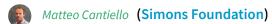


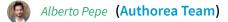


# How To Write Mathematical Equations, Expressions, and Symbols with LaTeX: A cheatsheet.









# 1 What is LaTeX?

LaTeX is a programming language that can be used for writing documents. It is especially useful to write mathematical notations: equations, formulae, etc. LaTeX makes special symbols and equations look good!

Note: you don't have to learn LaTeX to use Authorea. You can write mathematics in Authorea using a visual equation editor. If you're interested in using LaTeX, keep reading.

# 2 Writing LaTeX notation in Authorea

Authorea Beta supports LaTeX writing. In order to insert LaTeX: click on the Insert button in the toolbar and then select LaTeX from the dropdown. A LaTeX label shows next to the LaTeX block in which you can write LaTeX notation. Here are some tips for writing LaTeX in Authorea:

- 1. Click anywhere outside of the LaTeX block to render it.
- 2. Hover on Preview to see a Preview of the rendered content.
- 3. Do not paste an entire LaTeX article! Instead import documents from your homepage.
- 4. Only type LaTeX content in a LaTeX block, i.e. everything you would write after \begin{document} \begin{document} \
- 5. Do not type preamble (e.g. documentclass), frontmatter, macros or figures.
- 6. To add macros (newcommands) and packages, click Settings ightarrow Edit Macros
- 7. Use the Insert Figure button to insert images (and data).
- 8. Use math mode for equations, e.g.  $\mathcal{L}_{EM} = -\frac{1}{4}F^{\mu\nu}F_{\mu\nu}$  .



11. You can use sectioning commands like  $\lceil \$  to add headings.  $\rceil$ 

There are three ways to present a mathematical expression—*inline* (in the middle of a text line), as an *equation*, on a separate dedicated line, and as a full-sized inline expression (*displaystyle*).

#### 2.1 Inline mathematical expressions

Inline expressions occur in the middle of a sentence. To produce an inline expression, place the math expression between dollar signs (\$). For example, typing  $\$E=mc^2$  yields  $E=mc^2$ .

#### 2.2 Equations

Equations are mathematical expressions that are given their own line and are centered on the page. These are usually used for important equations that deserve to be showcased on their own line or for large equations that cannot fit inline. To produce an inline expression, place the mathematical expression between the symbols \[ \[ \] and \] . Typing \[ \[ x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}\] yields

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \tag{1}$$

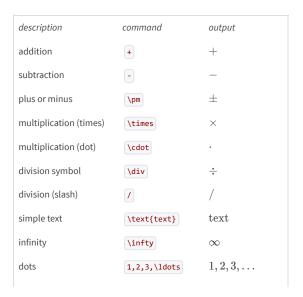
#### 2.3 Displaystyle

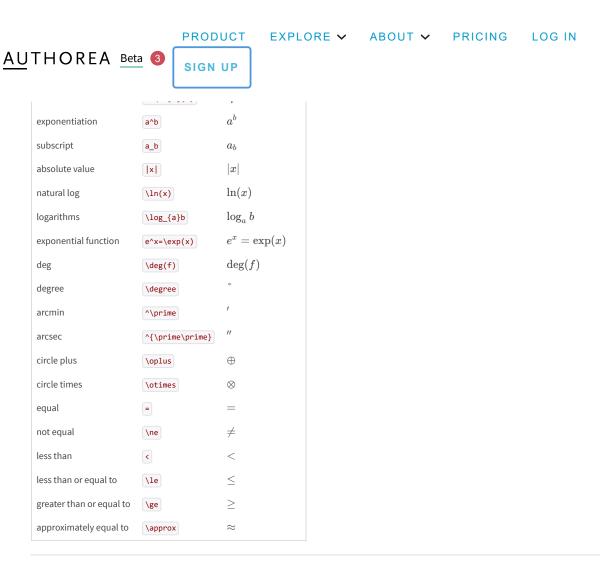
To get full-sized inline mathematical expressions use \displaystyle . Typing I want this \$\displaystyle \sum\_{n=1}^{\infty} \frac{1}{n}\$, not this \$\sum\_{n=1}^{\infty} \frac{1}{n}\$. yields: I want this  $\sum_{n=1}^{\infty} \frac{1}{n}$ , not this  $\sum_{n=1}^{\infty} \frac{1}{n}$ .

# 3 Symbols (in *math* mode)

## 3.1 The basics

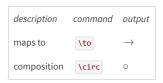
Math mode in LaTeX happens inside the dollar signs (\$...\$), inside the square brackets \[...\] and inside equation and displaystyle environments.



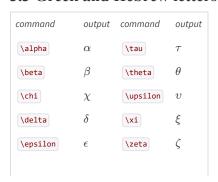


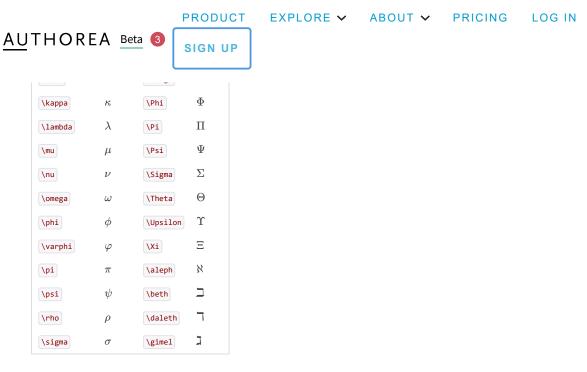
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#### 3.2 Functions

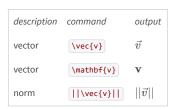


## 3.3 Greek and Hebrew letters

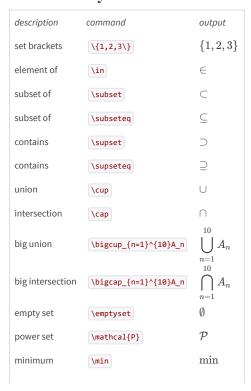




#### 3.4 Vectors



# 3.5 Set theory

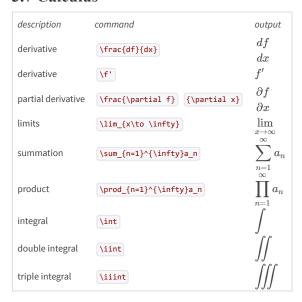




## 3.6 Logic



#### 3.7 Calculus

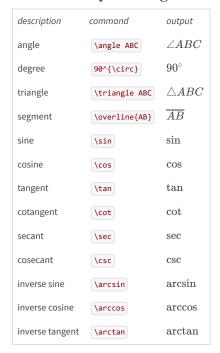


## 3.8 Number theory



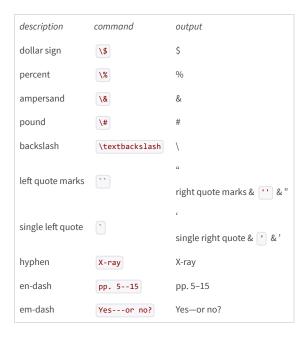


## 3.9 Geometry and trigonometry



# 4 Symbols (in text mode)

The followign symbols do not have to be surrounded by dollar signs.



# 5 Further reading

