



An introduction to LaTeX

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When NOT to use LaTeX

- For small documents, letters



Main features and strengths

- Professional type-setting
- Focus on document structure, not type-setting
- Mathematical formulae
- Good control over spacing, absolute positioning

Hello world!

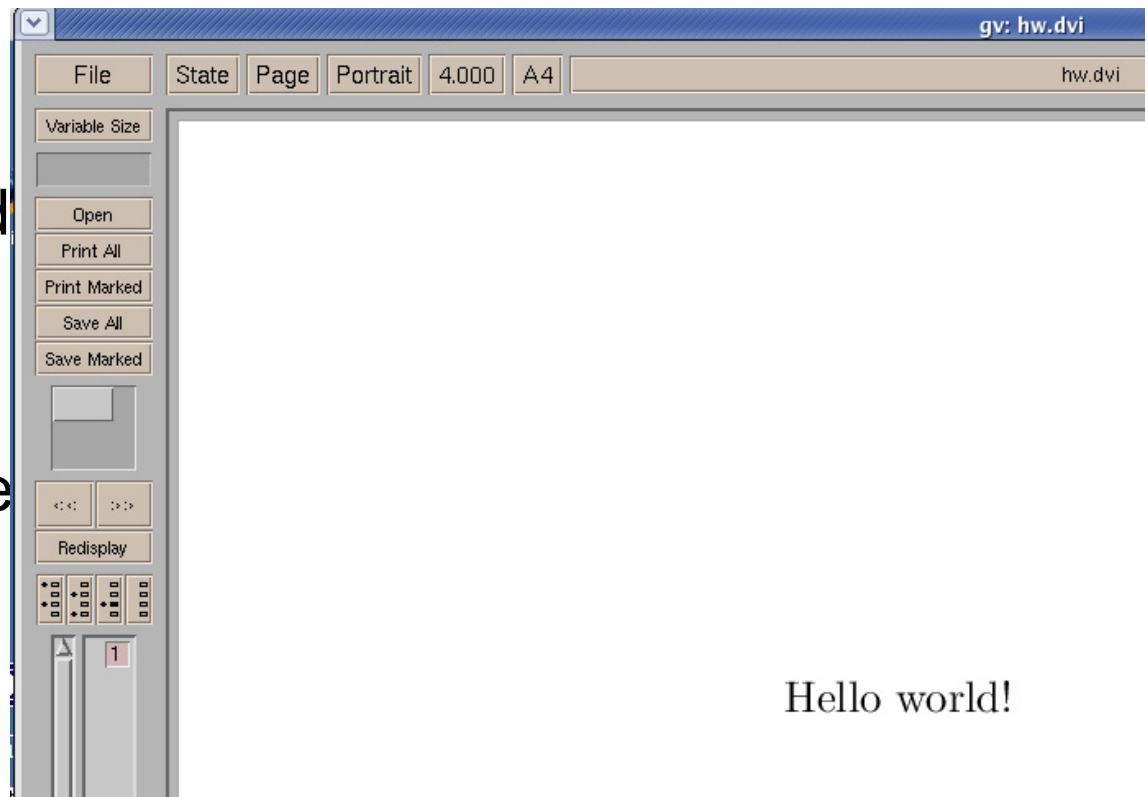
```
\documentclass[a4paper]{article}
\begin{document}
Hello world!
\end{document}
```

On command line, do

```
$ latex file.tex
```

```
$ dvips -o file.ps file
```

```
$ gv file.ps &
```



Hello world!

First basics

- LaTeX does not consider more than one space, or more than one blank line
- Special characters `$` `&` `%` `#` `_` `{` `}` `~` `^` `\` should be backslashed: `\$`
- All commands are with `\`, e.g. `\newline`
- `\\` (or `\newline`) gives a new line
- Comments are given with `%`
- Use editor that supports syntax highlighting, such as emacs, vi, nedit, etc.

More basics

- Spacing: use ~ for 'unbreakable space', e.g., in Figure~1, or in 'i.e.~there'.

Used in Figure and Table numbers, citations.

