UNIVERSITÀ DI PAVIA

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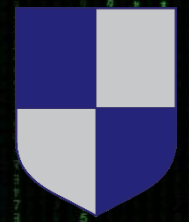

LaTeX

Lecture 2 – Common elements

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Preliminary notions

A LaTeX source file is a code written in some kind of programming language; it cointains both the corpus of the document and the commands (marking instructions) that explain to pdfLaTeX (one of the most common LaTeX compilers) how to treat the text to generate the final PDF document.

If the compiler succedes, the folder in which we are working will get other files, like:

- .toc: it contains the index (Table Of Contents);
- .bbl: it contains the bibliography;
- .log: log file;
- .aux: auxiliary file, containing other informations.

These files are not to be touched: LaTeX creates them during the first compiling and it uses them.

Prodotti da	Estensione	Descrizione
Utente	`.bib`	Database bibliografico
	`.jpg, .pdf, .png`	Formati grafici per LaTeX
	`.tex`	File sorgente
Classi, pacchetti e stili	`.bst`	Stile bibliografico per Biber
	`.cls`	Classe di documento
	`.sty`	Pacchetto
Composizione	`.aux`	Trasporta informazioni generiche
	`.lof`	Indice delle figure
	`.log`	Rendiconta l'ultima composizione
	`.lot`	Indice delle tabelle
	`.toc`	Indice generale
Pacchetti e programmi	`.bbl`	Bibliografia creata con Biber
	`.blg`	Rendiconto di Biber
	`.idx`	Voci dell'indice analitico
	`.ind`	Prodotto di `MakeIndex`
	`.ilg`	Rendiconto di `MakeIndex`
	`.out`	Segnalibri ipertestuali
Output	`.pdf`	Prodotto di pdfLaTeX

The .tex file

We'll always work on the .tex file, which has the following structure.

Header:

- Class declaration & package loading (look at https://www.ctan.org/pkg/)
- Custom commands
- General options
- Everything is contained in the red square.

Text:

- Everything is contained in the blue square.

```
\documentclass[opzioni]{classe}
\usepackage[opzioni]{pacchetto}

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

The .tex file

First of all, we must declare the kind of document, and its class, using the command:

