

You have 1 free story left this month. Sign up and get an extra one for free.

# Learn How to Write Markdown & LaTeX in The Jupyter Notebook

Not only Jupyter. Google Colab, R Markdown, and much more.



Khelifi Ahmed Aziz [Follow](#)

Apr 4 · 6 min read ★



 [medium.com/@ahmedazizkhelifi](https://medium.com/@ahmedazizkhelifi)

Background by JESHOOOTS.COM on Unsplash

**I**nteractive notebooks are experiencing a rise in popularity. *Why?* Simply because it's a great teaching environment, powerful, shareable, and provides the ability to perform data visualization in the same environment. *Which interactive notebooks should I use?* I recommend:

- **The Jupyter Notebook** is an open-source web application that allows you to create and share documents that contain live code, equations, visualizations, and narrative text.
- **Colaboratory** is a free Jupyter notebook environment that requires no setup and runs entirely in the cloud.

Both of them support

1. **Markdown** which is a markup language that is a superset of HTML.
2. **Latex** to render mathematical and scientific writing.

## Markdown

It's a very simple language that allows you to write HTML in a shortened way. It can be used on some websites like Stack Overflow or to write documentations (essentially on GitHub).

## Markdown file extension is .md

When you write in Markdown, you use shortened notations which are replaced by the corresponding HTML tags. Each time, I will tell you the HTML equivalent of the Markdown notation to show you how Markdown made our life easier than ever.

Even web developers, now, use Markdown then convert it to HTML using some websites.

### • Headings

You make titles using hashtags # . A single hashtag gives you a title (h1), two hashtags give you a subtitle (h2) and so on as shown below:

```
# Heading 1
## Heading 2
### Heading 3
#### Heading 4
##### Heading 5
##### Heading 6
```

HTML equivalent:

Output Result : Colab Notebook

## • Paragraphs

Paragraphs are represented by the `<p>` tag in HTML. In Markdown, they're separated by one or more blank lines. Like HTML, whitespace is ignored. So if you add 10 blank lines, you're still only going to have one paragraph.

```
This is a paragraph of text.
```

```
This is another paragraph of text.
```

HTML equivalent:

Output Result: Colab Notebook

## • Line breaks

Just end a line with two or more spaces , then type return. Or leave an empty line.

```
This is a text.      <!-- spaces -->
This is another text.
```

HTML equivalent:

Output Result: Colab Notebook

## • Mark emphasis

You can add emphasis by making text bold or italic.

Emphasis, aka italics, with **asterisks** or underscores.

Strong emphasis, aka bold, with **asterisks** or underscores.

Combined emphasis with **asterisks and underscores**.

Strikethrough uses two tildes ~ . ~~Scratch this~~

HTML equivalent:

Output Result: Colab Notebook

## • Lists

Creating lists in Markdown is a real pleasure, you will see that there is nothing simpler!

```
1. Item 1
2. Item 2 ( we can type 1. and the markdown will automatically
numerate them)
* First Item
  * Nested item 1
  * Nested item 2
    1. Keep going
    1. Yes

* Second Item
- First Item
- Second Item
```

HTML equivalent:

Output Result: Colab Notebook

## • Links and Images

To create a link, you must place the text of the link in square brackets followed by the URL in parentheses. Images are almost inserted in the same way as links, add an

exclamation mark ( ! ), followed by alt text in brackets, and the path or URL to the image asset in parentheses.

```
<!-- [Text] (link) -->
[Link Text] (https://medium.com/@ahmedazizkhelifi "Optional Title")

<!-- ![Alt Text] (image path "title") -->
![Alt Text] (https://miro.medium.com/max/80/0*PRNVc7bjff0Jj1pm.png
"Optional Title")

<!-- Linking Image -->
<!-- [[Alt Text] (image path "title")] (link) -->[[Alt Text]
(https://miro.medium.com/max/80/0*PRNVc7bjff0Jj1pm.png "Optional
Title")] (https://medium.com/@ahmedazizkhelifi)
```

HTML equivalent:

Output Result: Colab Notebook

## • Horizontal Rule

To create a horizontal rule, use three or more asterisks ( \*\*\* ), dashes ( --- ), or underscores ( \_\_\_ ) on a line by themselves.

```
Reading articles on Medium is awesome.
---
Sure !!
```

HTML equivalent:

Output Result: Colab Notebook

## • Table

It's so freaking easy. And you can use this website to generate them.

