Introduction to LaTeX Part II

for MST–Students

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1. Outline

2. Text
   - footnote
   - Reference
   - Counting

3. Structure
   - document
   - lists
   - BiB -TEX

4. math
   - text, distance & brackets
   - enviroments

Outline

- Basic
- Scientific Writing
- Usepackages, Presentation etc.

footnotes

Input

Some seensless\footnote{In our view} Text.

footnotes

Input

Some seensless\footnote{In our view} Text.

Output

Some seensless[a] Text.

[a] In our view

footnotes

Input

Some seensless\footnote{In our view} Text.

Output

Some seensless[a] Text.

[a] In our view

Tables

The default tabular enviroment don't support footnotes!

references within text

Input

Mark a text by a keyword `\label{keyword}`.
Reference with `\ref{keyword}`.

references within text

Input

Mark a text by a keyword `\label{keyword}`.
Reference with `\ref{keyword}`.

Output

Mark a text by a keyword .
Reference with 1. Here slide number.

references within text

Input

Mark a text by a keyword `\label{keyword}`.
Reference with `\ref{keyword}`.

Output

Mark a text by a keyword .
Reference with 1. Here slide number.

page reference

Or the pagenumber with `\pageref{keyword}`.
Or the pagenumber with 7.

references within text

Input

Mark a text by a keyword `\label{keyword}`.
Reference with `\ref{keyword}`.

Output

Mark a text by a keyword .
Reference with 1. Here slide number.

page reference

Or the pagenumber with `\pageref{keyword}`.
Or the pagenumber with 7.

twice

run LaTeX 2×

counters – What is counted?

- lists

counters – What is counted?

- lists
  - chapter, section, figure, table ...

counters – What is counted?

- lists
  - chapter, section, figure, table ...
- page

counters – What is counted?

- lists
  - chapter, section, figure, table ...
- page
- equation

counters – What is counted?

- lists
  - chapter, section, figure, table ...
- page
- equation
- footnote

counters – What is counted?

- lists
  - chapter, section, figure, table ...
- page
- equation
- footnote
- enumerations

commands about counting

- `\newcounter{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`
  - `\Alph{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`
  - `\Alph{name}`
  - `\fnsymbol{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`
  - `\Alph{name}`
  - `\fnsymbol{name}`
- `\addtocounter{name}{value}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`
  - `\Alph{name}`
  - `\fnsymbol{name}`
- `\addtocounter{name}{value}`
- `\stepcounter{name}`

commands about counting

- `\newcounter{name}`
- `\setcounter{name}{new value}`
- forms of numbers
  - `\roman{name}`
  - `\arabic{name}`
  - `\alph{name}`
  - `\Alph{name}`
  - `\fnsymbol{name}`
- `\addtocounter{name}{value}`
- `\stepcounter{name}`
- `\value{name}`

abstract and appendix

abstract

```
\begin{abstract}
An abstract.
\end{abstract}
```

abstract and appendix

abstract

```
\begin{abstract}
An abstract.
\end{abstract}
```

appendix

```
\appendix
\section{Figures}
\section{Tables}
```

abstract and appendix

abstract

```
\begin{abstract}
An abstract.
\end{abstract}
```

appendix

```
\appendix
\section{Figures}
\section{Tables}
```

appendix

Appendix use capital letters for counting.

structure

- no plain text

structure

- no plain text
- use `\input{name}` to include single TEX files

structure

- no plain text
- use `\input{name}` to include single TEX files
- example

structure

- no plain text
- use `\input{name}` to include single TEX files
- example

```
\begin{document}
\input{chapter1}
\input{chapter2}
\end{document}
```

structure

- no plain text
- use `\input{name}` to include single TEX files
- example

```
\begin{document}
\input{chapter1}
\input{chapter2}
\end{document}
```

alternative

`\include{file}` but better use input

lists of . . .

- table of contens `\tableofcontents`

lists of . . .

- table of contens `\tableofcontents`
- list of figures `\listoffigures`

lists of . . .

- table of contens `\tableofcontents`
- list of figures `\listoffigures`
- list of tables `\listoftables`

lists of . . .

