macOS, Linux and Windows)**
  - TeXstudio
  - Vim

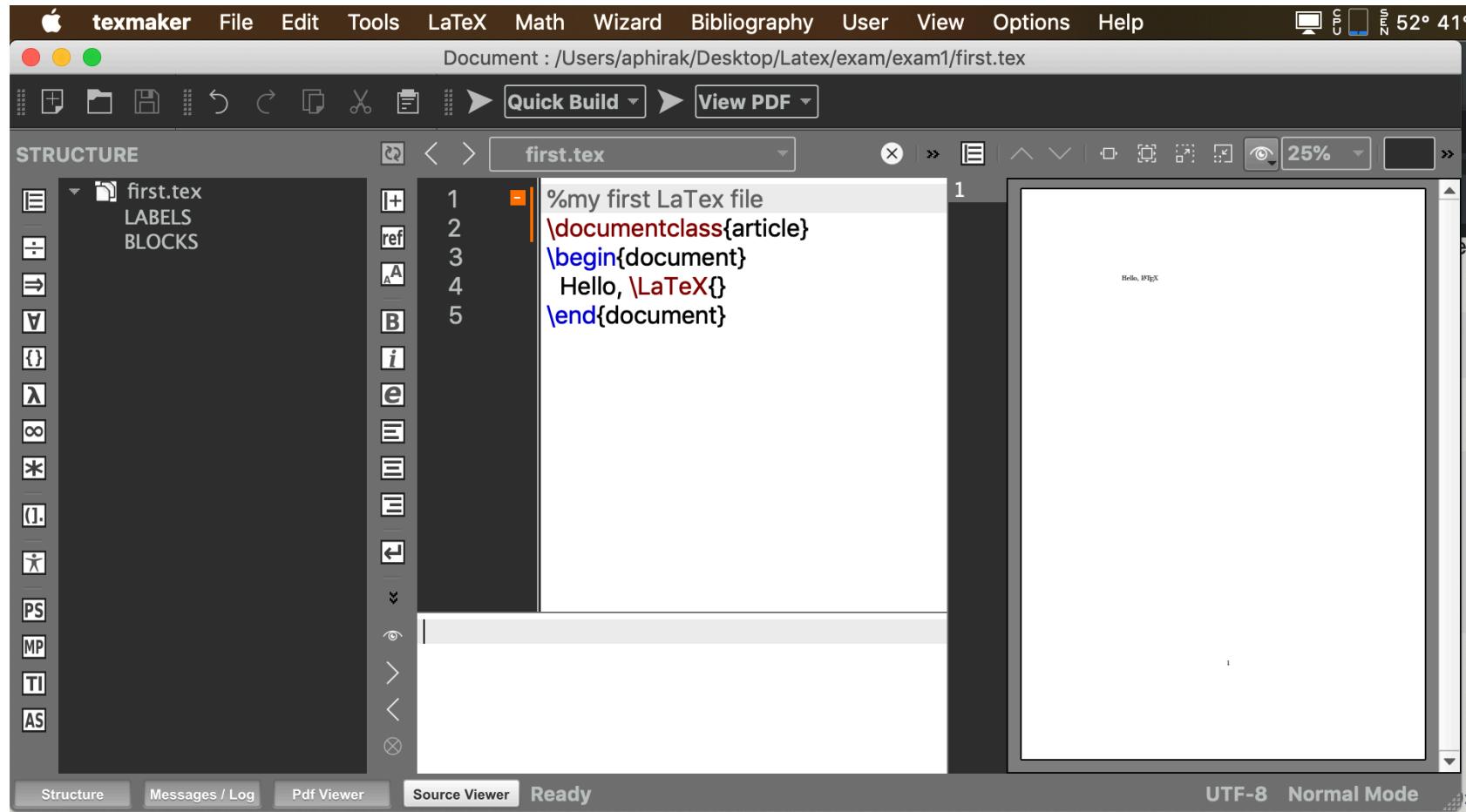
# Installing LaTex/TexXMaker: Ubuntu

- Based on ubuntu/debian distribution
  - Open working terminal

```
sudo apt-get install texlive-full  
sudo apt-get install texmaker
```

# TeXMaker

- Free cross-platform LaTeX editor

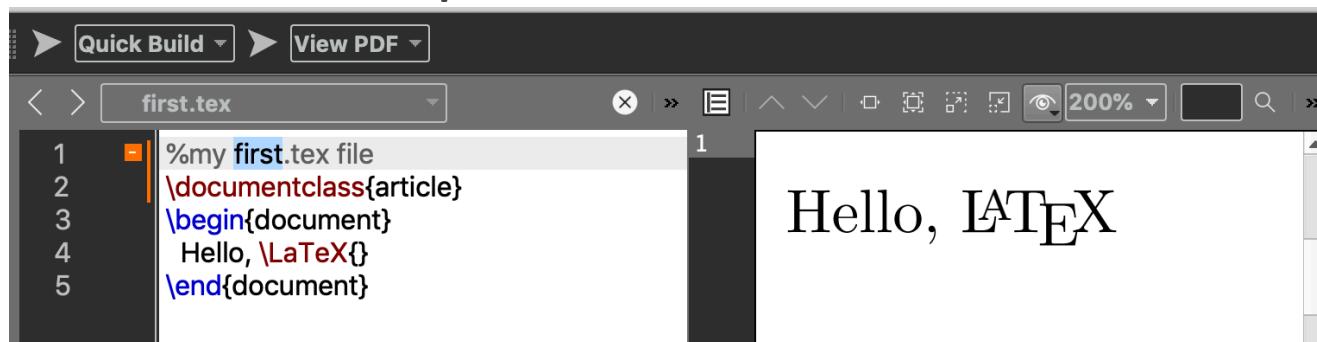


# "Hello, LaTex!"

- Open TexMaker, and then click **File**→**New**
- Writing the following code and save it as "first.tex"

```
%my first.tex file
\documentclass{article}
\begin{document}
Hello, \LaTeX{} 
\end{document}
```

