LaTeXday, morning session
Discovering LaTeX

Maxime Folschette Guillaume Perez Benjamin Miraglio

I3S, team MDSC
maxime.folschette@i3s.unice.fr, guillaume.perez@i3s.unice.fr, miraglio@i3s.unice.fr

Association des Doctorants en STIC de l'Université Nice Sophia-Antipolis

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Morning session outline

- general introduction to LaTeX
- installation of LaTeXon all the devices
- structuration and basic formatting of a document
- insertion of title pages, tables of content
- handling tables and figures
- basic introduction to mathematical expressions in LaTeX

Introduction

What is LaTeX?

- a typesetting software
- a tool allowing to quickly produce professional/scientific documents of great quality
- a versatile tool: thesis, reports, publications, books, letters, C.V., presentations ...

What is not LaTeX?

- a word processor
- a tool that can be used without any skill (hence this session !)

Comparison with Microsoft Word and LibreOffice Writer

Microsoft Word / LibreOffice Writer

- What You See (on the screen) Is What You Get : WYSIWYG
- no skill are needed for a basic use
- graphical interface
- formatting your document can be difficult
- incompatibilities between different versions
- poor handling of bibliography and mathematical expressions

Comparison with Microsoft Word and LibreOffice Writer

LaTeX

- distinguish the actual content of the document from its presentation format
- initial learning required for a basic use
- handle more swiftly big documents
- better compatibility between installations
- good handling of bibliography and mathematical expressions

Base principle

- a LaTeXdocument need to be compiled to make a pdf document
  - at first: LaTeXdocument in plain text (.tex)
  - in the end: PDF document (.pdf)
- the part of LaTeXcompiling your document is called the **LaTeXdistribution**
- the program that will help you write your LaTeXdocument is called the **editor**

LaTeXon different OS

Windows 

Distribution MiKTeX ⇒ `http://miktex.org`

Editor Texmaker ⇒ `http://www.xm1math.net/texmaker/index_fr.html`

Mac OS 

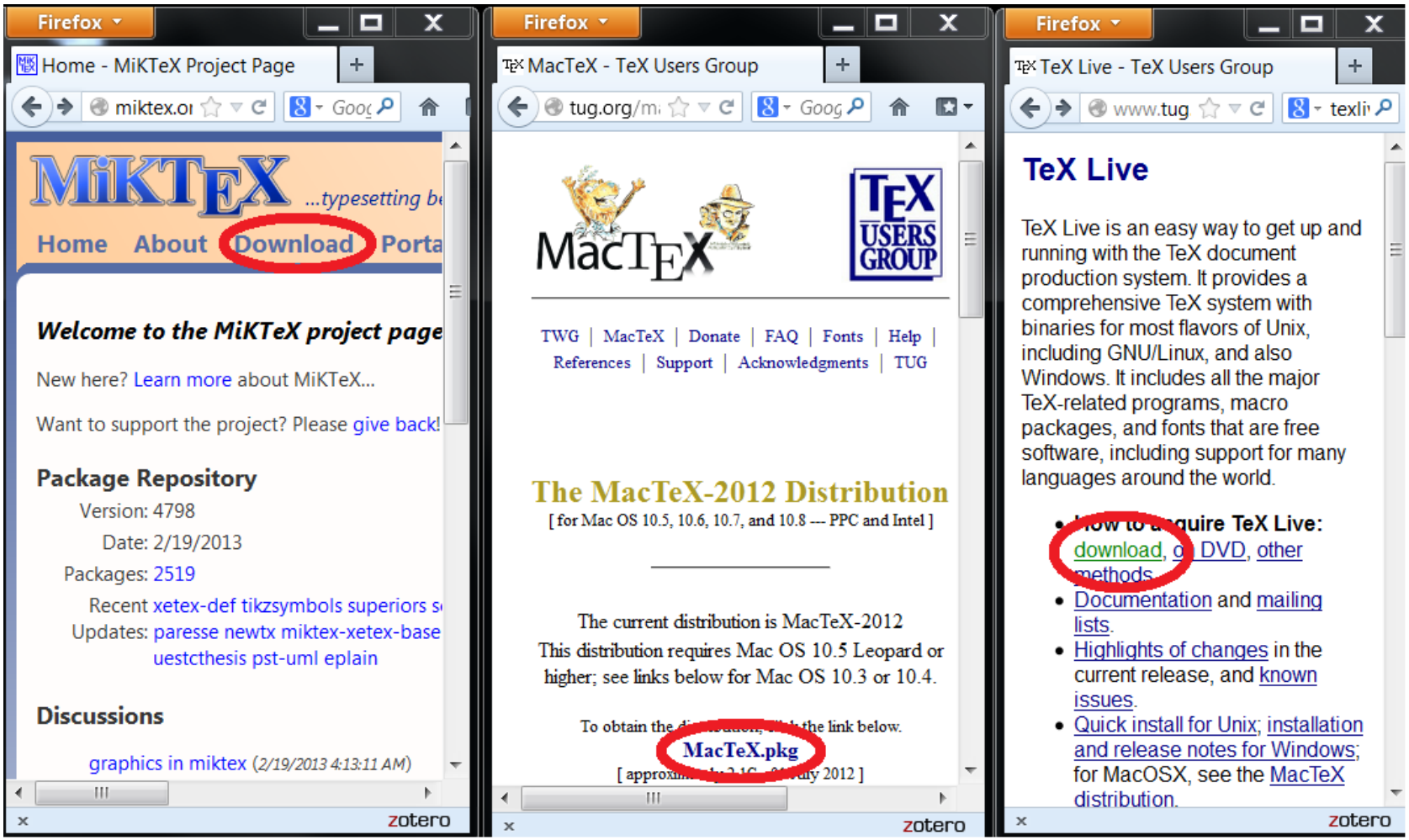
Distribution & editor MacTeX ⇒ `http://tug.org/mactex`