- table of contens `\tableofcontents`
- list of figures `\listoffigures`
- list of tables `\listoftables`
- list of references

structure

headings

```
\part{Bla}
\chapter{Bla}
\section{Bla}
\subsection{Bla} and \subsubsection{Bla}
\paragraph{Bla} and \subparagraph{Bla}
```

structure

headings

`\part{Bla}`
`\chapter{Bla}`
`\section{Bla}`
`\subsection{Bla}` and `\subsubsection{Bla}`
`\paragraph{Bla}` and `\subparagraph{Bla}`

table of contents

`\tableofcontents` headings were automatically included

structure

headings

```
\part{Bla}
\chapter{Bla}
\section{Bla}
\subsection{Bla} and \subsubsection{Bla}
\paragraph{Bla} and \subparagraph{Bla}
```

table of contents

`\tableofcontents` headings were automatically included

implementation

```
\headingcommand{Heading}
\headingcommand[short form]{Heading}
\headingcommand*{Heading}
```

figure

package

graphicx

figure

package

graphicx

format

eps, pdf, jpg

figure

package

graphicx

format

eps, pdf, jpg

command

`\includegraphics`(Options: draft, scale, angle)

figure

package

graphicx

format

eps, pdf, jpg

command

`\includegraphics`(Options: draft, scale, angle)

example

```
\includegraphics[scale=0.5, angle=90]{logo}
```

lists of figures

```
\begin{figure}
\includegraphics[scale=0.1]{logo-SF}
\caption{what ever}
\end{figure}
```

lists of figures

```
\begin{figure}
\includegraphics[scale=0.1]{logo-SF}
\caption{what ever}
\end{figure}
```

file type pdflatex

jpg, pdf, png ...

lists of tables

```
\begin{table}
\begin{tabular}{|c|c|c|}
\hline
A & B & C\\
1 & 2 & 3\\
\hline
\end{tabular}
\caption{simple example}
\end{table}
```

lists of tables

```
\begin{table}
\begin{tabular}{|c|c|c|}
\hline
A & B & C\\
1 & 2 & 3\\
\hline
\end{tabular}
\caption{simple example}
\end{table}
```

A	B	C
1	2	3

Table: simple example

BiB - TEX overview

- name literatur.bib

BiB - TEX overview

- name literatur.bib
- quote with `\cite{kurz2}`

BiB - TEX overview

- name literatur.bib
- quote with `\cite{kurz2}`
- sources

BiB - TEX overview

- name literatur.bib
- quote with `\cite{kurz2}`
- sources
- include

example entry

```
@TechReport{RePEc:pra:mprapa:5765,
author={Frank, Sascha and Rehm, Jan},
title={An unnoted fair bet in german state run lotteries,
a short notice},
year=2007,
month=Nov,
institution={University Library of Munich, Germany},
type={MPRA Paper},
url={http://ideas.repec.org/p/pra/mprapa/5765.html},
number={5765},
abstract={},
keywords={}
}
```

place and style

place `\bibliography{literatur}`
style `\bibliographystyle{unsrtdin}`

must and can

Different source have different can and must fields

must and can fields:

Book (author,editor,title, publisher, year, series, edition, . . .)

Article (author, title, journal,year, key, volume,. . .)

PhdThesis (author, title, school, year, address, month, note, . . .)

TechReport(author, title, journal, year, key, type,. . .)

must and can

Different source have different can and must fields
must and can fields:
Book (author,editor,title, publisher, year, series, edition, . . .)
Article (author, title, journal,year, key, volume,. . .)
PhdThesis (author, title, school, year, address, month, note, . . .)
TechReport(author, title, journal, year, key, type,. . .)

problems

for example ä etc. or & will cause some problems

how to run

1. pdflatex seminar.tex

how to run

1. pdflatex seminar.tex
2. pdflatex seminar.tex

how to run

1. pdflatex seminar.tex
2. pdflatex seminar.tex
3. bibtex seminar

how to run

1. pdflatex seminar.tex
2. pdflatex seminar.tex
3. bibtex seminar
4. pdflatex seminar.tex

how to run

1. pdflatex seminar.tex
2. pdflatex seminar.tex
3. bibtex seminar
4. pdflatex seminar.tex
5. pdflatex seminar.tex

how to run

1. pdflatex seminar.tex
2. pdflatex seminar.tex
3. bibtex seminar
4. pdflatex seminar.tex
5. pdflatex seminar.tex
6. acroread seminar.pdf

text

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

text

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

text

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

better

text

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

better

example

```
If $a,b \in R,
\textrm{then}\, (a+b)^{2} = a^{2} + 2ab + b^{2}$\\
```

text

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a + b)^2 = a^2 + 2ab + b^2$

better

example

```
If $a,b \in R,
\textrm{then}\, (a+b)^{2} = a^{2} + 2ab + b^{2}$\\
```