- Then, click build and preview the result



# Basic LaTex document

- Must contains **three** following components

```
\documentclass{article}  
\begin{document}  
\end{document}
```

- LaTex command – case sensitive
  - Backslash – at the beginning of text markup command
- `\documentclass` command **must** appear at the very beginning of LaTeX document

```
\command[option parameter] {parameter}
```

# Files in LaTex

Input	.tex	Latex input file. Can be compiled with <code>latex</code>
	.sty	Style Macros in LaTeX, can be loaded using <code>\usepackage</code>
System	.log	Gives a detailed account of the last compiler run.
	.aux	Transports information from one compiler run to the next, and stores cross-references information.
Output	.dvi	Device Independent File, viewed DVI previewer
	.ps	.pdf

# LaTex document structure

\documentclass		To define the document type
preamble	\author{}, \title{}, \date{}	To store the author, the title, and the date
	\usepackage	To extend latex beyond its basic functionality.
	New command	To write document
\begin{document}		
\frontmatter		Before the real content, Latin numbering
\mainmatter		The content, and in Arabic numbering
\backmatter		Contains appendices, bibliography, letter numbering,
\end{document}		

# Document structure

```
%Predefined format: article, report, book, ...
\documentclass{article}

%Packages used: to add functionality and customize LaTeX
\usepackage{graphicx}
\usepackage{natbib}

\begin{document}
%document body
%Text
%bibliography references
%...
\end{document}
```

# \documentclass[option]{class}

<b>article</b>	For articles in scientific journals, presentations, short reports, program documentation, invitations, ...
<b>IEEEtran</b>	For articles with the IEEE Transactions format.
<b>proc</b>	A class for proceedings based on the article class.
<b>report</b>	For longer reports containing several chapters, small books, thesis, ...
<b>book</b>	For real books.
<b>slides</b>	For slides. The class uses big sans serif letters.
<b>memoir</b>	For changing sensibly the output of the document. It is based on the book class, but you can create any kind of document with it.
<b>letter</b>	For writing letters.
<b>beamer</b>	For writing presentations.

# \documentclass[option]{class}

10pt, 11pt, 12pt	size of the main font, default is 10pt.
a4paper,..	Defines the paper size.
twocolumn	two columns instead of one.
twoside, oneside	Specifies whether double or single sided output should be generated.
landscape	Changes the layout of the document to print in landscape mode.

## Example

```
\documentclass[12pt,a4paper,oneside, lanscape]{report}
```

# Packges

- `\usepackage[options]{package}`
- options are additional information to the package

Package	Usage
graphicx	Allows you to insert graphic files within a document.
xcolor	Adds support for colored text.
listings	To insert programming code within the document.
arabtex, babel	For Arabic language support.

# Declarations and Environments

---

- **Declarations**

- Are started once
- Take effect until further notice

Ex. `\documentclass`, `\small`, `\large`

- **Environments**

- Have matching the begin and end declarations

Ex. `\begin{document}` ... `\end{document}`

# Special characters

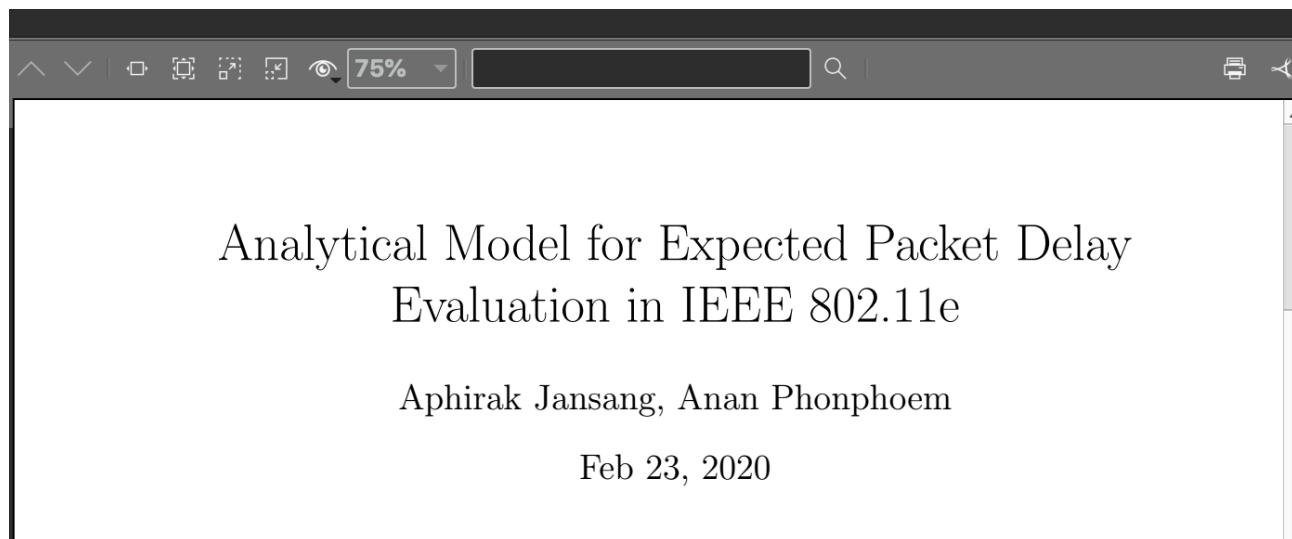
---

- Another type of command
- For printing non-standard characters or characters which usually mean something else
- Characters with special meaning:
  - Ex. \$ & % # \_ { } → \\$ \& \% \# \\_ \{ \}