Linux 

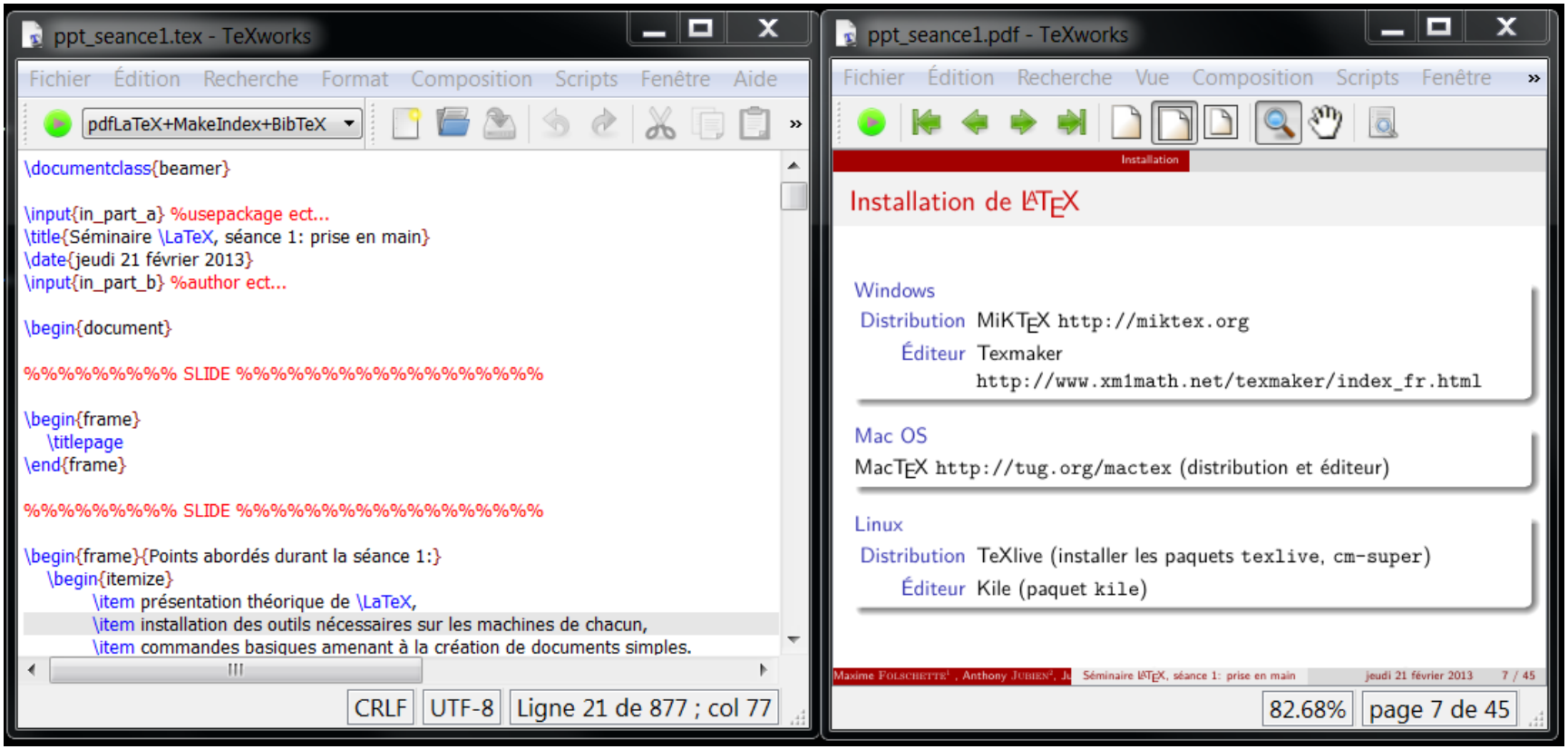
Distribution TeXlive ⇒ install packages `texlive`, `cm-super`

