Title

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1 Introduction

LaTeX, 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 TeX, which had been created in the 1970s by the computer scientist Donald Knuth. Nowadays, these systems are extremely standard in scientific writing.

To create LaTeX 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 LaTeX documents online, after first creating a free account. The makers also wrote a very nice guide to LaTeX 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:

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

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{ }`.

LaTeX 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!

LaTeX 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 (Terras)**.** *A theorem environment.*

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

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

$$= \frac{1}{2}[2x^2+2y^2] \tag{2.3}$$

$$= x^2+y^2. \tag{2.4}$$

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

To prevent LaTeX 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. □

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

Use `\cite[ ]{ }` to create a citation. Use an en dash (in TeX: `--`) 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.

References

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