# Sample document: article

```
\documentclass[12pt]{article}
\title{Analytical Model for Expected Packet Delay Evaluation in IEEE 802.11e}
\author{Aphirak Jansang, Anan Phonphoem}
\date{Feb 23, 2020}

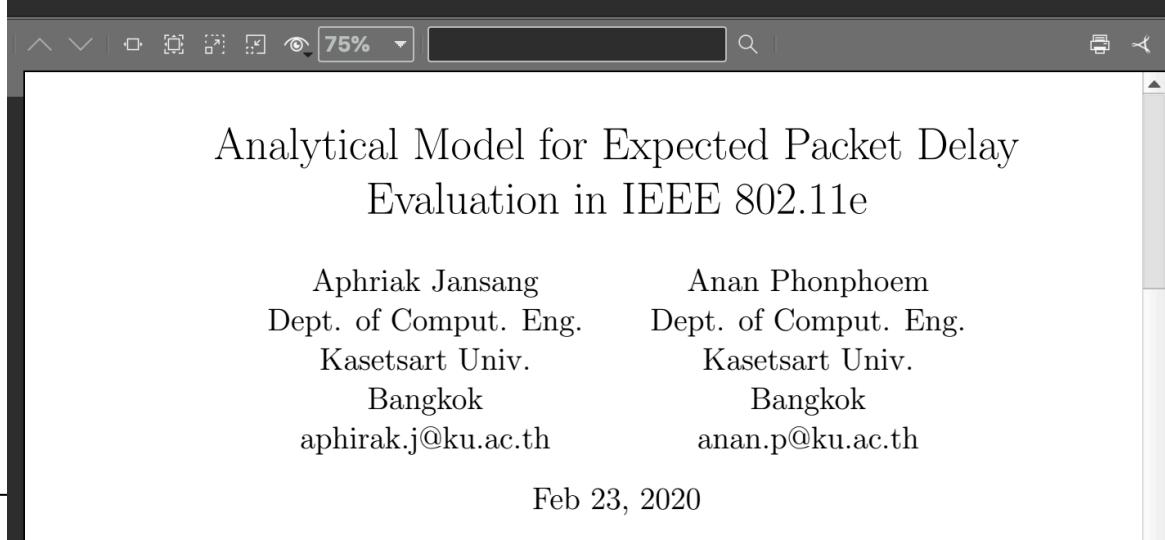
\begin{document}
\maketitle
\end{document}
```



# Sample document: article

```
\documentclass[12pt]{article}
\title{Analytical Model for Expected Packet Delay Evaluation in IEEE 802.11e}
\author{ Aphriak Jansang\\
Dept. of Comput. Eng. \\
Kasetsart Univ. \\
Bangkok \\
aphirak.j@ku.ac.th
\and
Anan Phonphoem\\
Dept. of Comput. Eng. \\
Kasetsart Univ. \\
Bangkok \\
anan.p@ku.ac.th}
\date{Feb 23, 2020}

\begin{document}
\maketitle
\end{document}
```



Analytical Model for Expected Packet Delay  
Evaluation in IEEE 802.11e

Aphriak Jansang	Anan Phonphoem
Dept. of Comput. Eng.	Dept. of Comput. Eng.
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Bangkok	Bangkok
aphirak.j@ku.ac.th	anan.p@ku.ac.th

Feb 23, 2020

# Adding abstract section

- To add abstract section into article

```
\documentclass[12pt]{article}
\title{Analytical Model for Expected Packet Delay Evaluation in IEEE 802.11e}
\author{Aphriak Jansang\\
Dept. of Comput. Eng. \\
Kasetsart Univ. \\
Bangkok \\
aphirak.j@ku.ac.th
\and
Anan Phonphoem\\
Dept. of Comput. Eng. \\
Kasetsart Univ. \\
Bangkok \\
anan.p@ku.ac.th
\date{Feb 23, 2020}
```

## Analytical Model for Expected Packet Delay Evaluation in IEEE 802.11e

Aphriak Jansang	Anan Phonphoem
Dept. of Comput. Eng.	Dept. of Comput. Eng.
Kasetsart Univ.	Kasetsart Univ.
Bangkok	Bangkok
aphirak.j@ku.ac.th	anan.p@ku.ac.th

Feb 23, 2020

**Abstract**

The abstract is placed here! Please feel free to write your abstract as long as you want.

**\begin{abstract}**

\noindent The abstract is placed here! Please feel free to write your abstract as long as you want.

**\end{abstract}**

\end{document}

# Adding section

- `\section{}`
  - Similarly, `\subsection{}`, `\subsubsection{}`, `\subsubsubsection{}`
  - LaTeX does automatic numbering. If you don't like it, use `section*{}`

## Layers of sectioning

section  
 subsection  
 subsubsection  
 paragraph  
 subparagraph

**`\section{Introduction}`**  
 Introduction content

**`\section{Related work}`**  
 Related work part

**`\subsection{QoE in Wireless Networks }`**  
QoE is Quality of Experience!

**`\subsubsection{IEEE 802.11e}`**  
IEEE 802.11e is here.

## 1 Introduction

Introduction content

## 2 Related work

Related work part

### 2.1 QoE in Wireless Networks

QoE is Quality of Experience!

#### 2.1.1 IEEE 802.11e

IEEE 802.11e is here.

