

A Sample L^AT_EX Article

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Abstract

This is a sample L^AT_EX document that explains some of the L^AT_EX commands.

1 Introduction

L^AT_EX is a markup language designed and implemented by **Leslie Lamport**, based on **Donald E. Knuth**'s typesetting language T_EX. The markup in the source file of a L^AT_EX document may appear somewhat challenging, but the compiled result of the document is certainly a pleasing rendering of the mark-up material.

L^AT_EX was built on T_EX's foundation. An article is divided into *logical units*, including an abstract, various sections and subsections, theorems, and a bibliography. The logical units are typed independently of one another. Once all the units have been typed, L^AT_EX controls the *placement* and *formatting* of these elements. L^AT_EX automatically numbers the sections, theorems, and equations in your article, and builds the cross-references. If any changes are made to the article, it automatically renumbers its various parts and rebuilds the cross-references.

Packages are extensions of L^AT_EX. L^AT_EX commands, as a rule, start with a backslash (\) and tell L^AT_EX to do something special. For example, in the instruction `\emph{instructions to \LaTeX}`, `\emph` is a L^AT_EX command. Another kind of instruction is called an *environment*. For example, the commands `\begin{flushright}` and `\end{flushright}` enclose a `flushright` environment—texts that are typed inside this environment are right justified (lined up against the right margin) when typeset.

2 Typing Text

The following keys are used to type text in a \LaTeX source file:

a-z A-Z 0-9
+ = * / () []

You may also use the following punctuation marks:

, ; . ? ! : ‘ ’ -

and the spacebar, and the Return (or Enter) key.

There are thirteen special keys that are mostly used in \LaTeX instructions:

\$ % & ~ _ ^ \ { } @ " |

If you need to use them in your document, there are commands available for typesetting these special characters. For example, \$ is typed as $\backslash\$$, the underscore (–) is typed as $\backslash_$, and % is typed as $\backslash\%$, whereas ä is typed as $\backslash\{\text{a}\}$, and @ is simply typed @.

In a \LaTeX source file, each *comment* line begins with %. \LaTeX will ignore everything on the line after the % character.

The *document class*, declared by the command $\backslash\text{documentclass}\{..\}$, in a \LaTeX source file controls how the document will be formatted. \LaTeX , by default, fully justifies the text by placing a certain size space between words—the *interword space*—and a somewhat larger space between sentences—the *intersentence space*. To force an interword space, you can use the $\backslash_$ command (the $_$ symbol indicates a blank space). The ~ (tilde) command also forces an interword space, but with a difference: it keeps words together on the same line. It is called a “tie” or “non-breakable space.”

When \LaTeX encounters a period, it must decide whether or not it indicates the end of a sentence. It uses the following rule: A period following a capital letter (e.g., A.) is interpreted

as being part of an abbreviation or an initial and will be followed by an interword space; otherwise, it signifies the end of a sentence and will be followed by an intersentence space. If this rule causes problems in your document, you can follow the period with `_` to force an interword space, or precede the period with `\@` to force an intersentence space.

In a \LaTeX document source file, left double quotes are typed as ‘ ’ (two left single quotes) and right double quotes are type as ’ ’ (two right single quotes). The left single quote key is usually in the upper-left or upper-right corner of the keyboard, and shares a key with the tilde (`~`) key.

In a \LaTeX command that requires an argument, the argument follows the name of the command and is placed between `{` and `}`. Command names are *case sensitive*. The command `\` (`\newline` is another form) breaks a line. You can use the `\` command and specify an appropriate amount of vertical space, for example `\[1in]`. Note that this command uses *square brackets* rather than braces because the argument is *optional*. The distance/spacing may be given in points(`pt`), centimeters(`cm`), or inches(`in`). To force a page break, use `\newpage`.

3 Typing Math

In addition to the keys listed above, you need the keys `|`, `<`, and `>` to type mathematical formulas. (`|` is the shifted `\` key on many keyboards).

There are two kinds of math formulas and environments:

1. *Inline math environments* open and close with `$` or open with `\(` and close with `\)`.
2. *Displayed math environments* open with `\[` and close with `\]`. Other forms of the displayed environment are `\begin{equation*} ... \end{equation*}` and `\begin{equation} ... \end{equation}`.

Within the math environment, \LaTeX uses its own spacing rules and completely ignores the number of white spaces typed with two exceptions:

1. Spaces that delimit commands (e.g., in `\infty a$`, the space is not ignored; in fact, `\infty a$` is an error)

2. Spaces in the arguments of commands that temporarily revert to text mode (`\mbox` and `\text` are such commands).

In text mode, many spaces equal one space; whereas, in math mode, spaces are ignored (unless they terminate a command). To adjust the spacing in a typeset document, use a spacing command. The same formula may be typeset differently depending on whether it is inline or display. For example, $\sum_{i=1}^n i^2$ is inline math. The following is the same expression as displayed math

$$\sum_{i=1}^n i^2.$$

Math symbols are invoked by commands inside a math formula or environment. The math symbols are organized into tables in Appendix A of textbook. Some commands (e.g. `\sqrt`) need arguments enclosed in braces (`{` and `}`). For example, to typeset $\sqrt{x^2y^2}$, type `\sqrt{x^2 y^2}`. To typeset $\sqrt[n]{x^2y^2}$, type `\sqrt[n]{x^2 y^2}`. Some commands need more than one arguments. For example to typeset

$$\frac{\sin x}{\cos^2 x + \tan x}$$

type

```
\[
  \frac{\sin x}{\cos^2 x + \tan x}
\]
```

`\frac` is the command; $\sin x$ and $\cos^2 x + \tan x$ are the arguments.

Theorem 1 *This is the Pythagorean Theorem. It says*

$$x^2 + y^2 = z^2. \tag{1}$$

Definition 1 *Earth is where life is possible.*

4 References

Michael Downes *Short Math Guide for L^AT_EX*, AMS, 2002

George Gratzner, *First Steps in L^AT_EX*, Springer-Verlag, New York, 1999