Editor Kile ⇒ install package `kile`

Download


Firefox
Home - MiKTeX Project Page
MiKTeX ...typesetting be
Home About Download Porta
Welcome to the MiKTeX project page
New here? Learn more about MiKTeX...
Want to support the project? Please give back!
Package Repository
Version: 4798
Date: 2/19/2013
Packages: 2519
Recent xetex-def tikzsymbols superiors s
Updates: paresse newtx miktex-xetex-base
uestcthesis pst-uml eplain
Discussions
graphics in miktex (2/19/2013 4:13:11 AM)
zotero
Firefox
MacTeX - TeX Users Group
MacTeX
TUG USERS GROUP
TWG | MacTeX | Donate | FAQ | Fonts | Help |
References | Support | Acknowledgments | TUG
The MacTeX-2012 Distribution
[for Mac OS 10.5, 10.6, 10.7, and 10.8 --- PPC and Intel]
The current distribution is MacTeX-2012
This distribution requires Mac OS 10.5 Leopard or higher; see links below for Mac OS 10.3 or 10.4.
MacTeX.pkg
zotero
Firefox
TeX Live - TeX Users Group
TeX Live
TeX Live is an easy way to get up and running with the TeX document production system. It provides a comprehensive TeX system with binaries for most flavors of Unix, including GNU/Linux, and also Windows. It includes all the major TeX-related programs, macro packages, and fonts that are free software, including support for many languages around the world.
download, DVD, other methods
Documentation and mailing lists.
Highlights of changes in the current release, and known issues.
Quick install for Unix; installation and release notes for Windows; for MacOSX, see the MacTeX distribution.
zotero

MikTeX (Windows)



MacTeX (MacOS)