# Font types

Font face:

```
\emph{Text}, \textbf{Text}, \texttt{Text}, \textrm{Text},  
\textsf{Text}, \textsc{Text}
```

Font size:

```
{\tiny Text}, {\scriptsize Text}, {\footnotesize Text},  
\small Text, {\normalsize Text}, {\large Text}, {\Large  
Text}, {\LARGE Text}, {\huge Text}, {\Huge Text}
```

Alignment:

```
\begin{center/flushright/flushleft}  
...  
\end{center/flushright/flushleft}
```

[More info: https://en.wikibooks.org/wiki/LaTeX/Text\\_Formatting](https://en.wikibooks.org/wiki/LaTeX/Text_Formatting)

# Two ways of using font size

```
1 % inline
2 {\Large This is some large text\par}
3
4 % environment
5 \begin{footnotesize}
6 ...
7 \end{footnotesize}
```

From <https://texblog.org/2012/08/29/changing-the-font-size-in-latex/#comment-5495>

# Lists

Bulleted lists:

```
\begin{itemize}
    \item Text
    \item Text
\end{itemize}
```

- Text
- Text

Numbered lists:

```
\begin{enumerate}
    \item Text
    \item Text
\end{enumerate}
```

- 1 Text
- 2 Text

# Referencing

## References

```
\section{Results}\label{res}
...
As seen in Section \ref{res} ...
```

## Footnotes

```
...telephony\footnote{Phony telephones}
```

### \section{Introduction}

The detail will be described in Section~\ref{related}

## 1 Introduction

The detail will be described in Section 2

### \section{Related work}\label{related}

Related work part

## 2 Related work

Related work part

# Bibliography management by hand

- Manually create a list of references

```
\documentclass[12pt]{article}
\begin{document}
\begin{thebibliography}{9}
\bibitem{latexcompanion}
Michel Goossens, Frank Mittelbach, and Alexander Samarin.
\textit{The \LaTeX\ Companion}.
Addison-Wesley, Reading, Massachusetts, 1993.

\bibitem{einstein}
Albert Einstein
\textit{Zur Elektrodynamik bewegter K{"o}rper}. (German)
[\textit{On the electrodynamics of moving bodies}].
Annalen der Physik, 322(10):891–921, 1905.
\end{thebibliography}
\end{document}
```

#of bibitem entries

## References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. *Zur Elektrodynamik bewegter K{"o}rper*. (German) [*On the electrodynamics of moving bodies*]. Annalen der Physik, 322(10):891921, 1905.

# Citations

## • `\cite{bibtexkey}`

```
1 \documentclass[12pt]{article}
2 \begin{document}
3 \section{First section}
4
5 This document is an example of \texttt{\thebibliography} environment using in bibliography management. Three items
6 are cited: \textit{The \LaTeX\ Companion} book
7 \cite{latexcompanion}, the Einstein journal paper
8 \cite{einstein}.
9
10
11 \begin{thebibliography}{9}
12 \bibitem{latexcompanion}
13 Michel Goossens, Frank Mittelbach, and Alexander Samarin.
14 \textit{The \LaTeX\ Companion}.
15 Addison-Wesley, Reading, Massachusetts, 1993.
16
17 \bibitem{einstein}
18 Albert Einstein.
19 \textit{Zur Elektrodynamik bewegter Körper}. (German)
20 [\textit{On the electrodynamics of moving bodies}].
21 Annalen der Physik, 322(10):891-921, 1905.
22 \end{thebibliography}
23 \end{document}
```

## 1 First section

This document is an example of `thebibliography` environment using in bibliography management. Three items are cited: *The L<sup>A</sup>T<sub>E</sub>X Companion* book [1], the Einstein journal paper [2].

## References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. *Zur Elektrodynamik bewegter Körper*. (German) [*On the electrodynamics of moving bodies*]. *Annalen der Physik*, 322(10):891-921, 1905.

[1] is referred by `\cite{latexcompanion}`  
[2] Is referred by `\cite{einstein}`

# Bibliography management by BibTex

- By using BibTex, the bibliography entries are kept in a separate file (.bib) and then imported into the main document

```
1 @article{einstein,
2     author = "Albert Einstein",
3     title = "{Zur Elektrodynamik bewegter K{"o}rper}.
4         ({German})
5         [{On} the electrodynamics of moving bodies]",
6     journal = "Annalen der Physik",
7     volume = "322",
8     number = "10",
9     pages = "891--921",
10    year = "1905",
11    DOI = "http://dx.doi.org/10.1002/andp.19053221004"
12 }
13
14 @book{latexcompanion,
15     author = "Michel Goossens and Frank Mittelbach and
16             Alexander Samarin",
17     title = "The \LaTeX\ Companion",
18     year = "1993",
19     publisher = "Addison-Wesley",
20     address = "Reading, Massachusetts"
21 }
```

# Bibtex File Management Software

JabRef - /Users/aphirak/Desktop/research.bib\* (BibTeX mode)

File Edit Search Groups View BibTeX Quality Tools Options Help

Search... Filter ?

research.bib\*

#	entryty...	author/editor	title	year	journal/bookt...	bibtexkey	ranking
1	Book	Goossens et al.	The Companion	1993		latexcomp...	
2	Article	Einstein	Zur Elektrodynamik bewegter Körper. (German) [On the ... 1905	1905	Annalen der P...	einstein	