```
\documentclass[opzioni]{classe}
```

- «opzioni» are the general document settings, and they are global;
- «classe» is the chosen document class, which defines the kind of document we are writing.

Most commons classes	
`article`	Scientific papers, articles, …
`report`	Relations
`book`	Books and thesis
`letter`	Letters
`beamer`	Presentations

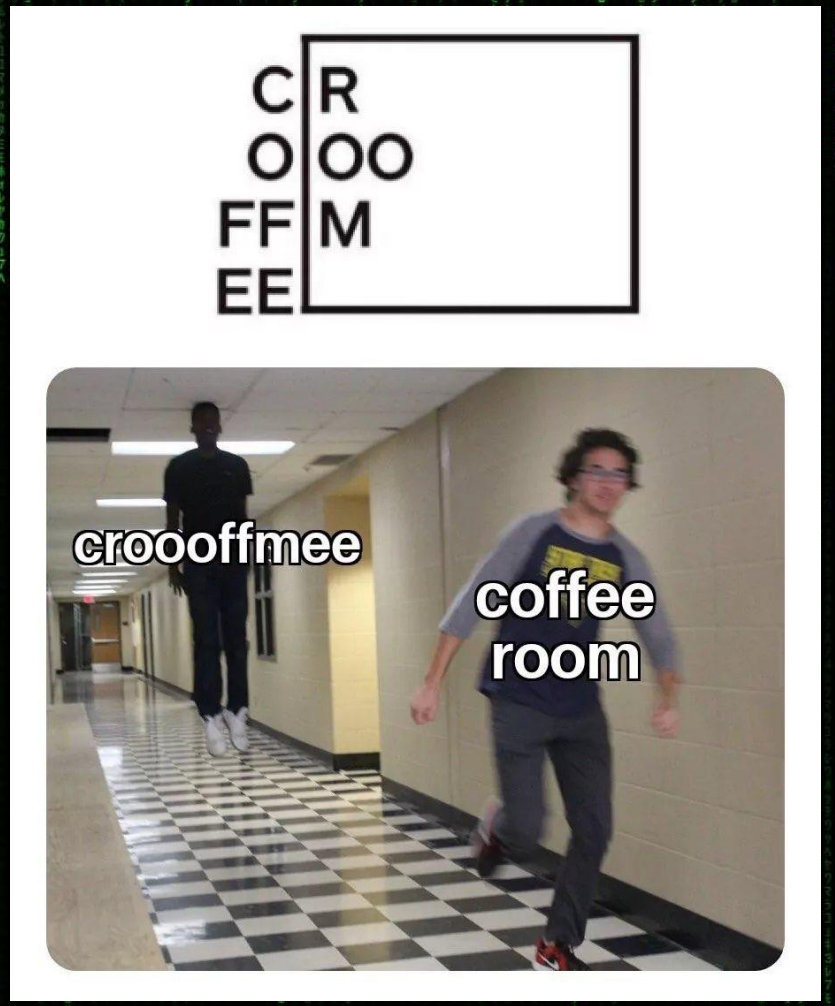
The .tex file

Between the square brackets in the documentclass command you can declare:

- `10pt, 11pt, 12pt` – They set the font size – Default is `10pt`;
- `a4paper, a5paper, …` – They set the page corners – Default is `letterpaper`, the USA standard;
- `oneside, twoside` – They specify if the text will be codified into one or two faces – Default is one for `article` and `report`, two for `book`;
- `opneright, openany` – The first, default for `book`, makes a new chapter start on the right, the second on any. Not avaiable for `article`.
- `twocolumn` – Splits the text on two columns per page.

Some typography

- The cage is the area of the sheet in which the body of the text is composed;
- A page is formed by the headboard, the cage and the footer;
- ISO A4 format is 21cm x 29.7cm (width by paper height);
- American "letter" format is 8.5 in x 11.5 in, or 21.6 cm x 29.2 cm;
- The body is the measure of the size of the characters.



Document structure

Top matter – At the beginning of most documents there will be information about the document itself, such as the title and date, and also information about the authors, such as name, address, email etc.

```
\documentclass[11pt,a4paper]{report}

\begin{document}
\title{How to Structure a LaTeX Document}
\author{Andrew Roberts}
\date{December 2004}
\maketitle
\end{document}
```

```
\documentclass{article}

\begin{document}

\begin{abstract}
Your abstract goes here...
...
\end{abstract}
...
\end{document}
```

Abstract – Most research papers have an abstract. This should appear in its logical order, therefore, after the top matter, but before the main sections of the body. This command is available for the document classes article and report, but not book.

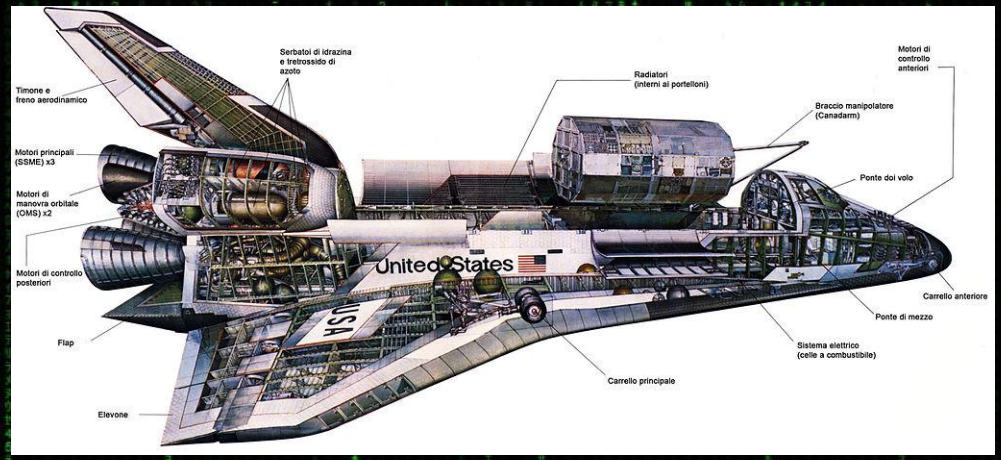
By default, LaTeX will use the word "Abstract" as a title for your abstract. If you want to change it into anything else, e.g. "Executive Summary", add the following line before you begin the abstract environment:

```
\renewcommand{\abstractname}{Executive Summary}
```

Sections and chapters

Features:

- You don’t need to specify section numbers;
- You don’t need to use `\begin` and `\end` command;
- You don’t need to add each section to the index;
- You can customize your section titles.



Command	Level	Comment
\part{"part"}	-1	not in letters
\chapter{"chapter"}	0	only books and reports
\section{"section"}	1	not in letters
\subsection{"subsection"}	2	not in letters
\subsubsection{"subsubsection"}	3	not in letters
\paragraph{"paragraph"}	4	not in letters
\subparagraph{"subparagraph"}	5	not in letters

Special paragraphs

```
\usepackage{verbatim}
```

```
This is another
\begin{comment}
rather stupid,
but helpful
\end{comment}
example for embedding
comments in your document.
```

This is another example for embedding comments in your document.

```
\begin{alltt}
Verbatim extended with the ability
to use normal commands.  Therefore, it
is possible to \emph{emphasize} words in
this environment, for example.
\end{alltt}
```

Verbatim extended with the ability
to use normal commands. Therefore, it
is possible to *emphasize* words in
this environment, for example.

```
\begin{verbatim}
The verbatim environment
  simply reproduces every
 character you input,
including all  s p a c e s!
\end{verbatim}
```

```
The verbatim environment
  simply reproduces every
 character you input,
including all  s p a c e s!
```

Book structure

Features:

- The standard LaTeX book class almost follows the same layout;
- If you do not make use of chapters, it is barely useful to use it;
- The class provides macros to change the formatting of some parts.

Traditional book format:

- Frontmatter: Half-title, Empty, Title page, Information (copyright, ISBN, ...), Dedication, Table of contents, List of figures, Preface.
- Mainmatter: Main topic, Appendix.
- Backmatter: Bibliography, Glossary / Index

The `\appendix` macro can be used to indicate that following sections or chapters are to be numbered as appendices.

Example of book here. You can compare it with an article, like this.

```latex
\begin{document}
\frontmatter

\maketitle

% Introductory chapters
\chapter{Preface}
% ...

\mainmatter
\chapter{First chapter}
% ...

