

LATEX Introduction

Raja Sher Afgun Usmani

April 8, 2019

Contents

- Introduction to LATEX
- What is LATEX ?
- LATEX Vs Ms-Word

 Output

 Description

 Output
- 6 How to Install?
- Mikitex.exe Installation.
- TeXStudio Installation
- Mathematical symbols
- Examples
- Totorial

LATEX Introduction

- ► LATEX (pronounced lay-tek) is a document preparation system for producing professional-looking documents
- ► It is not a **MS-Word** processor

What is LATEX

► LATEX is a bundle of software used by researchers to prepare their research documents.

LaTeX is...

- Document preparation system
- 4 High-quality typesetting
- Used for medium-to-large technical or scientific documents
- Not a word processor

Features and Components of LATEX

LATEX can be used for:

- Typesetting journal articles, technical reports, books, and slide presentations
- Managing large documents containing sectioning, cross-references, tables and figures
- Typesetting of complex mathematical formulas
- 4 Automatic generation of bibliographies and indexes
- Multi-lingual typesetting

LATEX Vs Ms-Word

- Microsoft Word is 'What You See Is What You Get' (WYSIWYG), this means
- ▶ You can see how the final document will look as you are typing. —
- When working in this way you will probably make changes to the document's appearance (such as line spacing, headings, page breaks) as you type.

But

With LaTeXyou do not see how the final document will look while you are typing it — this allows you to concentrate on the content rather than appearance.

Before you Start

- ► Actions for you to carry out are bulleted with an arrow ⇒
- Text you type is written in this font.
- Menu commands and button names are shown in bold.

Basic Body of LATEX

```
\documentclass[a4paper,12pt]{article}
\begin{document}
```

A sentence of text.

\end{document}

How to Install....??

- Very easy to install.
- ▶ Just two steps for installation.

How to Install....??

- Very easy to install.
- Just two steps for installation.
- Download and install mikitex 2.9.exe https://miktex.org/download

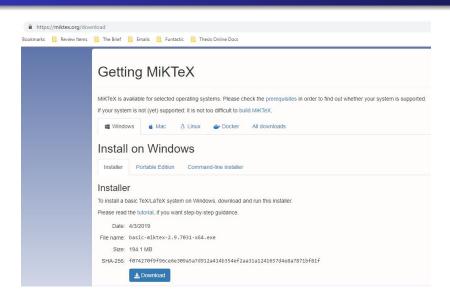
How to Install...??

- Very easy to install.
- Just two steps for installation.
- Download and install mikitex 2.9 exe https://miktex.org/download
- Download TeXstudio and then install. https://www.texstudio.org/

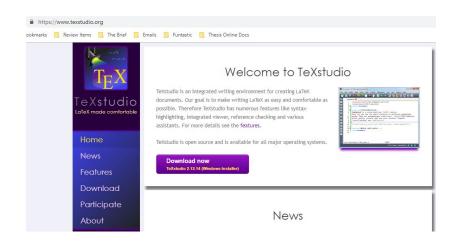
How to Install...??

- Very easy to install.
- Just two steps for installation.
- Download and install mikitex 2.9 exe https://miktex.org/download
- Download TeXstudio and then install. https://www.texstudio.org/

Installation Process



Installation Process



Basic Body for latex using...

When $\LaTeX 2_{\varepsilon}$ processes an input file, it expects it to follow a certain structure. Thus every input file must start with the command

```
\documentclass{...}
```

This specifies what sort of document you intend to write. After that, add commands to influence the style of the whole document, or load packages that add new features to the LATEX system. To load such a package you use the command

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

When all the setup work is done, you start the body of the text with the command

```
\begin{document}
```

Now you enter the text mixed with some useful LATEX commands. At the end of the document you add the

```
\end{document}
```

Basic Body for latex using...

```
\documentclass{article}
\begin{document}
Small is beautiful.
\end{document}
```

Main Body for latex

\documentclass[options]{class}

\documentclass[11pt,twoside,a4paper]{article}

\usepackage[options]{package}

How to use in mathematics

As earlier mentioned that:

- ▶ It helps in writing mathematical equations
- Different methods or packages are used
- Normally dollar sign \$ is used to write the equations.
- Examples are shown in coming slides

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

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

\TeX{} is pronounced as
\$\tau\epsilon\chi\$\\[5pt]
100-m\$^{3}\$ of water\\[5pt]
This comes from my \$\heartsuit\$

TEX is pronounced as $\tau \epsilon \chi$ 100 m³ of water This comes from my \heartsuit

```
Add $a$ squared and $b$ squared to get $c$ squared. Or, using a more mathematical approach \begin{equation} a^2 + b^2 = c^2 \end{equation} Einstein says \begin{equation} E = mc^2 \label{clever} \end{equation} He didn't say \begin{equation} 1 + 1 = 3 \tag{dumb} \end{equation}
This is a reference to
```

Add a squared and b squared to get c squared. Or, using a more mathematical approach

$$a^2 + b^2 = c^2 (3.1)$$

Einstein says

$$E = mc^2 (3.2)$$

He didn't sav

$$1 + 1 = 3 \tag{dumb}$$

This is a reference to (3.2).

\egref{clever}.

This is text style: $\lim_{n\to\infty}\sum_{k=1}^n\frac{1}{k^2}=\frac{\pi^2}{6}$. And this is display style:

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{1}{k^2} = \frac{\pi^2}{6}$$



A $d_{e_{e_p}}$ mathematical expression followed by a $h^{i^{g^h}}$ expression. As opposed to a smashed $d_{e_{e_p}}$ expression followed by a $h^{i^{g^h}}$ expression.