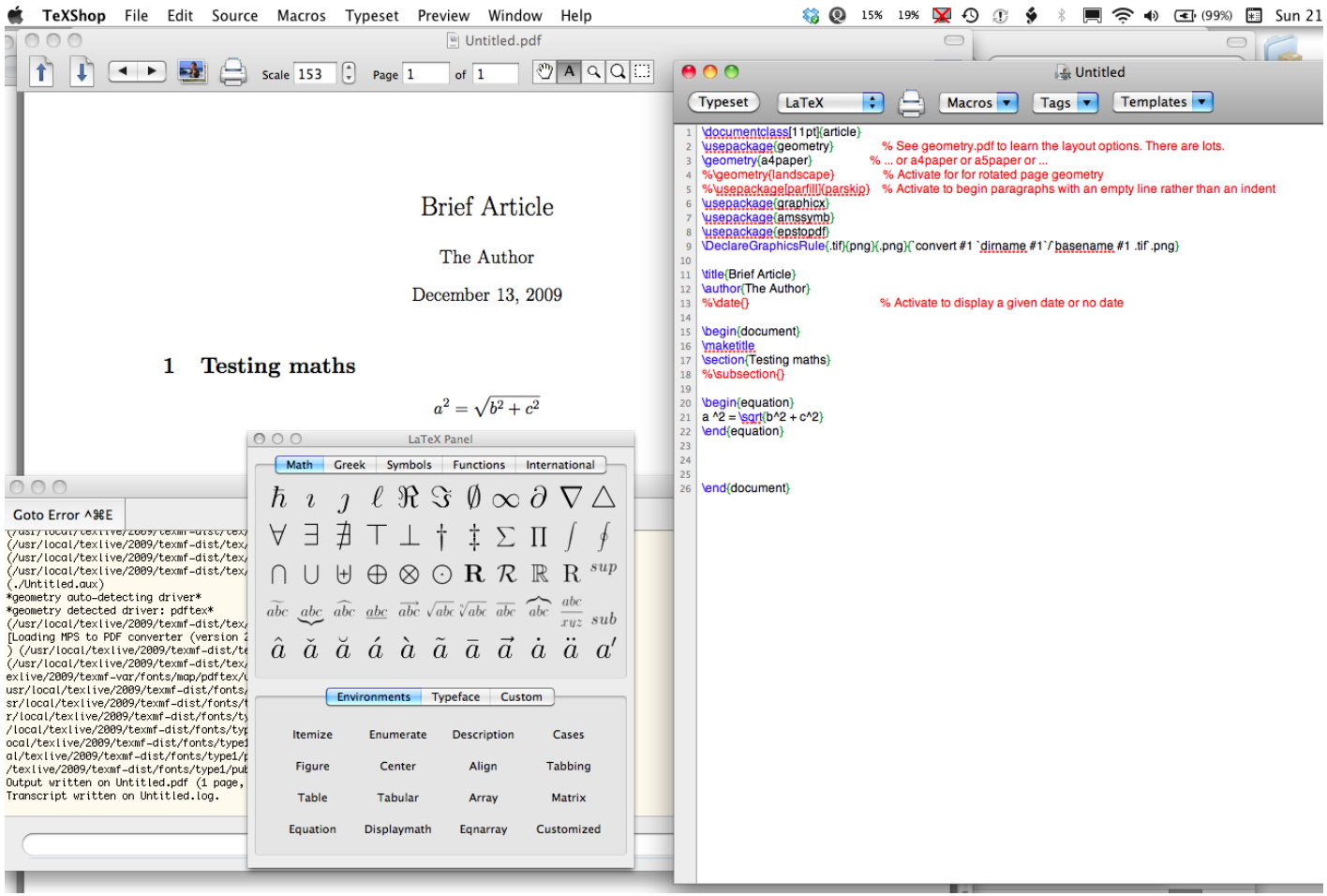


Image from `http://trondlossius.no/articles/969-mactex-2009`

TeXlive (Linux)

