

MINIMAL INTRODUCTION TO L^AT_EX

ADAM S. SIKORA

L^AT_EX (pronounced LAH-tekh or LAY-tekh) is a typesetting “language” and a computer program for document preparation. It is widely used in academia and it is a standard in all sciences involving math. (It is an extension of an earlier system TeX.)

L^AT_EX writing uses plain text only as opposed to the formatted text found in “What You See Is What You Get” word processors like Microsoft Word. For example,

Let $\alpha_{ij}^k \in \{1, 2\}$

outputs

Let $\alpha_{ij}^k \in \{1, 2\}$

in L^AT_EX.

In your Gradescope HW there will be questions which you can type in and those which require a solution uploaded into Gradescope. I strongly encourage you to use L^AT_EX math formatting in your typed in answers, cf. Sec 1.

If you feel ambitious, you can try to use it for preparing uploaded HW solutions as well. In this way you will be able to upload “professionally” looking pdf documents rather than scans of your handwriting. However, it is admittedly a more ambitious task, cf. Sec 2.

1. L^AT_EX EXPRESSIONS IN GRADESCOPE, CAMPUSWIRE, STACKEXCHANGE, WIKIPEDIA, MAC PAGES, ETC

Although L^AT_EX was designed as a standalone system for creating pdf documents, its math expressions format was adopted by several websites and computer programs, like Gradescope, StackExchange, Wikipedia, Mac Pages.

The simplest way of writing a math expression in L^AT_EX is by surrounding it by dollar signs, $\$$. A subscript or superscript consisting of a single character c is achieved by $_c$ and $\^c$. If a subscript or superscript consists of more than one character you need to enclose it in braces $\{...\}$, for example

$x_i^{n^2}$

outputs

$x_i^{n^2}$

(Note that $x_i^{n^2}$ is illegal.)

In general, braces are used to group math symbols together. However, in order to display them use $\{$ and $\}$. (Backslash is a special “control”

character in L^AT_EX.) Math operators

$$\leq, \geq, \neg, \vee, \wedge, \cap, \cup, \in, \subset, \subseteq, \subsetneq$$

can be entered as

```
\leq, \geq, \neg, \vee, \wedge, \cap, \cup, \in, \subset, \subseteq, \subsetneq
\subsetset, \subsetseteq, \subsetsetneq
```

Many of them can be negated by `\not`, for example

```
\alpha\not\in \emptyset
```

outputs $\alpha \notin \emptyset$ (“not an element of”).

L^AT_EX codes for all other conceivable symbols can be easily found online, eg. [1]. Furthermore, there are great apps [2] which provide a latex code matching any math symbol you draw.

The code `\mathbb N`, `\bf N` will output \mathbb{N} , \mathbf{N} . I encourage you to use one these symbols to denote the set of natural numbers. And analogous symbols, \mathbb{Z} , \mathbb{Q} , \mathbb{R} to denote the sets of integers, rationals and reals, respectively.

IMPORTANT: Unlike in the standalone L^AT_EX, all L^AT_EX expressions in Gradescope and CampusWire must be surrounded by double dollar signs, e.g. `$$\alpha \leq \beta$$`.

2. L^AT_EX DOCUMENT PREPARATION

Preparing a L^AT_EX standalone pdf document is a more ambitious task. You will need:

- A L^AT_EX software platform. Either
 - online <http://www.Overleaf.com> (the simplest) or
 - TeX Live or MiKTeX installed on your computer. It is very useful, but not necessary to install additionally a Latex integrated environment, like TexShop for MacOS or Texmaker on Windows or Linux. There are many other alternatives and most of them are free!
- Prepare your L^AT_EX code. Here is a minimal example

```
\documentclass[11pt]{amsart}
\usepackage{amssymb,amsmath}
\begin{document}
Let's go with \LaTeX\ to $\infty$ and beyond!
\end{document}
```

You either type it into Overleaf.com or into a plain text file with a `.tex` extension on your computer and then “latex” it into a pdf file.

The L^AT_EX standard is incredibly vast, it contains hundreds of commands, environments, and extension packages. They allow you to customize every conceivable aspect of your document. (The two packages used above extend

the range of math symbols available.) However, unless you are very particular about the visual appearance of your document, you only need a tiny slice of its functionality. [3] is a short (23 page) introduction to it.

If you feel somewhat ambitious, try to prepare HW solutions in L^AT_EX (for upload). Sooner or later you may want to learn L^AT_EX anyways. And you will need to learn it if you enroll into a Ph.D. program in any math related field. Needless to say, this document was prepared in L^AT_EX .

However, expect to be challenged. You will be stumped by L^AT_EX more than once. However, any conceivable question you may have was answered on the web already!

REFERENCES

- [1][1] Math Symbols Table, for example <http://www.math.wsu.edu/math/kcooper/M300/symALL.php>
- [2][2] Detexify (for Android) and DeTeXt (for iOS)
- [3][3] <https://ussproton.nl/files/pimpyourthesis-2019.pdf>