\$0.\overline{3} =
\underline{\underline{1/3}}\$

$$0.\overline{3} = \underline{\underline{1/3}}$$

$$\sum_{\substack{0 < i < n \\ j \subseteq i}}^n P(i,j) = Q(i,j)$$

```
\begin{multline}
a + b + c + d + e + f
+ g + h + i
\\
= j + k + l + m + n
\end(multline)
```

$$\begin{aligned} a+b+c+d+e+f+g+h+i \\ &= j+k+l+m+n \quad (3.4) \end{aligned}$$

```
\begin{align}
    a & = b + c \\
    & = d + e + f + g + h + i
    + j + k + 1 \nonumber \\
    & + m + n + o \\
    & = p + q + r + s
\end{align}
```

$$\begin{aligned} a &= b + c & (3.9) \\ &= d + e + f + g + h + i + j + k + l \\ &+ m + n + o & (3.10) \\ &= p + q + r + s & (3.11) \end{aligned}$$

```
\begin{equation*}
P = \frac{\displaystyle{
  \sum_{i=1}^n (x_i- x)
  (y_i- y)}
  {\displaystyle{\left[
  \sum_{i=1}^n(x_i-x)^2
  \sum_{i=1}^n(y_i- y)^2
  \right]^{1/2}}
\end{equation*}
```

$$P = \frac{\sum_{i=1}^{n} (x_i - x)(y_i - y)}{\left[\sum_{i=1}^{n} (x_i - x)^2 \sum_{i=1}^{n} (y_i - y)^2\right]^{1/2}}$$

How to write the different brackets??



```
\alpha
                  \theta
                                                  \upsilon
                                  0
                  \vartheta
\beta
                                  \pi
                                                  \phi
                  \iota
                                  \varpi
                                                  \varphi
\gamma
\delta
                  \kappa
                                  \rho
                                                  \chi
\epsilon
                  \lambda
                                                  \psi
                                  \varrho
\varepsilon
                                  \sigma
                  \mu
                                                  \omega
\zeta
                  \nu
                                  \varsigma
\eta
                  \xi
                                  \tau
\Gamma
                  \Lambda
                                  \Sigma
                                              Ψ \Psi
\Delta
                  \Xi
                                  \Upsilon
                                              \Omega \Omega
\Theta
              П
                  \Pi
                                  \Phi
```

```
<
   <
                      >
   \leg or \le
                      \geq or \ge
                                        \equiv
   \11
                                        \doteq
                      \gg
   \prec
                      \succ
                                        \sim
   \preceq
                      \succeq
                                        \simeq
   \subset
                      \supset
                                        \approx
   \subseteq
                      \supseteq
                                        \cong
   \sasubset a
                      \sasupset a
                                        \.Ioin a
   \sqsubseteq
                      \sqsupseteq
                                        \bowtie
   \in
                      \ni . \owns
                                        \propto
   \vdash
                      \dashv
                                        \models
   \mid
                      \parallel
                                        \perp
   \emile
                      \frown
                                        \asvmp
```



BIG Operators.

Σ	\sum	U	\bigcup	V	\bigvee
Π	\prod	\cap	\bigcap	\wedge	\bigwedge
\coprod	\coprod		\bigsqcup	+	\biguplus
ſ	\int	∮	\oint	0	\bigodot
\oplus	\bigoplus	\otimes	\bigotimes		

Arrows.

\leftarrow	\leftarrow or \gets	\leftarrow	\longleftarrow
\rightarrow	\rightarrow or \to	\longrightarrow	\longrightarrow
\leftrightarrow	\leftrightarrow	\longleftrightarrow	\longleftrightarrow
\Leftarrow	\Leftarrow	\leftarrow	\Longleftarrow
\Rightarrow	\Rightarrow	\Longrightarrow	\Longrightarrow
\Leftrightarrow	\Leftrightarrow	\iff	\Longleftrightarrow
\mapsto	\mapsto	\longmapsto	\longmapsto
\leftarrow	\hookleftarrow	\hookrightarrow	\hookrightarrow
_	\leftharpoonup	\rightarrow	\rightharpoonup
$\overline{}$	\leftharpoondown	\rightarrow	\rightharpoondown
\rightleftharpoons	\rightleftharpoons	\iff	\iff (bigger spaces)
\uparrow	\uparrow	+	\downarrow
1	\updownarrow	1	\Uparrow
1	\Downarrow	1	\Updownarrow
>	\nearrow	>	\searrow
1	\swarrow	K	\nwarrow
\sim	\leadsto a		

^aUse the latexsym package to access this symbol

Miscellaneous Symbols.

	\dots		\cdots	:	\vdots	•	\ddots
\hbar	\hbar	\imath	\imath	J	\jmath	ℓ	\ell
R	\Re	3	\Im	×	\aleph	80	\wp
\forall	\forall	∃	\exists	Ω	\mho a	∂	\partial
1	,	1	\prime	Ø	\emptyset	∞	\infty
∇	\nabla	\triangle	\triangle		$\operatorname{\backslash} \operatorname{Box}^a$	\Diamond	$\Diamond ^a$
\perp	\bot	\top	\top	1	\angle	\checkmark	\surd
\Diamond	\diamondsuit	\Diamond	\heartsuit	*	\clubsuit		\spadesuit
\neg	\neg or \lnot	b	\flat	þ	\natural	#	\sharp

 $^a\mathrm{Use}$ the latex sym package to access this symbol

Non-Mathematical Symbols.

These symbols can also be used in text mode.

```
† \dag \S \S \bigcirc \copyright \bigcirc \textregistered \bigcirc \dag \P \P \bigcirc \pounds \% \%
```

Thank You...!