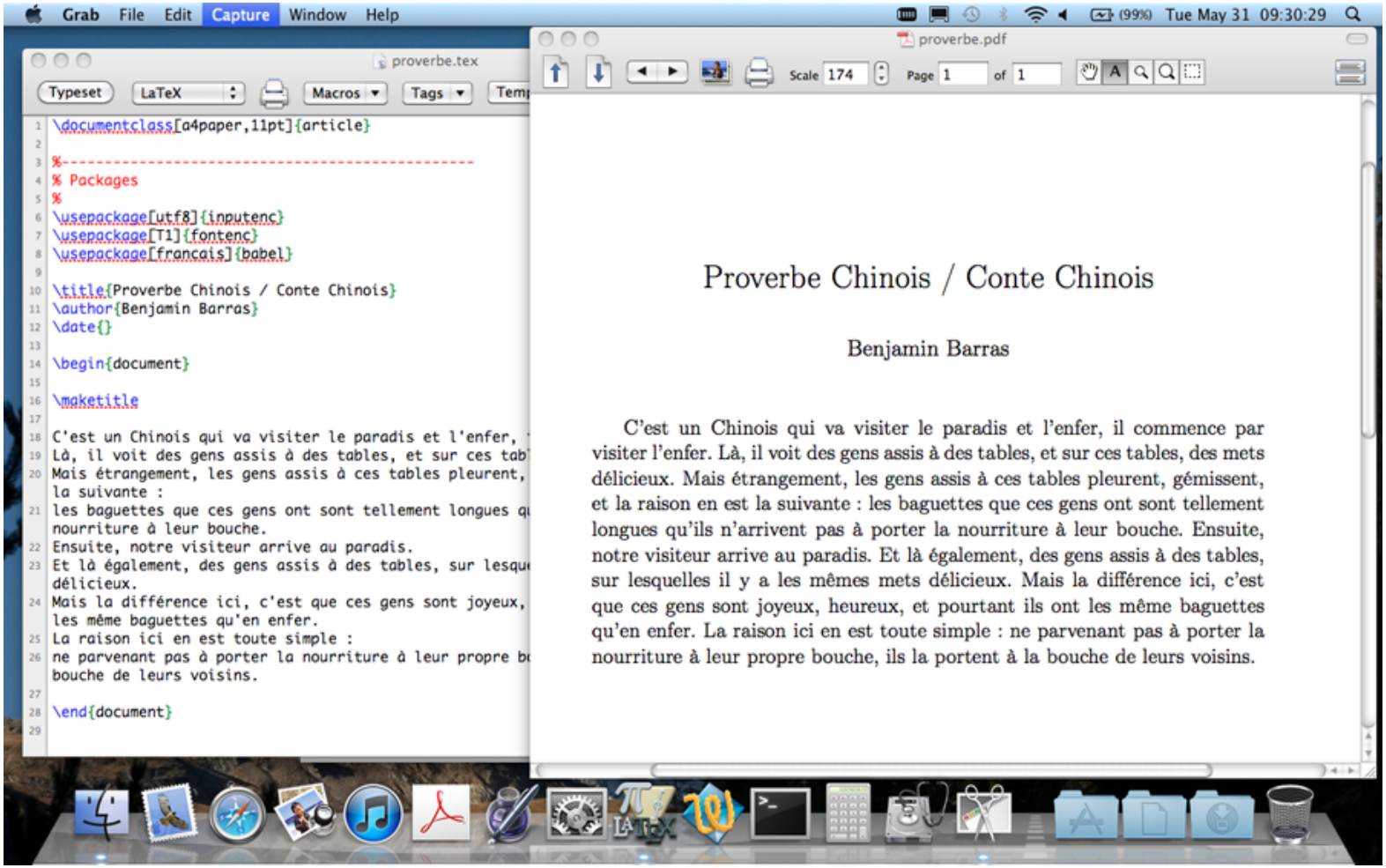


Image from `http://flashinformatique.epfl.ch/spip.php?article2315`

Display

Two windows on every OS

- left window: LaTeXeditor allowing the modification of your document
- right window: PDF file generated

You can see immediately the generated result.