Output

If $a, b \in R, \text{then}\, (a + b)^2 = a^2 + 2ab + b^2$

text amsmath

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

text amsmath

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

text amsmath

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

better

text amsmath

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a+b)^2 = a^2 + 2ab + b^2$

better

example

```
If $a,b \in R,
\text{then}\, (a+b)^{2} = a^{2} + 2ab + b^{2}$\\
```

text amsmath

example

```
If $a,b \in R,
then (a+b)^{2} = a^{2} + 2ab + b^{2} $\\
```

Output

If $a, b \in R, then (a + b)^2 = a^2 + 2ab + b^2$

better

example

```
If $a,b \in R,
\text{then}\, (a+b)^{2} = a^{2} + 2ab + b^{2}$\\
```

Output

If $a, b \in R,$ then $(a + b)^2 = a^2 + 2ab + b^2$

distance & brackets

distance

```
$x y$   xy
$x\,y$   x y
$x\quad y$   x   y
```

distance & brackets

distance

```
$x y$   xy
$x\,y$   x y
$x\quad y$   x   y
```

brackets

instead `(x + \sum_{i=0}^{n} y^{i^{2}})` $(x + \sum_{i=0}^{n} y^{i^{2}})$

better

`\left(x + \sum_{i=0}^{n} y^{i^{2}} \right)` $\left(x + \sum_{i=0}^{n} y^{i^{2}} \right)$

normal stuff

normal stuff

exponents and indices

```
$e^{i \phi}$
```

$e^{i \phi}$

normal stuff

exponents and indices

```
$e^{i \phi}$
```
$e^{i \phi}$

```
$a_{i}$
```
a_{i}

normal stuff

exponents and indices

```
$e^{i \phi}$
```
$e^{i \phi}$

```
$a_{i}$
```
a_{i}

root

```
$\sqrt{2}$
```
$\sqrt{2}$

normal stuff

exponents and indices

```
$e^{i \phi}$
```
$e^{i \phi}$

```
$a_{i}$
```
a_{i}

root

```
$\sqrt{2}$
```
$\sqrt{2}$

```
$\sqrt[3]{2}$
```
$\sqrt[3]{2}$

normal stuff

exponents and indices

```
$e^{i \phi}$
$a_{i}$
```

$e^{i \phi}$

a_{i}

root

```
$\sqrt{2}$
$\sqrt[3]{2}$
```

$\sqrt{2}$

$\sqrt[3]{2}$

frac

```
$\frac{1}{a}$
```

$\frac{1}{a}$

normal stuff

exponents and indices

```
$e^{i \phi}$
$a_{i}$
```

$e^{i \phi}$ a_{i}

root

```
$\sqrt{2}$
$\sqrt[3]{2}$
```

$\sqrt{2}$ $\sqrt[3]{2}$

frac

```
$\frac{1}{a}$
$\frac{1}{\frac{a}{b}}$
```

$\frac{1}{a}$ $\frac{1}{\frac{a}{b}}$

normal stuff 2

SPI

normal stuff 2

SPI

```
$\sum_{i=1}^{n} a_{i}$
```

$\sum_{i=1}^{n} a_{i}$

normal stuff 2

SPI

```
$\sum_{i=1}^{n} a_{i}$
$\prod_{i=1}^{n} a_{i}$
```

$\sum_{i=1}^{n} a_{i}$

$\prod_{i=1}^{n} a_{i}$

normal stuff 2

SPI

`$\sum_{i=1}^{n} a_{i}$`	$\sum_{i=1}^{n} a_i$
`$\prod_{i=1}^{n} a_{i}$`	$\prod_{i=1}^{n} a_i$
`$\int x \ dx $`	$\int x \ dx$

normal stuff 2

SPI

`$\sum_{i=1}^{n} a_{i}$`	$\sum_{i=1}^{n} a_i$
`$\prod_{i=1}^{n} a_{i}$`	$\prod_{i=1}^{n} a_i$
`$\int x \ dx $`	$\int x \ dx$