**X**  Required fields  Optional fields  Deprecated fields  General  Abstract  Comments  Related articles  BibTeX source

**Book**

Title

Publisher

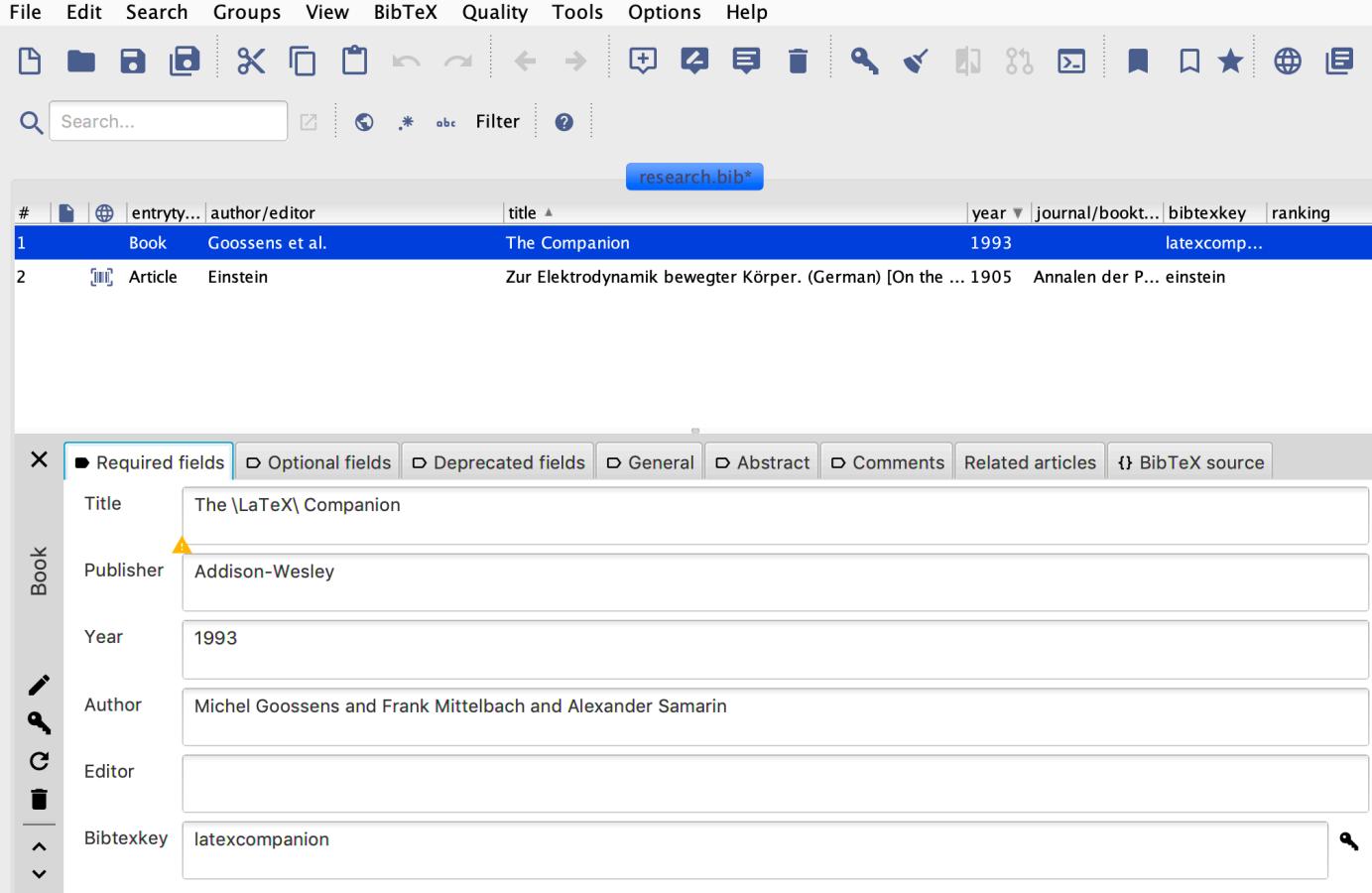
Year

Author

Editor

Bibtexkey  

Status: Preview style changed to: Preview



# main TeX file with BibTex

```

1 \documentclass[12pt]{article}
2 \begin{document}
3 \section{First section}
4
5 This document is an example of \texttt{\thebibliography}
6 environment using in bibliography management. Three items
7 are cited: \textit{The \LaTeX\ Companion} book
8 \textit{\textrm{latexcompanion}}, the Einstein journal paper
9 \textit{\textrm{einstein}}.
10
11 \bibliographystyle{unsrt}
12 \bibliography{research}
13
14 \end{document}

```

Bibtex file: research.bib

## 1 First section

This document is an example of `\thebibliography` environment using in bibliography management. Three items are cited: *The L<sup>A</sup>T<sub>E</sub>X Companion* book [1], the Einstein journal paper [2].