First document

minimal-*.tex

```
\documentclass[a4paper]{article}

\usepackage[utf8]{inputenc}
\usepackage[T1]{fontenc}
\usepackage[french]{babel}

\author{Preacutenom Nom}
\title{Title of the document}
\date{\today}

\begin{document}
    \maketitle

    My first document
\end{document}
```

Base structure of a LaTeXdocument

- Document class `\documentclass{classe}`
- Foreword
- Document body, between `\begin{document}` and `\end{document}`

Classy documents

\documentclass[⟨option1⟩, ⟨option2⟩]{⟨classe⟩}

Document classes

- **article** or **proc**: publications,
- **report**: thesis and reports,
- **beamer**: presentations,
- **book**, **letter**, . . . : a lot of other classes or available

Class options

- **Xpt** : change the character size to **X**
- **a4paper**: margins to print in A4 format
- **twoside**: two-sides printing

Packages

Why ?

- packages are library used for advanced functions
- allow to fill a gap or a need in LaTeX
- a lot are preinstalled with your distribution
- when compiling a document, required packages will be automatically downloaded

A lot of packages

\usepackage[⟨*option1*⟩, ⟨*option2*⟩]{⟨*paquet*⟩}

Usual packages

```
%%% Paquets fondamentaux :
% Accents
\usepackage[latin1]{inputenc}
\usepackage[T1]{fontenc}
% For french documents
\usepackage[francais]{babel}
% Mathematical expressions
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
```

```
%%% Other useful packages
% PDF file insertion
\usepackage{pdfpages}
% Figures positionning
\usepackage{float}
% Others
\usepackage[left,pagewise]{lineno}
\usepackage{graphicx}
\usepackage{array}
```

Special characters

Ten special characters

```
\ $ & % # ^ _ { }
```

They can be used in the text

```
\textbackslash \$ \& \% \# \_ \{ \}
```

Each special character delineate special zones of the document

- `%` for a commentary
- `$...$` for a mathematical expression
- `{ ... }` for a group of characters/words
- `\...` for a command

Chapiters, sections, sub-sections...

Each level of structuring has its own command

- `\part{title}`: part
- `\chapter{title}`: chapiter (only with `report` and `book` document classes)
- `\section{title}`: section
- `\subsection{title}`: sub-section
- `\subsubsection{title}`: sub-sub-section

Some rule to format paragraphs

- A paragraph break happen when you leave a line blank
- LaTeX ignore line breaks and multiple spaces (formatting is automatically done when compiling)

```
    | First paragraph
    |
    | Second
    | paragraph
    | !
    |
    |
    |
    | Last     paragraph
with a lot of spaces.
```

First paragraph
Second paragraph !
Last paragraph whith a lot of spaces.

Size and style of characters

Possible character sizes

```
\tiny tiny
\scriptsize scriptsize
\footnotesize footnotesize
\small small
\normalsize normalsize
\large large
```

tiny
scriptsize
footnotesize
small
normalsize
large

```
\Large Large
\LARGE LARGE
\huge huge
\Huge Huge
```

Large
LARGE
huge
Huge

Possible character styles

```
\textbf{Bold}
\textit{Italic}
\textsc{Small caps}
XXX\textsuperscript{Superscript}
\underline{Underline}
```

Gras
Italique
MAJUSCULES
XXX$^{\text{Exposant}}$
<u>Souligné</u>

Environment

```
\begin{environment-name}
  ...
  ...    % Environment content
  ...
\end{environment-name}
```

Allow to define the start and end of an environment (figures, mathematical expressions . . .).

itemize environment

```
\begin{itemize}
  \item first bullet
  \item second bullet
  \item ...
\end{itemize}
```

Command allowing to insert a bullet point list as the following

- first bullet
- second bullet
- ...

Insertion commands

- `\titlepage`: insert a title page
- `\newpage`: insert a new page
- `\clearpage`: insert a page break
- `\cleardoublepage`: insert a page break on uneven pages
- `\tableofcontents`: insert a table of contents
- `\listoffigures`: insert a table of figures
- `\listoftables`: insert a table of tables
- ...

Including tex files

Why ? To simplify the writing of important LaTeXfiles by splitting them in several files.
Included files must be in the same directory as the file including them.

Command:

`\input{file1}` to include `file1.tex` at the specified space.

Including a simple image

Command:

`\includegraphics{file_name}` to insert the image at the specified space.