\appendix
\chapter{First Appendix}

\backmatter
\chapter{Last note}
```

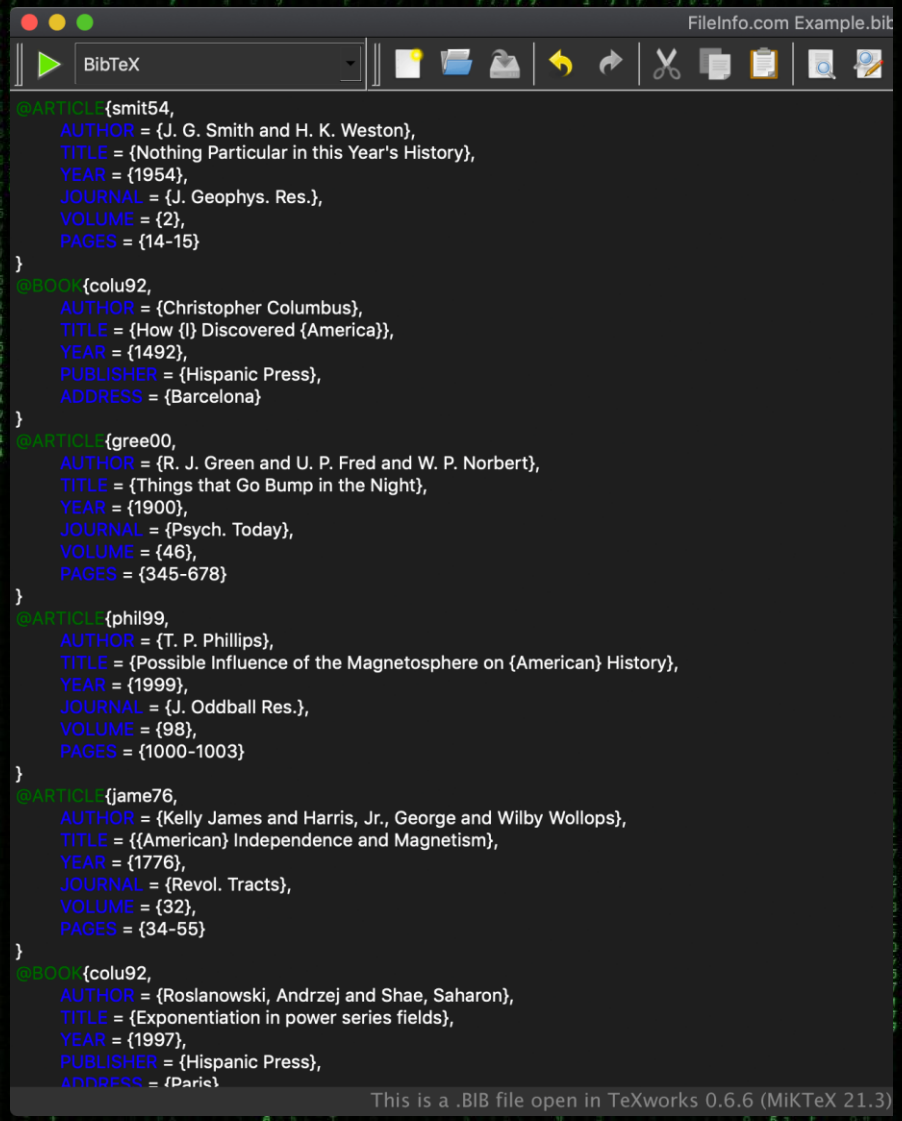
```latex
\appendix
\section{First Appendix}
```

Bibliography

At the ending of any good research paper there will be a complete list of references. LaTeX has two ways of inserting your references into a document:

- you can embed them within the document itself. It's simpler, but it can be time-consuming if you are writing several papers about similar subjects so that you often have to cite the same books;
- you can store them in an external BibTeX file and then link them via a command to your current document and use a BibTeX style to define how they appear. This way you can create a small database of the references you might use and simply link them, letting LaTeX work for you.

You just discovered why LaTeX creates one of its auxiliary files! What could it be?



An example on Overleaf

Menu | Upgrade | Pericolosita sismica probabilistica di un sito italiano per la costruzione di un ospedale militare | Review | Condividi | Submit | History | Layout | Chat

Source | Rich Text | Ω | Ricompila

- fase5b.png
- Relazione.lof
- Relazione.lot
- Relazione.pdf
- Relazione.tex
- seismogram.png
- strikeslip.png
- taipei.png

File outline
- Introduzione
- Identificazione delle sorg...
- Distribuzione delle magn...
- Distribuzione delle dista...
- Intensit\`a dell'onda sis...
- Calcolo della curva di pe...
- Analisi dei risultati otten...