- Dashes:

daughter-in-law, X-rated
pages 13–67
yes—or no?
0, 1 and –1

daughter-in-law, X-rated\\
pages 13--67\\
yes---or no? \\
\$0\$, \$1\$ and \$-1\$

Fonts

■ Font styles:

<code>\textrm{...}</code>	roman	<code>\textsf{...}</code>	sans serif
<code>\texttt{...}</code>	typewriter		
<code>\textmd{...}</code>	medium	<code>\textbf{...}</code>	bold face
<code>\textup{...}</code>	upright	<code>\textit{...}</code>	<i>italic</i>
<code>\textsl{...}</code>	<i>slanted</i>	<code>\textsc{...}</code>	SMALL CAPS
<code>\emph{...}</code>	<i>emphasised</i>	<code>\textnormal{...}</code>	document font

■ Font sizes:

<code>\tiny</code>	tiny font	<code>\Large</code>	larger font
<code>\scriptsize</code>	very small font	<code>\LARGE</code>	very large font
<code>\footnotesize</code>	quite small font		
<code>\small</code>	small font	<code>\huge</code>	huge
<code>\normalsize</code>	normal font		
<code>\large</code>	large font	<code>\Huge</code>	largest

■ Hyphenation:

I think this is: supercalifragilisticex-
pialidocious

```
I think this is: su\per\cal\-%  
i\frag\i\lis\tic\ex\pi\-%  
al\i\do\cious
```

■ Footnotes:

Footnotes^a are often used by people
using L^AT_EX.

```
Footnotes\footnote{This  
is a footnote} are often used  
by people using \LaTeX.
```

^aThis is a footnote

■ References:

A reference to this subsection looks
like: “see section 2.6 on page 20.”

```
A reference to this subsection  
\label{sec:this} looks like:  
‘‘see section~\ref{sec:this} on  
page~\pageref{sec:this}.’’
```

The preamble

- Specify document defaults:
- Include extra packages with `\usepackage{packagename}`
- Set page size (if default is not OK), main font
- Create new commands and macros
- Set title and author: `\title{} \author{}`
- Create title & author with `\maketitle` right after `\begin{document}`

Document classes

- **Choose class:** `article`, `book`, `report`, `slides`, `amsart`, ...
- **Choose headings style:** `plain`, `headings`, `empty`
- **Choose font size, paper size** (`a4paper`, `letterpaper`, ...)
- **Choose** `twocolumn` **output (or not)**

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

Document structure

To start a new chapter, do

`\chapter{chaptertitle}` (only for book style)

And so on, for `section`, `subsection`,
`subsubsection`, `paragraph`, `appendix`

To get unnumbered sections etc, use

`\section*{sectiontitle}`

To make TOC: `\tableofcontents` right after

`\begin{document}`

Environments

- `\begin{name} ... \end{name}`
- **Lists:** `itemize`, `enumerate`, `description`
- `\begin{displaymath} ... \end{displaymath}` **or**
`\[...\]`
- **Plenty of maths environments**
- **Text alignment:** `flushleft`, `flushright`,
`center`, `quote`, `verse`

1. You can mix the list environments to your taste:


- But it might start to look silly.
- If you over-do it.

2. Therefore remember:

Stupid things will not become smart because they are in a list.

Smart things though, can be presented beautifully in a list.

```
\begin{enumerate}
\item You can mix the list
environments to your taste:
\begin{itemize}
\item But it might start to
look silly.
\item If you over-do it.
\end{itemize}
\item Therefore remember:
\begin{description}
\item[Stupid] things will not
become smart because they are
in a list.
\item[Smart] things though, can be
presented beautifully in a list.
\end{description}
\end{enumerate}
```



This text is
left aligned. \LaTeX is not trying to
make each line the same length.

```
\begin{flushleft}
This text is\\ left aligned.
\LaTeX{} is not trying to make
each line the same length.
\end{flushleft}
```

This text is right
aligned. \LaTeX is not trying to make
each line the same length.

```
\begin{flushright}
This text is right\\ aligned.
\LaTeX{} is not trying to make
each line the same length.
\end{flushright}
```

Tables

7C0	hexadecimal
3700	octal
11111000000	binary
1984	decimal

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

Pi expression	Value
π	3.1416
π^π	36.46
$(\pi^\pi)^\pi$	80662.7

```
\begin{tabular}{c r @{.} l}  
Pi expression & & \\  
\multicolumn{2}{c}{Value} \\  
\hline  
$\pi$ & 3&1416 & \\  
$\pi^{\pi}$ & 36&46 & \\  
$(\pi^{\pi})^{\pi}$ & 80662&7 & \\  
\end{tabular}
```

Floats

- Figures and Tables are floats

- Start a new float with `\begin{table} [!hbp]`

- Determine placement with

`h` *here* at the very place in the text where it occurred. This is useful mainly for small floats.