Use \ before the dollar signs \$ , on your Notebook, otherwise, you'll enter the math display mode (check it out on the LaTeX side).

Id	Label	Price
01	Markdown	\\$1600
02	is	\\$12
03	AWESOME	\\$999

HTML Equivalent:

Output Result: Colab Notebook

## • Code and Syntax Highlighting

```
```python
def staySafe(Coronavirus)
    if not home:
        return home
```
```

HTML Equivalent:

Output Result: Colab Notebook

## • Blockquotes

Blockquotes work like replies to e-mails: you must precede the quoted lines with a > .

```
> This is a blockquote.
>
> This is part of the same blockquote.

Quote break

> This is a new blockquote.
```

HTML Equivalent:

Output Result: Colab Notebook

# LaTeX

Have you ever asked yourself, how they write complex maths and physics equations using computer? Well, it's all about LaTeX.

The Jupyter Notebook uses MathJax to render LaTeX inside HTML / Markdown. Just put your LaTeX math inside `$ $`. Or enter in *display* math mode by writing between `$$ $$`.

To insert a mathematical formula we use the dollar symbol `$`, as follows:

Euler's identity:  $e^{i\pi} + 1 = 0$

To isolate and center the formulas and enter in math display mode, we use 2 dollars symbol:

...

Euler's identity:

$$e^{i\pi} + 1 = 0$$

Output Result: Colab Notebook

## Important Notes:

1. To add **little spacing** in math mode use `\,`
2. To add **a new line** when in math mode use `\\`
3. To display **fraction** use `\frac{arg 1}{arg 2}`
4. For **power** (superscripts text) use `^{\}`
5. For **indices** (subscripts) use `_{\}`
6. For **roots** use `\sqrt[n]{arg}`

The `[n]` is optional.

$$\frac{arg1}{arg2}$$

$$x^2$$

$$e^{i\pi}$$

$$A_i$$

$$B_{ij}$$

$$\sqrt[n]{arg}$$

Output Example: Colab Notebook

## LaTeX file extension is .tex

### • Greek Letters

To write greek letters, type `\` and the letter name:

$$\text{Given : } \pi = 3.14, \alpha = \frac{3\pi}{4} \text{ rad}$$

$$\omega = 2\pi f$$

$$f = \frac{c}{\lambda}$$

$$\lambda_0 = \theta^2 + \delta$$

$$\Delta\lambda = \frac{1}{\lambda^2}$$

Output Result: Colab Notebook

### Important Note:

To write **Capital Greek Letter**, type the first case after the backslash `\` as an uppercase, for example:

```
\delta >>> δ
\Delta >>> Δ
```

```
\omega >>> ω
\Omega >>> Ω
```



|          |                     |          |                     |
|----------|---------------------|----------|---------------------|
| $\Delta$ | <code>\Delta</code> | $\delta$ | <code>\delta</code> |
| $\Omega$ | <code>\Omega</code> | $\omega$ | <code>\omega</code> |

Output Example: Colab Notebook

As shown in this figure:

|                    |                               |                      |                                 |
|--------------------|-------------------------------|----------------------|---------------------------------|
| $\alpha$           | <code>\alpha</code>           | $\xi, \Xi$           | <code>\xi, \Xi</code>           |
| $\beta$            | <code>\beta</code>            | $\circ$              | <code>\circ</code>              |
| $\gamma, \Gamma$   | <code>\gamma, \Gamma</code>   | $\pi, \Pi$           | <code>\pi, \Pi</code>           |
| $\delta, \Delta$   | <code>\delta, \Delta</code>   | $\varpi$             | <code>\varpi</code>             |
| $\epsilon$         | <code>\epsilon</code>         | $\rho$               | <code>\rho</code>               |
| $\varepsilon$      | <code>\varepsilon</code>      | $\varrho$            | <code>\varrho</code>            |
| $\zeta$            | <code>\zeta</code>            | $\sigma, \Sigma$     | <code>\sigma, \Sigma</code>     |
| $\eta$             | <code>\eta</code>             | $\varsigma$          | <code>\varsigma</code>          |
| $\theta, \Theta$   | <code>\theta, \Theta</code>   | $\tau$               | <code>\tau</code>               |
| $\vartheta$        | <code>\vartheta</code>        | $\upsilon, \Upsilon$ | <code>\upsilon, \Upsilon</code> |
| $\iota$            | <code>\iota</code>            | $\phi, \Phi$         | <code>\phi, \Phi</code>         |
| $\kappa$           | <code>\kappa</code>           | $\varphi$            | <code>\varphi</code>            |
| $\lambda, \Lambda$ | <code>\lambda, \Lambda</code> | $\chi$               | <code>\chi</code>               |
| $\mu$              | <code>\mu</code>              | $\psi, \Psi$         | <code>\psi, \Psi</code>         |
| $\nu$              | <code>\nu</code>              | $\omega, \Omega$     | <code>\omega, \Omega</code>     |