```
\documentclass[a4paper]{article}
\renewcommand{\familydefault}{\sfdefault}
\usepackage[italian]{babel}
\usepackage[T1]{fontenc}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{amssymb}
\usepackage{graphicx}
\usepackage{caption}
\usepackage{booktabs}
\usepackage{verbatim}
\usepackage[margin=2cm]{geometry}
\captionsetup{tableposition=top,figureposition=bottom,font=small}

\title{Pericolosit\`a sismica probabilistica di un sito italiano per la costruzione di un ospedale militare}
\author{Giovanni N. D'Aloisio, Elisabetta M. Bilotto, Antonio Di Sandro}
\date{\today}

\begin{document}

\maketitle

\begin{abstract}
    La Probabilistic Seismic Hazard Analysis (PSHA) \`e lo studio del rischio sismico di una zona geografica; essa avviene mediante metodi probabilistici, grazie ai quali si possono fare previsioni sulle performance delle strutture ivi presenti. L'obiettivo di questa relazione \`e quello di discutere i calcoli e i risultati ottenuti dalla PSHA del sito scelto e valutare la possibilit\`a di costruirvi un ospedale militare, utilizzando il modello Gutenberg-Richter e la legge di attenuazione Akkar-Bommer (2010).

    In allegato \`e incluso il file .xlsx con cui sono stati eseguiti i calcoli descritti.
```

Pericolosità sismica probabilistica di un sito italiano per la costruzione di un ospedale militare

Giovanni N. D'Aloisio, Elisabetta M. Bilotto, Antonio Di Sandro

4 novembre 2022

Sommario

La Probabilistic Seismic Hazard Analysis (PSHA) è lo studio del rischio sismico di una zona geografica; essa avviene mediante metodi probabilistici, grazie ai quali si possono fare previsioni sulle performance delle strutture ivi presenti. L'obiettivo di questa relazione è quello di discutere i calcoli e i risultati ottenuti dalla PSHA del sito scelto e valutare la possibilità di costruirvi un ospedale militare, utilizzando il modello Gutenberg-Richter e la legge di attenuazione Akkar-Bommer (2010).

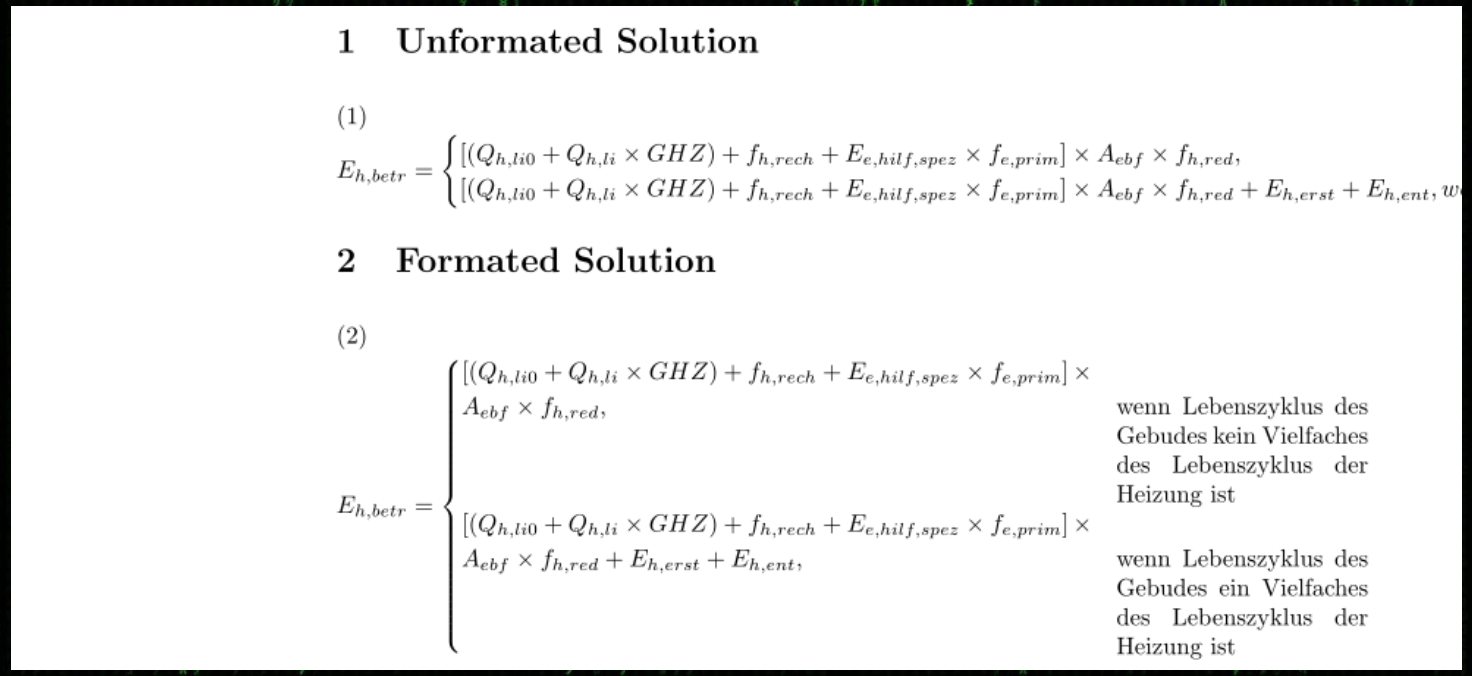
In allegato è incluso il file .xlsx con cui sono stati eseguiti i calcoli descritti.