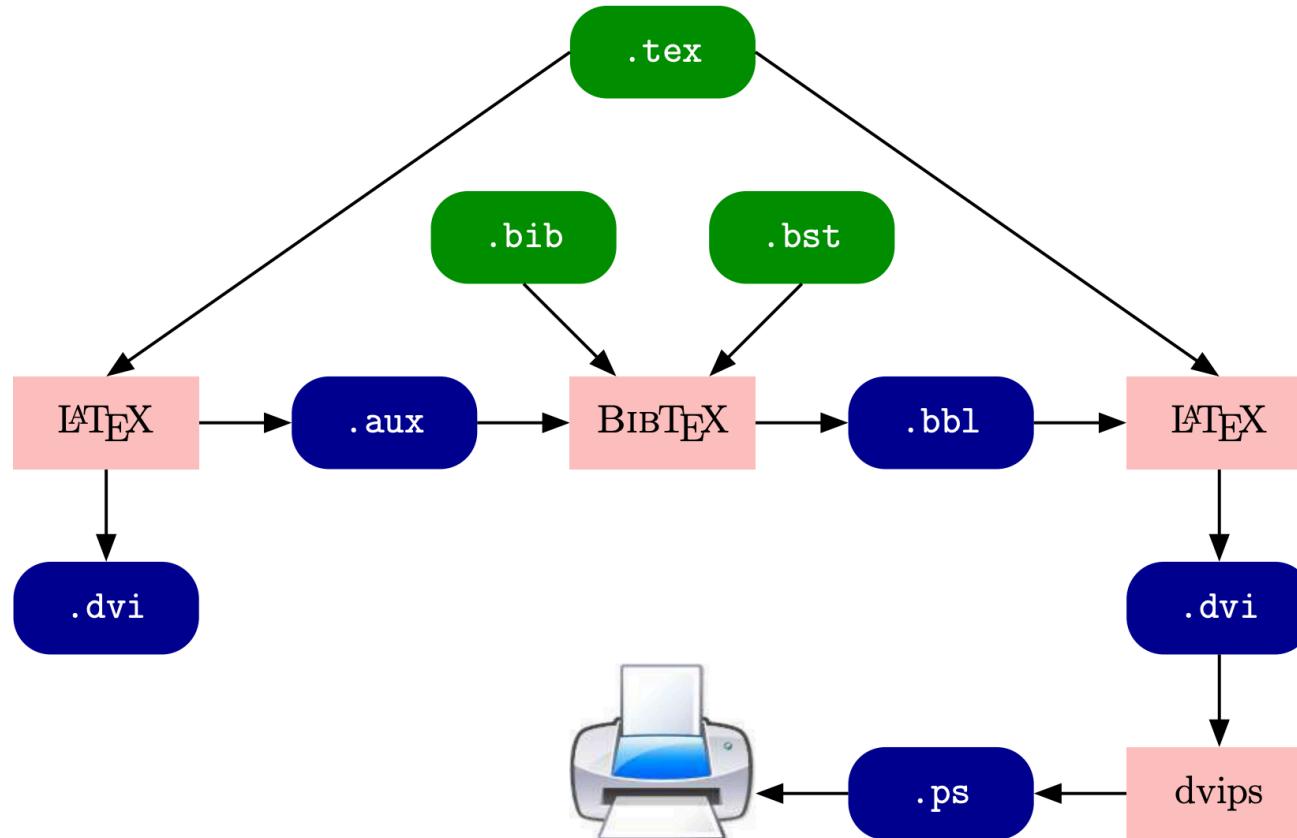
## References

- [1] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The L<sup>A</sup>T<sub>E</sub>X Companion*. Addison-Wesley, Reading, Massachusetts, 1993.
- [2] Albert Einstein. Zur Elektrodynamik bewegter Körper. (German) [On the electrodynamics of moving bodies]. *Annalen der Physik*, 322(10):891–921, 1905.

# Bibliography styles in LaTex

Style Name	Author Name Format	Reference Format	Sorting
unsrt	Homer Jay Simpson	#ID#	as referenced
plain	Homer Jay Simpson	#ID#	by author
alpha	Homer Jay Simpson	Sim95	by author
acm	Simpson, H. J.	#ID#	
abbrv	H. J. Simpson	#ID#	by author

# Bibtex workflow



\*Taken from Biblet: A portable BibTEX bibliography style for generating highly customizable XHTML by Tristan Miller

# Figures in LaTex

- \usepackage{graphicx}
- Default: the same location as .tex file
- To specify a separate images directory:

```
\usepackage{graphicx}  
\graphicspath{ {images/} }
```

- To specify more than one separate images directories

```
\usepackage{graphicx}  
\graphicspath{ {images1/} {images2} }
```

# \includegraphics[options]{imgfile}

width=xx	width of the imported image to xx.
height=xx	height of the imported image to xx.
keepaspectratio	scale the image according to both height and width [true/false]
scale=xx	Scales the image by the desired factor.
angle=xx	rotates the image by xx degrees
trim=l b r t	crops the image [left, bottom, right, top]
resolution=x	Specify image resolution in dpi

Graphics formats: (at least) JPG, PNG, PDF...

(If you're using pdflatex. With **latex** and **dvips**, only embedded PostScript (eps) figures are supported. This can be confusing...)

# Figure Caption and Position

```
\begin{figure}
\center
\includegraphics[options]{imgfile}
\caption{imagefile caption}
\label{fig:imgfile}
\end{figure}
```

```
\begin{figure}[h]
\center
\includegraphics{kulogo.jpg}
\caption{KU Logo}
\label{fig:kulogo}
\end{figure}
```

\ref{fig:kulogo}



Figure 1: KU Logo

# \begin{figure} \end{figure}

```
\begin{figure}[placement specifier]
... figure contents ...
\end{figure}
```

Specifier	Permission
<code>h</code>	Place the float <i>here</i> , i.e., <i>approximately</i> at the same point it occurs in the source text (however, not <i>exactly</i> at the spot)
<code>t</code>	Position at the <i>top</i> of the page.
<code>b</code>	Position at the <i>bottom</i> of the page.
<code>p</code>	Put on a special <i>page</i> for floats only.
<code>!</code>	Override internal parameters LaTeX uses for determining "good" float positions.
<code>H</code>	Places the float at precisely the location in the LaTeX code. Requires the <code>float</code> package, <sup>[1]</sup> i.e., <b>\usepackage{float}</b> .

