

Title

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1 Introduction

L^AT_EX, pronounced *LAY-tek* or *LAH-tek*, is a software system for typesetting documents. It was created in the 1980s by the computer scientist Leslie Lamport, building on a more basic system called T_EX, which had been created in the 1970s by the computer scientist Donald Knuth. Nowadays, these systems are extremely standard in scientific writing.

To create L^AT_EX documents on your own computer, you need a *compiler*, and for maximum convenience, an *editor* as well. You edit a `.tex` file in the editor, then click “compile” (or use a keyboard shortcut) to tell the compiler to create a `.pdf` document. In doing so, the compiler will create a bunch of extra files with extensions like `.aux`, `.log`, and so on. For this reason, it’s helpful to keep all the documents for a given project within a single folder.

Alternatively, Overleaf (<https://www.overleaf.com/>) is a website where you can create L^AT_EX documents online, after first creating a free account. The makers also wrote a very nice guide to L^AT_EX itself:

https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes

This webpage contains guidance on choosing and installing a compiler:

https://www.overleaf.com/learn/latex/Choosing_a_LaTeX_Compiler

The links above were typeset using the `\url{ }` command within a `center` environment.

2 A New Section

2.1 Subsection

An instance of a mathematical display:

$$(2.1) \quad X = \bigcup_{i,j=1}^{\infty} (U_i \cap V_j).$$

Notice that `\bigcap`, `\bigcup` produce the larger symbols \bigcap, \bigcup , whereas `\cap`, `\cup` produce the smaller symbols \cap, \cup .

2.2 Another Subsection

You can use commands like `\textbf{ }` and `\textit{ }` to produce text in **bold** or *italics*. A shorter command for the latter is `\emph{ }`.

L^AT_EX offers several different alphabetic fonts in math mode, like

- `\mathbb{ }` for blackboard boldface (\mathbb{A}),
- `\mathbf{ }` for ordinary boldface (\mathbf{A}),
- `\mathcal{ }` for calligraphic (\mathcal{A}),
- `\mathfrak{ }` for fraktur (\mathfrak{A}), and
- `\mathsf{ }` for sans-serif (A).

Please use them wisely!

L^AT_EX also offers several ways to decorate a symbol in math mode, like `\bar{ }`, `\hat{ }`, `\vec{ }`, among others. Use `\widehat{ }` to get a hat that stretches: Compare \hat{X} and \widehat{X} .

2.3 Yet Another Subsection

The list above was created using the `itemize` environment. To get a numbered list, use the `enumerate` environment:

1. An item.
2. Another item.
3. A third item.

Environments are also used to set apart blocks of text for theorems, proofs, and so on.

Theorem 2.1. *A theorem environment.*

Proof. This `proof` environment contains an `align` environment:

$$(2.2) \quad \frac{1}{2} [(x-y)^2 + (x+y)^2] = \frac{1}{2} [(x^2 - 2xy + y^2) + (x^2 + 2xy + y^2)]$$

$$(2.3) \quad = \frac{1}{2} [2x^2 + 2y^2]$$

$$(2.4) \quad = x^2 + y^2.$$

Notice that we used the commands `\left` and `\right` to make some brackets appropriately large.

To prevent L^AT_EX from numbering each line, use `align*` instead of `align`. To have a single number for the entire environment, put your math inside a `split` environment *inside* the `align` environment. \square

Definition 2.2. A definition environment. Here is a link to Theorem 2.1.

Remark 2.3. A remark environment. It contains a link to equation (2.1).

3 A Third Section

To typeset quotation marks, use ‘ and ’:

‘`word`’ produces “word”.

Using " will not produce the correct double-quotation marks.

Use `\cite[]{ }` to create a citation. Use an en dash (in T_EX: `--`) instead of a hyphen (`-`) to typeset page ranges. For instance,

`\cite[82-83]{munkres}` produces [M, 82-83].

The green text is a link to the bibliography entry below.

Theorem 3.1 (Munkres). *You can give a theorem/definition/remark a label in parentheses, to indicate who discovered it.*

References

[M] J. Munkres. *Topology*. 2nd Edition. Pearson Education, Ltd. (2014).