Indice

Elenco delle figure

Text formatting

Writers use formatting techniques to differentiate textual elements from the rest of the text. Italicization is often used to add emphasis to key words or phrases. Footnotes are useful for providing extra information or clarification without interrupting the main flow of the text. However, it is also very easy to abuse, and a document that has been overdone can look and read worse.



1 Unformated Solution

(1)

$$E_{h,betr} = \begin{cases} [(Q_{h,li0} + Q_{h,li} \times GHZ) + f_{h,rech} + E_{e,hilf,spez} \times f_{e,prim}] \times A_{ebf} \times f_{h,red}, \\ [(Q_{h,li0} + Q_{h,li} \times GHZ) + f_{h,rech} + E_{e,hilf,spez} \times f_{e,prim}] \times A_{ebf} \times f_{h,red} + E_{h,erst} + E_{h,ent}, w \end{cases}$$

2 Formated Solution

(2)

$$E_{h,betr} = \begin{cases} [(Q_{h,li0} + Q_{h,li} \times GHZ) + f_{h,rech} + E_{e,hilf,spez} \times f_{e,prim}] \times A_{ebf} \times f_{h,red}, & \text{wenn Lebenszyklus des Gebudes kein Vielfaches des Lebenszyklus der Heizung ist} \\ [(Q_{h,li0} + Q_{h,li} \times GHZ) + f_{h,rech} + E_{e,hilf,spez} \times f_{e,prim}] \times A_{ebf} \times f_{h,red} + E_{h,erst} + E_{h,ent}, & \text{wenn Lebenszyklus des Gebudes ein Vielfaches des Lebenszyklus der Heizung ist} \end{cases}$$

Text formatting

```
Some of the greatest \emph{discoveries}
in science
were made by accident.

\textit{Some of the greatest \emph{discoveries}
in science
were made by accident.}

\textbf{Some of the greatest \emph{discoveries}
in science
were made by accident.}
```

The `\emph` command does different things depending on the context. Try it by yourself here.

For getting bold, italic or underlined text, just use the `\textbf`, `\textit` or `\underline` commands.

Some of the greatest *discoveries* in science were made by accident.
Some of the greatest discoveries *in science were made by accident.*
Some of the greatest *discoveries* in science were made by accident.

Spacing & hyphenation

- If you want to use larger inter-line spacing:

```
\linespread{factor}
```

- The command \- inserts a discretionary hyphen into a word, in order to make it the only point where hyphenation is allowed, and it can be used when LaTeX isn't capable to hyphenate it automatically:

```
\begin{minipage}{2in}
I think this is: su\-per\-cal\-%
i\-frag\-i\-lis\-tic\-ex\-pi\-%
al\-i\-do\-cious
\end{minipage}
```

I think this is: supercalifragi-
listicexpialidocious

Quote-marks and superscript and subscript

LaTeX treats left and right quotes as different entities. For single quotes, a grave accent ` gives a left quote mark, and an apostrophe ' gives a right. For double quotes, simply double the symbols, and LaTeX will interpret them accordingly. The right quote is also used for apostrophe in LaTeX.

```
To `quote' in LaTeX

To ``quote'' in LaTeX

To ``quote" in LaTeX

To ,,quote'' in LaTeX

,,German quotation marks``

<<French quotation marks>>

``Please press the `x' key.''

,,Proszę, naciśnij klawisz <<x>>''.
```

```
\usepackage[T1]{fontenc}
```

To “quote” in Latex.

To “quote” in Latex.

To „quote” in Latex.

„German quotation marks“

«French quotation marks»

“Please press the ‘x’ key.”

„Proszę, naciśnij klawisz «x»”.

```
\documentclass{article}
\begin{document}
Wombat\textsubscript{walzing}

Michelangelo was born on March 6\textsuperscript{th}, 1475.
\end{document}
```

Wombat$_{\text{walzing}}$
Michelangelo was born on March 6$^{\text{th}}$, 1475.

Special characters

LaTeX command	Sample	Description
\`{o}	ò	grave accent
\'{o}	ó	acute accent
\^{o}	ô	circumflex
\"{o}	ö	umlaut, trema or dieresis
\H{o}	ő	long Hungarian umlaut (double acute)
\~{o}	õ	tilde
\c{c}	ç	cedilla
\k{a}	ą	ogonek
\l{}	ł	barred l (l with stroke)
\={o}	ō	macron accent (a bar over the letter)
\b{o}	o̲	bar under the letter
\.{o}	ȯ	dot over the letter
\d{u}	ụ	dot under the letter
\r{a}	å	ring over the letter (for å there is also the special command \aa)
\u{o}	ŏ	breve over the letter
\v{s}	š	caron/háček ("v") over the letter
\t{oo}	o͡o	"tie" (inverted u) over the two letters
\o{}	ø	slashed o (o with stroke)
{\i}	ı	dotless i (i without tittle)

- Less than and greater than: `\textless` `\textgreater`
- Use UTF-8: `\usepackage[utf8]{inputenc}`
- Euro: `\usepackage[official]{eurosym}` + `\euro{}`
- Degree symbol:

```
\usepackage{amsmath}
\usepackage{siunitx}
%...

A $\SI{45}{\degree}$ angle.

It is \SI{17}{\degreeCelsius} outside.
```

- Other symbols: add \ before the symbol, for example \$ for **$**.

Special characters

Input	Output	Purpose
-	-	inter-word
--	–	page range, 1–10
---	—	punctuation dash—like this
$-$	−	minus sign

```
Not like this ... but like this:\\
New York, Tokyo, Budapest, \ldots
```

Not like this ... but like this:
New York, Tokyo, Budapest, ...

Command	Example	Description
\today	May 31, 2006	Current date
\TeX	TEX	Your favorite typesetter
\LaTeX	LATEX	The Name of the Game
\LaTeXe	LATEX 2_ε	The current incarnation

```
Hyphen: daughter-in-law, X-rated\\
En dash: pages 13--67\\
Em dash: yes---or no? \\
Minus sign: $0$, $1$ and $-1$
```

Hyphen: daughter-in-law, X-rated
En dash: pages 13–67
Em dash: yes—or no?
Minus sign: 0, 1 and −1