Full Greek Letter List. Source

## • Roman Names:

$$\sin(-\alpha) = -\sin(\alpha)$$

$$\arccos(x) = \arcsin(u)$$

$$\log_n(n) = 1$$

$$\tan(x) = \frac{\sin(x)}{\cos(x)}$$

Output Result: Colab Notebook

|        |                   |         |                    |           |                      |
|--------|-------------------|---------|--------------------|-----------|----------------------|
| $\sin$ | <code>\sin</code> | $\sinh$ | <code>\sinh</code> | $\arcsin$ | <code>\arcsin</code> |
| $\cos$ | <code>\cos</code> | $\cosh$ | <code>\cosh</code> | $\arccos$ | <code>\arccos</code> |
| $\tan$ | <code>\tan</code> | $\tanh$ | <code>\tanh</code> | $\arctan$ | <code>\arctan</code> |
| $\sec$ | <code>\sec</code> | $\coth$ | <code>\coth</code> | $\min$    | <code>\min</code>    |
| $\csc$ | <code>\csc</code> | $\det$  | <code>\det</code>  | $\max$    | <code>\max</code>    |
| $\cot$ | <code>\cot</code> | $\dim$  | <code>\dim</code>  | $\inf$    | <code>\inf</code>    |
| $\exp$ | <code>\exp</code> | $\ker$  | <code>\ker</code>  | $\sup$    | <code>\sup</code>    |
| $\log$ | <code>\log</code> | $\deg$  | <code>\deg</code>  | $\liminf$ | <code>\liminf</code> |

|       |                  |        |                   |           |                      |
|-------|------------------|--------|-------------------|-----------|----------------------|
| $\ln$ | <code>\ln</code> | $\arg$ | <code>\arg</code> | $\limsup$ | <code>\limsup</code> |
| $\lg$ | <code>\lg</code> | $\gcd$ | <code>\gcd</code> | $\lim$    | <code>\lim</code>    |

Source

## • Other Symbols

### Angles:

Left angle :  $\langle$

Right angle :  $\rangle$

Angle between two vectors  $u$  and  $v$  :  $\langle \vec{u}, \vec{v} \rangle$

$$\vec{AB} \cdot \vec{CD} = 0 \Rightarrow \vec{AB} \perp \vec{CD}$$

### Sets and logic

$$\mathbb{N} \subset \mathbb{Z} \subset \mathbb{D} \subset \mathbb{Q} \subset \mathbb{R} \subset \mathbb{C}$$

Output Result: Colab Notebook

|             |                        |              |                          |                |                           |
|-------------|------------------------|--------------|--------------------------|----------------|---------------------------|
| $\cup$      | <code>\cup</code>      | $\mathbb{R}$ | <code>\mathbb{R}</code>  | $\forall$      | <code>\forall</code>      |
| $\cap$      | <code>\cap</code>      | $\mathbb{Z}$ | <code>\mathbb{Z}</code>  | $\exists$      | <code>\exists</code>      |
| $\subset$   | <code>\subset</code>   | $\mathbb{Q}$ | <code>\mathbb{Q}</code>  | $\neg$         | <code>\neg</code>         |
| $\subseteq$ | <code>\subseteq</code> | $\mathbb{N}$ | <code>\mathbb{N}</code>  | $\vee$         | <code>\vee</code>         |
| $\supset$   | <code>\supset</code>   | $\mathbb{C}$ | <code>\mathbb{C}</code>  | $\wedge$       | <code>\wedge</code>       |
| $\supseteq$ | <code>\supseteq</code> | $\emptyset$  | <code>\varnothing</code> | $\vdash$       | <code>\vdash</code>       |
| $\in$       | <code>\in</code>       | $\emptyset$  | <code>\emptyset</code>   | $\models$      | <code>\models</code>      |
| $\ni$       | <code>\ni</code>       | $\aleph$     | <code>\aleph</code>      | $\Rightarrow$  | <code>\Rightarrow</code>  |
| $\notin$    | <code>\notin</code>    | $\setminus$  | <code>\setminus</code>   | $\nRightarrow$ | <code>\nRightarrow</code> |
| $\not\in$   | <code>\not\in</code>   | $\equiv$     | <code>\equiv</code>      |                |                           |

