HUMBOLDT-UNIVERSITÄT ZU BERLIN

LaTeX for Linguists

L4L 02: Math mode & new commands

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Reader & Webpage

LaTeX Reader (Freitag & Machicao y Priemer 2019b):
https://doi.org/10.13140/RG.2.2.29299.27682

Exercises and **Handouts**:
https://www.linguistik.hu-berlin.de/de/staff/amyp/latex

Math mode 1

- LaTeX has a special mode for **formulae**.
- Text is in **italics**, **blanks** and **line breaks** are **ignored**.

```
$You shouldn't use text in math mode.$
```

Youshouldn′tusetextinmathmode.

- With the command `\textrm{ }` or `\textnormal{ }` inside the math mode, text in upright mode with blanks can be used.

```
$You shouldn't use \textrm{ text in math } mode.$
```

Youshouldn′tuse text in math *mode.*

Math environments

Two different math environments can be used for the math mode:

- for **inline** formulae: `$ test test $`

```
If $2^2+\sqrt{2}=c^4$, what is the value of $c$?
```

If $2^2 + \sqrt{2} = c^4$, what is the value of c?

- **display** style (*math environment* in narrow sense):
  `\[ test test \]` or `$$ test test $$`

```
If $$2^2+\sqrt{2}=c^4$$, what is the value of $c$?
```

If

$$2^2 + \sqrt{2} = c^4$$

, what is the value of c?

Equation environment

For **numbered equations**: `equation` environment

```
\begin{equation}
\label{eq:FirstEq}
\lim_{n \to \infty}
\sum_{k=1}^n \frac{1}{k^2}
= \frac{\pi^2}{6}
\end{equation}
```

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

For **cross references** to numbered equations `\eqref{ }` can be used.

```
see \eqref{eq:FirstEq}

see \ref{eq:FirstEq}
```

see (1)
see 1

Math packages

Some symbols can only be used when specific math packages are loaded.

Math packages from the American Mathematical Society (AMS)

```
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{amstext}
\usepackage{mathrsfs}
```

Exercise

- Load the following packages in the preamble of your document:

```
\usepackage{amsmath}
\usepackage{amsfonts}
\usepackage{amssymb}
\usepackage{amstext}
\usepackage{mathrsfs}
```

- Create a new section in your document with the title: Math mode & new commands.
- Write a sentence (i.e. text) in the inline math mode, use also *ü*, *ß*, *á* and see what happens.
- Use `textrm` inside the math mode.
- Write the Pythagorean theorem ($a^2 + b^2 = c^2$) in the display mode.
- Use the equation environment to produce the quadratic formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{2}$$

- Label your equation and refer to it with `eqref` in a sentence.

Customizing your commands

You can create your own commands!

```
$\langle e, t \rangle$

$\langle \langle e,t \rangle , \langle
\langle e,t \rangle ,t \rangle \rangle$
```

$\langle e, t \rangle$

$\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$

Defining a command with **one argument** (for semantic types):

```
\newcommand{\type}[1]{\langle #1 \rangle}
```

The argument of the new command will be in angled brackets:

```
$\type{e,t}$

$\type{\type{e,t},\type{\type{e,t},t}}$
```

$\langle e, t \rangle$

$\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$

`\type{ }` can be embedded in further `\type{ }` commands!

Defining a command with **one argument** (for graphemes):

```
\newcommand{\ab}[1]{$\langle$#1$\rangle$}
```

The argument of the new command will be in angled brackets, but not in math mode:

```
\ab{buying a house}
```

(3) a. ⟨buying a house⟩ [with ab]
b. ⟨*buyingahouse*⟩ [with type]

`\ab{ }` cannot embed further `\ab{ }` commands!

But try this:

```
\newcommand{\graph}[1]{\textlangle#1\textrangle}

\graph{test \graph{test}}
```

(4) ⟨test ⟨test⟩⟩

Defining a command **without arguments** (for abbreviations):

```
\newcommand{\ra}{$\rightarrow$}

\newcommand{\et}{$\type{e,t}$}

P \ra\ Q

\et
```

(5) $P \rightarrow Q$

(6) $\langle e, t \rangle$

Defining a command with **more than one argument**:

```
\newcommand{\citegen}[3]{#1's #2 (#3)}

\citegen{Abney}{dissertation}{1987} is considered a milestone in NP Syntax.
```

Abney's dissertation (1987) is considered a milestone in NP Syntax.

Exercise

- Create a command `\XB` which outputs "X-bar theory".
- Create a command `\wrt` which outputs "w.r.t."
- Create a command `\obj` with one argument which outputs the argument in italics, e.g. for marking object language.
- Create a command `\gqq` with one argument which outputs double German quotation marks around text (try out: `\glqq{}` and `\grqq{}` for this task). Try a similar command for English quotation marks and for single quotation marks.
- Create a command `\abbsec` with one argument which outputs the abbreviation "Sec." and the cross reference to a Section (code for protected blank `\,`).
- Create a command `\sspace` with two arguments which outputs a number (1st argument) and a scale unit (2nd argument) separated by a protected short blank (code for protected short blank `~`).
- Create a command `\mix` (with 3 arguments) using your predefined commands: `wrt`, `obj` and `\sspace` (output: w.r.t. *door knob* 5.10 $).
- Put the definition of `mix` before the definition of `wrt`.

Internet sources I

- Link: Akzente und Sonderzeichen in LaTeX.
  `https://de.wikibooks.org/wiki/LaTeX/_Akzente_und_Sonderzeichen` [Access: 10/10/2017]
- Link: LaTeX/Special Characters.
  `https://en.wikibooks.org/wiki/LaTeX/Special_Characters` [Access: 02/01/2019]

Literature I

Freitag, Constantin & Antonio Machicao y Priemer. 2019a. LaTeX-Einführung für Linguisten. Manuscript. `https://doi.org/10.13140/RG.2.2.29299.27682`.

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Knuth, Donald E. 1986. *The TeX book*. Boston, MA: Addison-Wesley.

Kopka, Helmut. 1994. *LaTeX: Einführung*, vol. 1. Bonn: Addison-Wesley.

Machicao y Priemer, Antonio & Elisabeth Eberle. 2019. LaTeX for Linguists – Slides. Workshop for PhD candidates given at the PhD day of the Department of German Studies and Linguistics – Humboldt-Universität zu Berlin – 09. Oktober 2019.

Machicao y Priemer, Antonio & Robyn Kerkhof. 2016. LaTeX-Einführung für Linguisten – Slides. Präsentation beim 7. linguistischen Methodenworkshop an der Humboldt-Universität zu Berlin – 22.–24. Februar 2016. `https://www.researchgate.net/publication/295667182_LaTeX-Einfuhrung_fur_Linguisten`.

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