When the image is located in a sub-directory, for example the directory "img".

```
\includegraphics{img/image_name}
```

Including a PDF file

Command:

`\includepdf[pages=-]{file_name}` to insert all the pages of a PDF file.

`\includepdf[pages={3,5-8,60}]{file_name}` to only insert some pages of a PDF file (here pages 3, 5, 6, 7, 8 and 60).

- useful to include big PDF documents
- command `\includegraphics{file_name}` is better for a figure in PDF.

Figure environment

```
\begin{figure}
  ...
\end{figure}
```

The figure environment is a float:

- insert the figure in the text with an optimized layout
- the layout is automatically computed by LaTeX

Float principle

You can tune the object position with a parameter:

```
\begin{figure}[⟨position⟩]
  ...
\end{figure}
```

Different possible positions:

- `h` : the object is inserted at the specified place
- `t` : the object is inserted on the top of the page
- `b` : the object is inserted at the bottom of the page
- `p` : the object is inserted on a page reserved to floats

You can select several parameters at once, the first parameter being prioritised:

`\begin{figure}[ht]` (recommended)

"!" overrides layout parameters of LaTeX:

`\begin{figure}[!h]` (not recommended)

Using the figure environment

Most common use:

```
\begin{figure}[⟨position⟩]
  \centering
  \includegraphics[⟨options⟩]{⟨image_name⟩}
\end{figure}
```

- Display a centered image (`\centering` command)
- options of `\includegraphics` allow to tune the size of the image:
  - `width=width in cm`
  - `height=height in cm`
  - `scale=scale` (1, 2, 0.5, ...)

Caption and label

Most common use:

```
\begin{figure}[⟨position⟩]
  \centering
  \includegraphics[⟨options⟩]{⟨image_name⟩}
  \caption{⟨caption_name⟩}
  \label{⟨label_name⟩}
\end{figure}
```

- `\caption{caption\_name}` insert a caption
- `\label{label\_name}` add a label to an object. You can later refer to it with the commands `\ref{label\_name}` (figure number) and `\pageref{label\_name}` (page number).

Example :

```
See slide \pageref{my_logo}.
```

See slide **??**.

Exemple

```
\begin{figure}[h]
  \centering
  \includegraphics[width=5cm]{img/latex.jpg}
  \caption{\LaTeX language logo}
  \label{monlogo}
\end{figure}
```

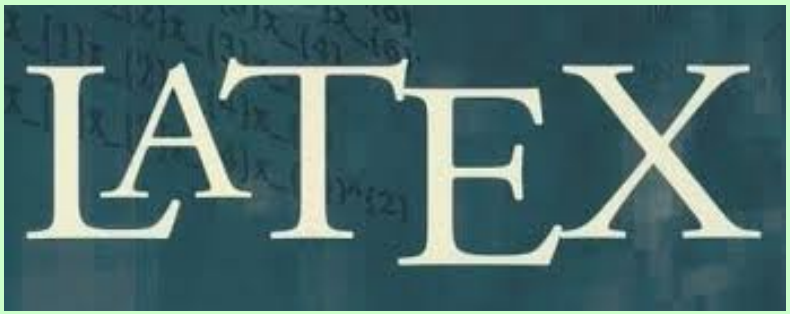


Figure : LaTeXlanguage logo

(If the image `latex.jpg` is located in the `img` directory !)

Mathematics with LaTeX

- ~~equation editor required~~
- knowledge of usual commands required
- possibility to insert equations in text:
  You can easily show that $1 + 1 = 4$.
- possibility to insert equations between two paragraphs and number them automatically:

$$1 + 1 = 4 \tag{1}$$

Équations in text

For example :

```
If $x < 0$, then $\sqrt{x}$ doesn't exist.
```

If $x < 0$, then $\sqrt{x}$ doesn't exist.

Or, depending on the document police:

If $x < 0$, then $\sqrt{x}$ doesn't exist.

