Latex for logic homework

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1 Installation

Latex is installed and ready for use within minutes.

1.1 Linux, Unix, BSD

Most likely Latex has already been installed, and you only need to add the latex-commands to your classpath, e.g. `pdflatex`. Otherwise, install latex via your package manager of choice, e.g. `yum install latex` or `apt-get install latex`.

1.2 Mac OS

Download and install **Texlive**. When installed, you should be able to use the latex-commands right from the terminal. Comes with most of the packages you will want to use.

1.3 Windows

Download and install **Miktex**. When installed, you should be able to use the latex-commands right from the windows terminal. If you load a package that does not come with the standard program installation, Miktex will automatically download an install it.

1.4

2 A Latex document

A standard Latex document looks like this:

```
\documentclass{article}

\begin{document}
Hello world!
\end{document}
```

The area between `\documentclass{article}` and `\begin{document}` is the hearder. This is where we specify document-wide settings. The area between `\begin{document}` and `\end{document}` is the content area.

The file name should end with the `.tex`-extention (e.g. `hello.tex`). In the terminal you can turn it into a pdf-file with the command `pdflatex hello.tex`. If there are no errors, the pdf-file will be placed in the same directory as the tex-file.

3 Some things about the header

3.1 Additional settings

The command `\documentclass` can be altered in order to reflect different document properties. We chose to use `article`, other available options are `book`, `report`, and `letter`.

`\documentclass[a4paper,11pt]{article}` also specifies the paper type and the standard font size.

3.2 Title, subtitle, author, date

```
\title{Logic homework}
\subtitle{Week 4}
\author{Theo Janssen}
```

3.3 Loading packages

In section **??** we will use the package `verbatim` for making multi-line comments. Since this functionality is not part of the standard equipment of Latex, we will have to load it explicitly. We do this by adding `\usepackage{verbatim}` to the header.

4 Some things about the content

4.1 Title

If you include the command `\maketitle`, it will generate the title for your document based on the information you provided in the header (i.e. `\author{}`, `\title{}`, `\subtitle{}`, `\date{}`).

4.2 Structure

You can structure your document by dividing it into sections and subsections. Do do this with the commands `\section{Section name}` and `\subsection{Subsection name}`.

4.3 Rudimentary markup

Markup name	Latex notation	Document result
Bold text	`\textbf{lalala}`	**lalala**
Italics	`\emph{lilili}`	*lilili*
Monospace	`\texttt{lololo}`	`lololo`

4.4 Comments

There are line comments `% Commented text...` and multi-line comments (for which you need to load the `verbatim`-package, see section **??**):

```
\begin{comment}
Commented ...
... text
\end{comment}
```

4.5 Verbatim

Sometimes you want to display ASCI-signs literally, i.e. not interpreted by Latex. This can be done inline with `\verb`. For multi-line verbatim you use `\begin{verbatim}` and `\end{verbatim}`. (This too requires the package `verbatim`.)

4.6 Mathematical and logical symbols and equations

Inline symbols occur between dollar signs. For example the logical 'and' is included inline with `$\land$`.

Besides inline mathematical symbolism, you can also make equations. Observe that in such cases you do not include the `$`-signs. You can include text in an equation by enclosing it within `\text{}`.

```
\begin{equation}
\forall x (P(x) \leftarrow (\exists y (Q(y)))) \text{some text}
\end{equation}
```

The commands for the most common logical and set-theoretical notation are listed in the following table. Some of these symbols require the `latexsym` package, so include `\usepackage{latexsym}` in the header of your document as well.

Symbol name	Latex notation	Document result
And	`\land`	$\land$
Or	`\lor`	$\lor$
Negation	`lnot`	$\neg$
Implication	`\rightarrow`	$\rightarrow$
Bi-implication	`\leftrightarrow`	$\leftrightarrow$
Entails	`\vdash`	$\vdash$
Models	`\vDash`	$\vDash$
Universal quantification	`\forall`	$\forall$
Existential quantification	`\exists`	$\exists$
Subscripts	`a_{n + 1}`	a_{n+1}
Superscripts	`a^2`	a^2
Greek alphabet	`\alpha \gamma \Gamma`	$\alpha\ \gamma\ \Gamma$
Verum	`\top`	$\top$
Falsum	`\bot`	$\bot$
Infinity	`\infty`	∞
Summations	`\Sigma^{i=1}_\infty`	$\Sigma_{\infty}^{i=1}$
Smaller than or equal	`\leq`	$\leq$
Larger than or equal	`\geq`	$\geq$
Unequal	`\neq`	$\neq$

5 Appendices

5.1 Common symbols for set theory

Symbol name	Latex notation	Document result
Set membership	`\in`	$\in$
Not a member of	`\notin`	$\notin$
Subset	`\subset \subseteq`	$\subset\ \subseteq$
Superset	`\supset \supseteq`	$\supset\ \supseteq$

5.2 List

For a list with bullet points use the following:

```
\begin{itemize}
\item ...
...
\item ...
\end{itemize}
```

If you want a numbered list instead, replace `itemize` with `enumerate`.

5.3 Further reading

- The Not So Short Introduction to Latex by Tobias Oetiker. If you want a more comprehensive introduction to Latex.
- University of Cambridge, Engineering Depatment, Latex page Advanced text processing in Latex. For resources regarding advanced Latex editing.
- Latex for logicians