`t` at the *top* of a page

`b` at the *bottom* of a page

`p` on a special *page* containing only floats.

`!` without considering most of the internal parameters^a which could stop this float from being placed.

Example float

Figure~\ref{white} is an example of Pop-Art.

```
\begin{figure}[!hbp]
\makebox[\textwidth]{\framebox[5cm]{\rule{0pt}{5cm}}}
\caption{Five by Five in Centimetres} \label{white}
\end{figure}
```

Note order of \caption{} and \label{}

More common usage: including pic1.eps

```
\begin{figure}[!htbp]
\includegraphics[width=12cm]{pic1}
\caption{...}\label{fig:pic1}
\end{figure}
```

New commands

■ Simple:

“The not so Short Introduction to L^AT_EX 2_ε” ... “The not so Short Introduction to L^AT_EX 2_ε”

```
\newcommand{\tnss}{  
    {The not so Short Introduction  
    to \LaTeXe}  
% in the document body :  
“\tnss” \ldots{} “\tnss”
```

■ With argument:

- The *not so* Short Introduction to L^AT_EX 2_ε
- The *very* Short Introduction to L^AT_EX 2_ε

```
\newcommand{\txsit}[1]{  
    {The \emph{#1} Short  
    Introduction to \LaTeXe}  
% in the document body:  
\begin{itemize}  
\item \txsit{not so}  
\item \txsit{very}  
\end{itemize}
```

Mathematics basics

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

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

$$\epsilon > 0 \quad (3.1)$$

From (3.1) we gather ...

```
\begin{equation} \label{eq:eps}
\epsilon > 0
\end{equation}
From (\ref{eq:eps}) we gather
\ldots
```

$$x^2 \geq 0 \quad \text{for all } x \in \mathbf{R} \quad (3.3)$$

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

Maths basics 2

$$a_1 \quad x^2 \quad e^{-\alpha t} \quad a_{ij}^3$$
$$e^{x^2} \neq e^{x^2}$$

$$\sqrt{x} \quad \sqrt{x^2 + \sqrt{y}} \quad \sqrt[3]{2}$$

$$\overline{m+n}$$

$$\underbrace{a + b + \dots + z}_{26}$$

$$\lim_{n \rightarrow 0} \frac{\sin x}{x} = 1$$

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$$\underbrace{a+b+\dots+z}_{26}$$

$$\lim_{n \rightarrow 0} \frac{\sin x}{x} = 1$$

More maths

$$\sum_{i=1}^n \int_0^{\frac{\pi}{2}}$$

```
\begin{displaymath}
\sum_{i=1}^n \quad \quad
\int_0^{\frac{\pi}{2}} \quad \quad
\end{displaymath}
```

$$\iint_D dx dy \quad \text{instead of} \quad \int \int_D dx dy$$

```
\begin{displaymath}
\int \int_D dx \, dy \quad \quad
\text{\texttrm{instead of}} \quad \quad
\int \int_D dx dy
\end{displaymath}
```

$$\left((x+1)(x-1) \right)^2$$

$$\left(\left(\left(\left(\right) \right) \right) \right) \quad \parallel \parallel \parallel \parallel$$

```
\Big( (x+1) (x-1) \Big) ^{2} \\
\big(\Big(\bigg(\Bigg(\quad
\big\}\Big\}\bigg\}\Bigg\}\quad
\big\|\Big\|\bigg\|\Bigg\|\quad
```

Matrices and co.

$$\mathbf{X} = \begin{pmatrix} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ \vdots & \vdots & \ddots \end{pmatrix}$$

```
\begin{displaymath}
\mathbf{X} =
\left( \begin{array}{ccc}
x_{11} & x_{12} & \dots \\
x_{21} & x_{22} & \dots \\
\vdots & \vdots & \ddots
\end{array} \right)
\end{displaymath}
```

$$y = \begin{cases} a & \text{if } d > c \\ b + x & \text{in the morning} \\ l & \text{all day long} \end{cases}$$

```
\begin{displaymath}
y = \left\{ \begin{array}{l}
a & \text{if } d > c \\
b+x & \text{in the morning} \\
l & \text{all day long}
\end{array} \right.
\end{displaymath}
```