Sets and Logic: Source

|                   |                               |                   |                              |
|-------------------|-------------------------------|-------------------|------------------------------|
| $\rightarrow$     | <code>\rightarrow, \to</code> | $\mapsto$         | <code>\mapsto</code>         |
| $\nrightarrow$    | <code>\nrightarrow</code>     | $\longmapsto$     | <code>\longmapsto</code>     |
| $\longrightarrow$ | <code>\longrightarrow</code>  | $\leftarrow$      | <code>\leftarrow</code>      |
| $\Rightarrow$     | <code>\Rightarrow</code>      | $\Leftrightarrow$ | <code>\Leftrightarrow</code> |
| $\nRightarrow$    | <code>\nRightarrow</code>     | $\downarrow$      | <code>\downarrow</code>      |
| $\Longrightarrow$ | <code>\Longrightarrow</code>  | $\uparrow$        | <code>\uparrow</code>        |
| $\leadsto$        | <code>\leadsto</code>         | $\updownarrow$    | <code>\updownarrow</code>    |

## Arrows: Source

|           |                      |                   |                              |                      |                                 |
|-----------|----------------------|-------------------|------------------------------|----------------------|---------------------------------|
| $<$       | <code>&lt;</code>    | $\angle$          | <code>\angle</code>          | $\cdot$              | <code>\cdot</code>              |
| $\leq$    | <code>\leq</code>    | $\sphericalangle$ | <code>\measuredangle</code>  | $\pm$                | <code>\pm</code>                |
| $>$       | <code>&gt;</code>    | $\ell$            | <code>\ell</code>            | $\mp$                | <code>\mp</code>                |
| $\geq$    | <code>\geq</code>    | $\parallel$       | <code>\parallel</code>       | $\times$             | <code>\times</code>             |
| $\neq$    | <code>\neq</code>    | $45^\circ$        | <code>45^{\circ}</code>      | $\div$               | <code>\div</code>               |
| $\ll$     | <code>\ll</code>     | $\cong$           | <code>\cong</code>           | $*$                  | <code>\ast</code>               |
| $\gg$     | <code>\gg</code>     | $\ncong$          | <code>\ncong</code>          | $ $                  | <code>\mid</code>               |
| $\approx$ | <code>\approx</code> | $\sim$            | <code>\sim</code>            | $\dagger$            | <code>\nmid</code>              |
| $\asymp$  | <code>\asymp</code>  | $\simeq$          | <code>\simeq</code>          | $n!$                 | <code>n!</code>                 |
| $\equiv$  | <code>\equiv</code>  | $\nsim$           | <code>\nsim</code>           | $\partial$           | <code>\partial</code>           |
| $\prec$   | <code>\prec</code>   | $\oplus$          | <code>\oplus</code>          | $\nabla$             | <code>\nabla</code>             |
| $\preceq$ | <code>\preceq</code> | $\ominus$         | <code>\ominus</code>         | $\hbar$              | <code>\hbar</code>              |
| $\succ$   | <code>\succ</code>   | $\odot$           | <code>\odot</code>           | $\circ$              | <code>\circ</code>              |
| $\succeq$ | <code>\succeq</code> | $\otimes$         | <code>\otimes</code>         | $\star$              | <code>\star</code>              |
| $\propto$ | <code>\propto</code> | $\oslash$         | <code>\oslash</code>         | $\sqrt{\phantom{x}}$ | <code>\sqrt{\phantom{x}}</code> |
| $\doteq$  | <code>\doteq</code>  | $\upharpoonright$ | <code>\upharpoonright</code> | $\checkmark$         | <code>\checkmark</code>         |