# To generate Figures and Graphs

---

- Figures

- xfig
- dia
- latex
- PowerPoint
- Word plus screenshot

- Graphs

- R
- Matlab
- Gnuplot
- Excel
- Python: matplotlib



# Typesetting Math

## $\text{\LaTeX}$ math support

$$\int_a^b \frac{d\theta}{1+\theta^2} = \tan^{-1} b - \tan^{-1} a$$

## Using math mode

Inline math mode: \$...\$

$$\int_1^\infty e^{-x} dx \quad \sum_{n=0}^\infty n!$$

Display math mode: \$\$...\$\$

Numbered equations: \begin{equation} ... \end{equation}

# Greek letters

- $\nu$  is \nu
- $\xi$  is \xi
- $\circ$  is o
- $\pi$  is \pi
- $\varpi$  is \varpi
- $\rho$  is \rho
- $\varrho$  is \varrho
- $\sigma$  is \sigma
- $\zeta$  is \zeta
- $\eta$  is \eta
- $\theta$  is \theta
- $\vartheta$  is \vartheta
- $\iota$  is \iota
- $\kappa$  is \kappa
- $\lambda$  is \lambda
- $\mu$  is \mu
- $\alpha$  is \alpha
- $\beta$  is \beta
- $\gamma$  is \gamma
- $\delta$  is \delta
- $\epsilon$  is \epsilon
- $\varepsilon$  is \varepsilon

# Inline Math mode

---

974	$\$974\$$
$4 + 2$	$\$4+2\$$
$\sqrt[3]{5}$	$\$\\sqrt[3]{5}\$$
$\frac{x}{y}$	$\$\\frac{x}{y}\$$
$A_y^x$	$\$A^x_y\$$
$\sum_{k=1}^n k$	$\$\\sum_{k=1}^n k\$$
$2 \neq 4$	$\$2 \\neq 4\$$
$\phi \in \Psi$	$\$\\phi \\in \\Psi\$$
$\hat{i} \times \hat{j} = \hat{k}$	$\$\\hat{i} \\times \\hat{j} = \\hat{k}\$$
$f''(\xi)$	$\$f''(\\xi)\$$
$\text{CH}_3\text{COOH}$	$\text{CH\$}_3\text{\$COOH}$
$180^\circ\text{C}$	$\$180\\circ\$$

... runs in  $\$\\Theta(\\log n)\$$  time ...

# Math mode

Method	Special Characteristics	Usage
<code>\$....\$</code>	None	In-line math
<code>\begin{equation}</code> <code>\end{equation}</code>	Goes to a newline and center equation with label	Equations
<code>\[ .... \]</code>	Goes to a newline and center equation	Equations with no label

inline math mode:  $\sqrt[10]{\frac{a}{b}}$ .

inline math mode:  $\sqrt[10]{\frac{a}{b}}$ .

As shown in Eq.~\ref{eq:m1}

```
\begin{equation}
y=\sqrt[10]{\frac{a}{b}}
\label{eq:m1}
\end{equation}
```

As shown in Eq. 1

$$y = \sqrt[10]{\frac{a}{b}} \quad (1)$$

# amsmath

- \usepackage{amsmath}



The **amsmath** part is an extension package for LaTeX that provides various features to facilitate writing math formulas and to improve the typographical quality of their output.

- For more information
  - <https://ctan.org/pkg/amsmath?lang=en>

# Math exercises

Write the follow basic equations in  $\text{\LaTeX}$ .

$$2 = \frac{3}{2} + \frac{1}{2}$$

$$\frac{n(n+1)}{2} = \sum_{i=1}^n i$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

# Math exercises

---

Here are some trickier equations (not just math) to try:

$$\oint \mathbf{B} \cdot d\mathbf{S} = \mu_0 \epsilon_0 \frac{d\Phi_E}{dt} + \mu_0 i_{enc}$$

$$k = A e^{-E_A/RT}$$

$$K_a = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$$

$$V = \left( \bigoplus_{\lambda \in \text{Spec}(T)} V^{(\lambda)} \right) \oplus V^{\text{non-sp}}$$

# Online Math editor

- <https://www.mathcha.io/>
- Import/Export Math from LaTex



**35k<sup>+</sup>** users registered, **120k<sup>+</sup>** documents created

[Open Editor](#)



Desktop (offline) version, built for your privacy

[Get Notebook](#)

# Tables in Latex

- Using tabular environment

```
\begin{tabular}[pos]{table spec}
...
\end{tabular}
```

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

```
\begin{tabular}{ l c r }
  1 & 2 & 3 \\
  4 & 5 & 6 \\
  7 & 8 & 9 \\
\end{tabular}
```

1	2	3
4	5	6
7	8	9

# Tables in Latex

- Using tabular environment
  - Defining row

```
\begin{tabular}{l c r}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9 \\
\end{tabular}
```

1	2	3
4	5	6
7	8	9

&	column separator
\backslash	start new row (additional space may be specified after \\\ using square brackets, such as \\[6pt])
\hline	horizontal line
\newline	start a new line within a cell (in a paragraph column)
\cline{i-j}	partial horizontal line beginning in column $i$ and ending in column $j$

# Example: table with vertical lines

```
\begin{tabular}{ l | c | r }
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9 \\
\end{tabular}
```

1	2	3
4	5	6
7	8	9

# Example: table horizontal lines

```
\begin{tabular}{ l | c | r }
\hline
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9 \\
\hline
\end{tabular}
```

1	2	3
4	5	6
7	8	9

# Example

```
\begin{center}
\begin{tabular}{ l | c | r }
\hline
1 & 2 & 3 \\
\hline
4 & 5 & 6 \\
\hline
7 & 8 & 9 \\
\hline
\end{tabular}
\end{center}
```

1	2	3
4	5	6
7	8	9

# Example: \cline{}

```
\begin{tabular}{|r|l|}
\hline
7C0 & hexadecimal \\
3700 & octal \\ \cline{2-2}
11111000000 & binary \\
\hline \hline
1984 & decimal \\
\hline
\end{tabular}
```

