

# L<sup>A</sup>T<sub>E</sub>X for Logic

Ulle Endriss

December 3, 2014

## 1 Introduction

We give some simple examples to demonstrate how you can use L<sup>A</sup>T<sub>E</sub>X to produce a nice-looking document on a logic-related subject (or any scientific subject in general). So this is about learning L<sup>A</sup>T<sub>E</sub>X;<sup>1</sup> don't take the actual content too serious.

Section 3, for instance, provides some logic-related examples. (At the time of writing this, I didn't know which number that section would get in the end, so I used a combination of the `label`- and the `ref`-command; see source file `sample.tex`.)

## 2 Basic Stuff

The text is written in a simple text editor and then formatted using the `latex`-command. Spacing, page breaks, numbering of sections, subsections, definitions, and other environments are all done automatically. This helps a lot when you develop large documents. Sometimes some “manual” adjustments are still necessary—nothing is perfect—but these should be kept to an absolute minimum. The underlying philosophy is that you concentrate on writing and leave the design of the document to the professionals (that is, the people who developed L<sup>A</sup>T<sub>E</sub>X in this case).

### 2.1 Fonts

Look at the source for this paragraph to find out how to *emphasise* parts of a sentence or how to get L<sup>A</sup>T<sub>E</sub>X to display something in **bold font**. In some case you may wish to use `typewriter font` or `sans serif`. Maybe even

---

<sup>1</sup>From now on I will simply write L<sup>A</sup>T<sub>E</sub>X rather than L<sup>A</sup>T<sub>E</sub>X. It would just get a bit tedious otherwise.

CAPITALISATION, but for aesthetic reason you should probably use all of these with some care.

## 2.2 Mathematics

If you want to write something mathematical, you need to switch to “math mode”. For something short within a paragraph, such as  $f(x^2 + 17)$ , use dollar signs. For a bigger formula that you want to be centred you could, for example, use the `equationarray`-environment:

$$\sum_{i=1}^n i = \frac{n \cdot (n + 1)}{2} \quad (1)$$

Please note that this is just one of several ways of doing something like this. You can find other examples throughout this document.

There are special commands for all sorts of mathematical symbols. Here are just some of them:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\subseteq$ ,  $\equiv$ ,  $\approx$ ,  $\Leftarrow$ ,  $\leftrightarrow$ ,  $\infty$ ,  $\in$ ,  $\leq$ , and so on . . .

## 3 Some Logic Examples

Here’s a list of examples:

1.  $(\neg A \vee B) \leftrightarrow (A \rightarrow B)$
2.  $(\forall x)P(x) \wedge (\exists x)Q(x) \rightarrow (\exists x)(P(x) \wedge Q(x))$
3.  $\mathcal{M} \models \varphi \vee (\psi_1 \wedge \psi_2)$
4.  $\mathcal{M} \not\models \neg\varphi$
5.  $Famous \sqcap \exists dislikes.(Rich \sqcup \neg Talented)$
6.  $B \cup \{\varphi\}$  is satisfiable
7.  $\{(x, y) \in \mathcal{D}^2 \mid x < y\}$
8.  $\mu := \mu \circ [y \leftarrow g(b, a)]$
9.  $(\forall x_1) \cdots (\forall x_n) \varphi [y \leftarrow f(x_1, \dots, x_n)]$
10.  $\top$  and  $\perp$

In LaTeX, there are two ways of writing the Greek letter *phi* (lowercase):  $\phi$  and  $\varphi$ . I prefer the latter.

## 4 More Examples

And some more examples ...

### 4.1 Program Code

You can use the `verbatim`-environment to typeset short programs. It tells LaTeX to print everything exactly as it appears in the source file, using typewriter font (that is, the real LaTeX is essentially “switched off”).

```
reverse_list( [], []).

reverse_list( [Head | Tail], ReversedList) :-
    reverse_list( Tail, ReversedTail),
    append( ReversedTail, [Head], ReversedList).
```

### 4.2 Tables

Here’s a simple table:

Person	Biblical?	Female?	Superstar?
Adam	yes	no	no
Britney	no	yes	yes
Christina	no	yes	yes
Eve	yes	yes	no

## 5 Getting More Information

There’s a lot of information available on the web. Try these links:

- <http://www.latex-project.org/intro.html>
- <http://www.ctan.org/tex-archive/info/lshort/english/>