SPI

normal stuff 2

SPI

```
$\sum_{i=1}^{n} a_{i}$
$\prod_{i=1}^{n} a_{i}$
$\int x \ dx $
```

$\sum_{i=1}^{n} a_{i}$

$\prod_{i=1}^{n} a_{i}$

$\int x \ dx$

SPI

```
$\sum\limits_{i=1}^{n} a_{i}$
```

$$\sum\limits_{i=1}^{n} a_{i}$$

normal stuff 2

SPI

```
$\sum_{i=1}^{n} a_{i}$
$\prod_{i=1}^{n} a_{i}$
$\int x \ dx $
```

$\sum_{i=1}^{n} a_{i}$

$\prod_{i=1}^{n} a_{i}$

$\int x \ dx$

SPI

```
$\sum\limits_{i=1}^{n} a_{i}$

$\prod\limits_{i=1}^{n} a_{i}$
```

$$\sum_{i=1}^{n} a_{i}$$

$$\prod_{i=1}^{n} a_{i}$$

normal stuff 2

SPI

```
$\sum_{i=1}^{n} a_{i}$
$\prod_{i=1}^{n} a_{i}$
$\int x \ dx $
```

$\sum_{i=1}^{n} a_{i}$

$\prod_{i=1}^{n} a_{i}$

$\int x \ dx$

SPI

```
$\sum\limits_{i=1}^{n} a_{i}$

$\prod\limits_{i=1}^{n} a_{i}$

$\int\limits_{-\infty }^{\infty} x \ dx$
```

$\sum\limits_{i=1}^{n} a_{i}$

$\prod\limits_{i=1}^{n} a_{i}$

$\int\limits_{-\infty }^{\infty} x \ dx$

remarks & braces

remarks

`\dots` ...

remarks & braces

remarks

`\dots` ...

`\vdots` ⋮

remarks & braces

remarks

`\dots`	$\dots$
`\vdots`	$\vdots$
`\ddots`	$\ddots$

remarks & braces

remarks

\dots $\dots$

\vdots $\vdots$

\ddots $\ddots$

under...

```
$\underbrace{a+\dots+a}_{\textrm{n-times}} = na $
```

remarks & braces

remarks

```
\dots  ...
\vdots  ⋮
\ddots  ⋱
```

under...

```
$\underbrace{a+\dots+a}_{\textrm{n-times}} = na $
```

$$\underbrace{a + \cdots + a}_{\text{n-times}} = na$$

remarks & braces

remarks

```
\dots  ...
\vdots  ⋮
\ddots  ⋱
```

under...

```
$\underbrace{a+\dots+a}_{\textrm{n-times}} = na $
```

$\underbrace{a+\dots+a}_{\textrm{n-times}} = na$

over...

```
$\overbrace{a+\dots+a}^{\textrm{n-times}} = na $
```

remarks & braces

remarks

```
\dots  ...
\vdots  ⋮
\ddots  ⋱
```

under...

```
$\underbrace{a+\dots+a}_{\textrm{n-times}} = na $
```

$\underbrace{a+\dots+a}_{\textrm{n-times}} = na$

over...

```
$\overbrace{a+\dots+a}^{\textrm{n-times}} = na $
```

$\overbrace{a+\dots+a}^{\textrm{n-times}} = na$

in line

$ Input

```
$  x-y \leq 0 \, \forall \, x \leq y $
$ \sum_{i=0}^{n} a_{i}$
```

in line

$ Input

```
$  x-y \leq 0 \, \forall \, x \leq y $
$ \sum_{i=0}^{n} a_{i}$
```

$ Output

$x - y \leq 0 \, \forall \, x \leq y \, \sum_{i=0}^{n} a_i$

displaymath

Input

```
\begin{displaymath}
 x-y \leq 0 \, \forall \, x \leq y
\sum_{i=0}^{n} a_{i}
\end{displaymath}
```

displaymath

Input

```
\begin{displaymath}
 x-y \leq 0 \, \forall \, x \leq y
\sum_{i=0}^{n} a_{i}
\end{displaymath}
```