7C0	hexadecimal
3700	octal
11111000000	binary
1984	decimal

# Rows spanning multiple columns

```
\begin{tabular}{ |1|1| }
\hline
\multicolumn{2}{|c|}{Team sheet} \\
\hline
GK & Paul Robinson \\
LB & Lucas Radebe \\
DC & Michael Duberry \\
DC & Dominic Matteo \\
RB & Dider Domi \\
MC & David Batty \\
MC & Eirik Bakke \\
MC & Jody Morris \\
FW & Jamie McMaster \\
ST & Alan Smith \\
ST & Mark Viduka \\
\hline
\end{tabular}
```

Team sheet	
GK	Paul Robinson
LB	Lucus Radebe
DC	Michael Duberry
DC	Dominic Matteo
RB	Dider Domi
MC	David Batty
MC	Eirik Bakke
MC	Jody Morris
FW	Jamie McMaster
ST	Alan Smith
ST	Mark Viduka

# Columns spanning multiple rows

```
...
\usepackage{multirow}
...

\begin{tabular}{ |1|1|1| }
\hline
\multicolumn{3}{ |c| }{Team sheet} \\
\hline
Goalkeeper & GK & Paul Robinson \\ \hline
\multirow{4}{*}{Defenders} & LB & Lucas Radebe \\
& DC & Michael Duberry \\
& DC & Dominic Matteo \\
& RB & Didier Domi \\ \hline
\multirow{3}{*}{Midfielders} & MC & David Batty \\
& MC & Eirik Bakke \\
& MC & Jody Morris \\ \hline
Forward & FW & Jamie McMaster \\ \hline
\multirow{2}{*}{Strikers} & ST & Alan Smith \\
& ST & Mark Viduka \\ \hline
\end{tabular}
```

Team sheet		
Goalkeeper	GK	Paul Robinson
Defenders	LB	Lucas Radebe
	DC	Michael Duberry
	DC	Dominic Matteo
	RB	Didier Domi
Midfielders	MC	David Batty
	MC	Eirik Bakke
	MC	Jody Morris
Forward	FW	Jamie McMaster
Strikers	ST	Alan Smith
	ST	Mark Viduka

# Table Caption, Referencing, and List of Tables

```
\begin{table}[h]
    <Table Design>
    \caption{text}
    \label{table:simparam1}
\end{table}
```

# Online LaTex table generator

- <https://www.tablesgenerator.com/>

**LaTeX Tables Generator**

File ▾ Edit ▾ Table ▾ Column ▾ Row ▾

**Format:**  A  B  I  U

	A	B	C
1	Item		
2	Animal	Description	Price (\$)
3	Gnat	per gram	13.65
4		each	0.01
5	Gnu	stuffed	92.50
6	Emu	stuffed	33.33
7	Armadillo	frozen	8.99

**Result** (click "Generate" to refresh)

```

1 | \begin{table}□
2 | \begin{tabular}{llr}
3 | \hline
4 | \multicolumn{2}{c}{Item} & \\ \cline{1-2}
5 | Animal & Description & Price (\$) \\ \hline
6 | Gnat & per gram & 13.65 \\
7 | & each & 0.01 \\
8 | Gnu & stuffed & 92.50 \\
9 | Emu & stuffed & 33.33 \\
10 | Armadillo & frozen & 8.99 \\ \hline
11 | \end{tabular}
12 | \end{table}

```

Escape special TeX symbols (%,&\_,#, \$)  
 Compress whitespace  Smart output formatting

# Thai language in Latex

- Using XeLaTex, TH Sarabun New font for Thai language

```
\documentclass{article}

\usepackage{fontspec}
\setmainfont[Scale=1.2]{TH Sarabun New}
\XeTeXlinebreaklocale "th_TH"
\XeTeXlinebreakskip = Opt plus 1pt
\linespread{1.2}

\begin{document}

\end{document}
```

# Using TTF fonts for Thai language

```
\usepackage{fontspec}
\setmainfont[Scale=1.2,
    BoldFont={THSarabunNew_Bold.ttf},
    ItalicFont={THSarabunNew_Italic.ttf},
    BoldItalicFont={THSarabunNew_BoldItalic.ttf},
]{THSarabunNew.ttf}
\XeTeXlinebreaklocale "th_TH"
\XeTeXlinebreakskip = Opt plus 1pt
\linespread{1.2}
```

 mainThai.tex	Today 17:48
 THSarabunNew_Bold.ttf	15 Nov BE 2562 00:09
 THSarabunNew_BoldItalic.ttf	15 Nov BE 2562 00:10
 THSarabunNew_Italic.ttf	15 Nov BE 2562 00:07
 THSarabunNew.ttf	15 Nov BE 2562 00:05

# Example: Thai document

```
\documentclass{article}
\usepackage{fontspec}
\setmainfont[Scale=1.2,
    BoldFont={THSarabunNew_Bold.ttf},
    ItalicFont={THSarabunNew_Italic.ttf},
    BoldItalicFont={THSarabunNew-BoldItalic.ttf},
]{THSarabunNew.ttf}
\XeTeXlinebreaklocale "th_TH"
\XeTeXlinebreakskip = Opt plus 1pt
\linespread{1.2}

%\usepackage{xltxtra} % for backward compatibility
\title{การใช้งาน Latex กับภาษาไทย }
\author{aphirak.j}
\date{February 2020}
\usepackage{natbib}
\usepackage{graphicx}
\begin{document}
\maketitle
\section{บทนำ}
\begin{abstract}

```