Equation between paragraphs

```
\begin{equation}      % Start of the equation environment
  1+1=0               % equation
  \label{eq_zero}     % equation label
\end{equation}        % End of the equation environment
```

Insert a numbered mathematical expression with a label.

$$1 + 1 = 0 \tag{2}$$

The label can then be used to make a regerence to the equation (`eq_zero`):

```
See equation (\ref{eq_zero}).
```

See equation (2).

Most usual commands

- `\sqrt{1+2}`: square root $\sqrt{1+2}$
- `\frac{1}{2}`: fraction $\frac{1}{2}$
- `\sin(1+2)`: sinus $\sin(1+2)$
- `1^{1+2}` or `1^2`: power 1^{1+2} or 1^2
- `1_{1+2}` or `1_2`: index 1_{1+2} or 1_2
- `1_{1+2}^{1+3}` or `1_2^3`: power AND index 1_{1+2}^{1+3} or 1_2^3
- `\vec{AB}` or `\overrightarrow{AB}`: vector $\vec{AB}$ $\overrightarrow{AB}$
- `\sum_a^b`: sum $\sum_a^b x$

Equation array

```
\begin{eqnarray*}      % Start of the equation environment
  1+1&=&4\\              % equation1
  2+1&=&3\\              % equation2
  2+2&=&2                % equation3
\end{eqnarray*}        % End of the equation environment
```

Result

$$\begin{aligned} 1+1 &= 4 \\ 2+1 &= 3 \\ 2+2 &= 2 \end{aligned}$$

Advance mathematic

```
  V1
  $\sum_{i=1}^{n}{\alpha_i}=\beta$
V2
\begin{displaymath}
\sum_{n=1}^{\infty}{\frac{1}{n^2}}=\frac{\Pi^2}{6}
\end{displaymath}
```

Result

V1

$\sum_{i=1}^{n} \alpha_i = \beta$

V2

$$\sum_{n=1}^{\infty} \frac{1}{n^2} = \frac{\Pi^2}{6}$$

How to build matrix

```
$\begin{pmatrix}
e&2 \\
3&5
\end{pmatrix}$
```

Result

$$\begin{pmatrix} e & 2 \\ 3 & 5 \end{pmatrix}$$

Greek characters

- The command correspond to the name of the greek letter:
  - "Name" : corresponding letter in uppercase
  - "name" : corresponding letter in lowercase

Examples:

`\Omega`: Ω

`\omega`: ω

Other examples :

```
A, B, \Gamma, \Delta, E
\alpha, \beta, \gamma, \delta, \epsilon, \varepsilon
```

A, B, Γ, Δ, E
$\alpha, \beta, \gamma, \delta, \epsilon, \varepsilon$

Tables with LaTeX

- Poorly managed in LaTeX, tables need to be handled with care
- Inserted thanks to the `table` environment

Table and tabular environment

```
\begin{table} % Start of the table environment
  \centering % Center table
  \begin{tabular}{|l|c|r|} % Start of the tabular environment
    \hline % Horizontal line
    colonne 1 & colonne 2 & colonne 3 \\
    \hline % Horizontal line
    1 & 1 & 3 \\
    2 & 2 & 4 \\
    \hline % Horizontal line
  \end{tabular} % End of the tabular environment
  \label{table_label} % Table label (useful to make a reference to the table later
  \caption{Table caption} % Table caption
\end{table} % End of the table environment
```

results in:

colonne 1	colonne 2	colonne 3
1	1	3
2	2	4

Table : Table caption

Base code for a table tableau

- `\hline` makes an horizontal line
- The column number of the table must be written in the beggining, between the second pair of braces `\begin{tabular}{|l|c|r|}`, with:
  - `l` for a left-aligned column
  - `r` for a right-aligned column
  - `c` for a centered column
  - `|` for a vertical line between two columns (Alt Gr + 6)
  - `||` for a double vertical line between two columns

Multispan line/column

- Merging x columns : `\multicolumn{x}{c|c|}{text}`
- Merging lines is harder, you have to trace the horizontal line with `\cline` instead of `\hline`, for example between columns col1 and col2: `\cline{col1-col2}`