BibTeX

- Keep one refs.bib file with all your references
- Example entry:

```
@article{ewens.72,  
  author    = {W.J. Ewens},  
  title     = {The sampling theory of selectively neutral alleles},  
  journal   = {Theor. Pop. Biology},  
  year      = 1972,  
  volume    = 3,  
  pages     = {87--112},  
}
```

- Cite with `\cite{ewens.72}`
- Include bib-file right before `\end{document}`:

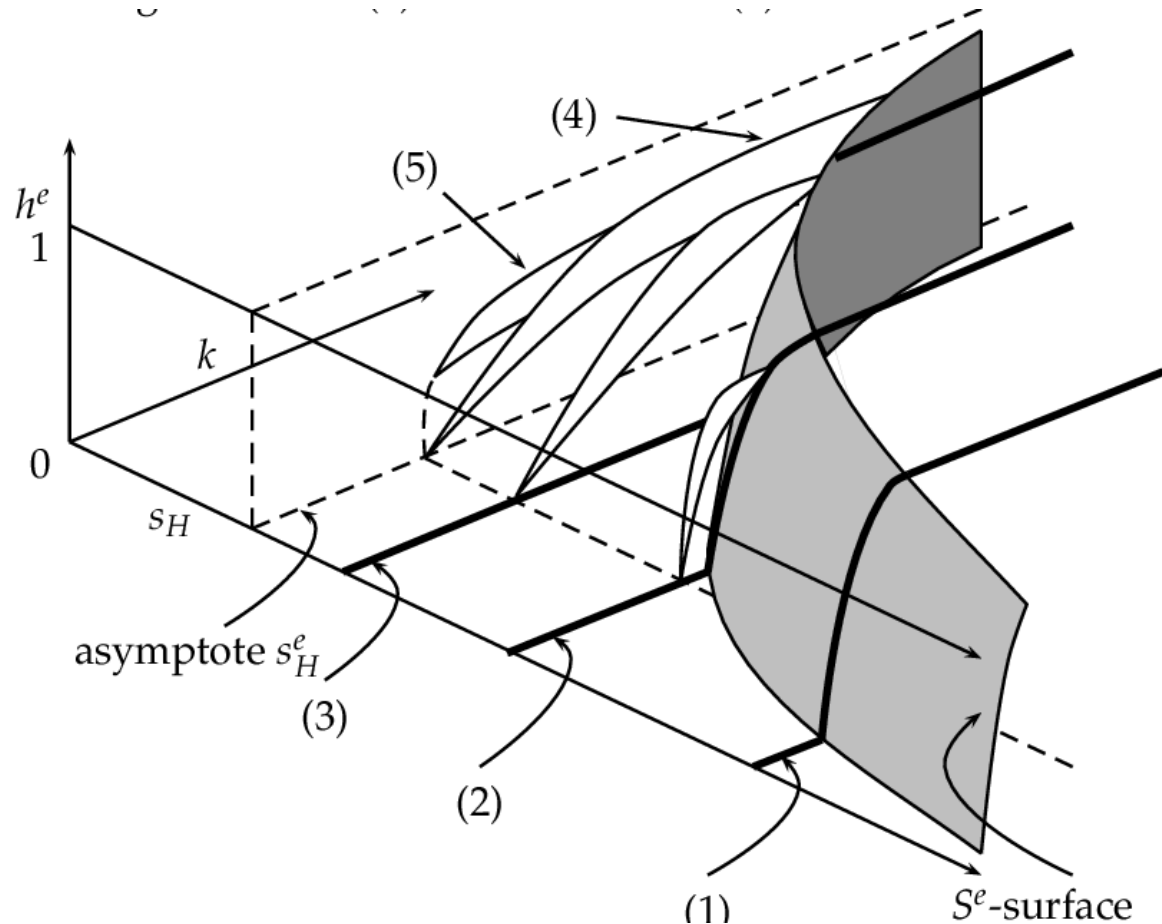
```
\bibliography{/home/staff/planque/linux/Bib/refs}  
\bibliographystyle{plain}
```

More info

- The not so short introduction to LaTeX2e, by Oetiker, Partl, Hyna and Schlegl
- LaTeX: A document preparation system, by Lamport
- The LaTeX Companion, by Goossens, Mittelbach, Samarin
- CTAN on the web

Goodies

- Program your own pictures with `pstricks`



- 
- Use AMS styles instead of standard LaTeX styles