Output

$$x - y \leq 0 \forall x \leq y \sum_{i=0}^{n} a_i$$

displaymath

Input

```
\begin{displaymath}
 x-y \leq 0 \, \forall \, x \leq y
\sum_{i=0}^{n} a_{i}
\end{displaymath}
```

Output

$$x - y \leq 0 \forall x \leq y \sum_{i=0}^{n} a_i$$

Input displaymath–short

```
\[ x-y \leq 0 \, \forall \, x \leq y \]
```

displaymath

Input

```
\begin{displaymath}
 x-y \leq 0 \, \forall \, x \leq y
\sum_{i=0}^{n} a_{i}
\end{displaymath}
```

Output

$$x - y \leq 0 \forall x \leq y \sum_{i=0}^{n} a_i$$

Input displaymath–short

```
\[ x-y \leq 0 \, \forall \, x \leq y \]
```

Output displaymath–short

$$x - y \leq 0 \forall x \leq y$$

equation

Input

```
\begin{equation}
 x-y \leq 0 \, \forall \, x \leq y
\end{equation}
\begin{equation}
\sum_{i=0}^{n} a_{i}
\end{equation}
```

equation

Input

```
\begin{equation}
 x-y \leq 0 \, \forall \, x \leq y
\end{equation}
\begin{equation}
\sum_{i=0}^{n} a_{i}
\end{equation}
```

Output

$$x - y \leq 0 \, \forall \, x \leq y \tag{1}$$

$$\sum_{i=0}^{n} a_i \tag{2}$$

eqnarray

Input eqnarray

```
\begin{eqnarray}
 x-y & \leq & 0 \, \forall \, x \leq y \\
\sum_{i=0}^{n}a_{i}&\geq&0\, \forall \,a_{i}\geq0
\end{eqnarray}
```

eqnarray

Input eqnarray

```
\begin{eqnarray}
 x-y & \leq & 0 \, \forall \, x \leq y \\
\sum_{i=0}^{n}a_{i}&\geq&0\, \forall \,a_{i}\geq0
\end{eqnarray}
```

Output eqnarray

$$x - y \leq 0 \, \forall \, x \leq y \tag{1}$$

$$\sum_{i=0}^{n} a_i \geq 0 \, \forall \, a_i \geq 0 \tag{2}$$

eqnarray 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x) \\
\sin^{''''} &=& \sin(x) \\
\end{eqnarray}
```

eqnarray 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x) \\
\sin^{''''} &=& \sin(x) \\
\end{eqnarray}
```

$$\begin{aligned}
\sin' &= \cos(x) && (1)\\
\cos' &= -\sin(x) && (2)\\
\sin'' &= -\sin(x) && (3)\\
\sin''' &= -\cos(x) && (4)\\
\sin'''' &= \sin(x) && (5)\\
& && (6)
\end{aligned}$$

eqnarray 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x) \\
\sin^{''''} &=& \sin(x)
\end{eqnarray}
```

eqnarray 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x) \\
\sin^{''''} &=& \sin(x)
\end{eqnarray}
```

$$\sin' = \cos(x) \quad (1)$$
$$\cos' = -\sin(x) \quad (2)$$
$$\sin'' = -\sin(x) \quad (3)$$
$$\sin''' = -\cos(x) \quad (4)$$
$$\sin'''' = \sin(x) \quad (5)$$

eqnarray 2 better 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \nonumber \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x)
\end{eqnarray}
```

eqnarray 2 better 2

```
\begin{eqnarray}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \nonumber \\
\sin^{''} &=& - \sin(x) \\
\sin^{'''} &=& - \cos(x)
\end{eqnarray}
```

$$\sin^{'} = \cos(x) \tag{1}$$
$$\cos^{'} = -\sin(x)$$
$$\sin^{''} = -\sin(x) \tag{2}$$
$$\sin^{'''} = -\cos(x) \tag{3}$$

without numbers

example

```
\begin{eqnarray*}
\sin^{'} &=& \cos(x) \\
\cos^{'} &=& - \sin(x) \\
\end{eqnarray*}
```

$$\begin{aligned} \sin^{'} &= \cos(x) \\ \cos^{'} &= -\sin(x) \end{aligned}$$