## Other Symbols: Source

### • Vertical curly braces:

To define a left vertical curly brace we use the attribute

`\left\{`

to close it we use

`\right\}`

$$\text{sign}(x) = \begin{cases} 1 & \text{if } x \in \mathbf{N}^* \\ 0 & \text{if } x = 0 \\ -1 & \text{else.} \end{cases}$$

$$\left. \begin{array}{l} \alpha^2 = \sqrt{5} \\ \alpha \geq 0 \end{array} \right\} \alpha = 5$$

## • Horizontal curly braces

For horizontal curly braces, we use :

```
\underbrace{...}
\overbrace{...}
```

$$\underbrace{\ln\left(\frac{5}{6}\right)}_{\simeq -0.1823} < \overbrace{\exp(2)}^{\simeq 7.3890}$$

Output Result: Colab Notebook

## • Derivative

First order derivative :

$$f'(x)$$

K-th order derivative :

$$f^{(k)}(x)$$

Partial first order derivative :

$$\frac{\partial f}{\partial x}$$

Partial k-th order derivative :

$$\frac{\partial^k f}{\partial x^k}$$

Output Result: Colab Notebook

## • Limit

Limit at plus infinity :

$$\lim_{x \rightarrow +\infty} f(x)$$

Min :

$$\min_{x \in [\alpha, \beta]} f(x)$$

Limit at minus infinity :

$$\lim_{x \rightarrow -\infty} f(x)$$

Limit at  $\alpha$  :

$$\lim_{x \rightarrow \alpha} f(x)$$

Sup :

$$\sup_{x \in \mathbb{R}} f(x)$$

Max :

$$\max_{x \in [a, b]} f(x)$$

Inf :

$$\inf_{x > s} f(x)$$

Output Result: Colab Notebook

## • Sum

Sum from 0 to +inf:

$$\sum_{j=0}^{+\infty} A_j$$

Double sum:

$$\sum_{i=1}^k \sum_{j=1}^{l+1} A_i A_j$$

Taylor expansion of  $e^x$ :

$$e^x = \sum_{k=0}^n \frac{x^k}{k!} + o(x^n)$$

Output Result: Colab Notebook

## • Product

Product:

$$\prod_{j=1}^k A_{\alpha_j}$$

Double product:

$$\prod_{i=1}^k \prod_{j=1}^l A_i A_j$$

Output Result: Colab Notebook

## • Integral

Simple integral:

$$\int_a^b f(x)dx$$

Double integral:

$$\int_a^b \int_c^d f(x,y)dxdy$$

Triple integral:

$$\iiint$$

Quadruple integral:

$$\iiiii$$

Multiple integral :

$$\int \cdots \int$$

Contour integral:

$$\oint$$

Output Result: Colab Notebook

## • Matrix

Plain:

$$\begin{array}{ccc} 1 & 2 & 3 \\ a & b & c \end{array}$$

Round brackets:

$$\begin{pmatrix} 1 & 2 & 3 \\ a & b & c \end{pmatrix}$$

Curly brackets:

$$\left\{ \begin{array}{ccc} 1 & 2 & 3 \\ a & b & c \end{array} \right\}$$

Pipes:

$$\left| \begin{array}{ccc} 1 & 2 & 3 \\ a & b & c \end{array} \right|$$

Double pipes

$$\| \begin{array}{ccc} 1 & 2 & 3 \end{array} \|$$

$$\| a \quad b \quad c \|$$

Output Result: Colab Notebook

## Resources:

- <https://www.datasciencecentral.com/profiles/blogs/all-about-using-jupyter-notebooks-and-google-colab>
- [https://oeis.org/wiki/List\\_of\\_LaTeX\\_mathematical\\_symbols](https://oeis.org/wiki/List_of_LaTeX_mathematical_symbols)
- <https://jupyter.org/>
- [https://en.wikipedia.org/wiki/Project\\_Jupyter](https://en.wikipedia.org/wiki/Project_Jupyter)
- <https://en.wikipedia.org/wiki/Markdown>
- <http://tug.ctan.org/info/undergradmath/>
- <https://openclassrooms.com/en/courses/1304236-redigez-en-markdown>

. . .

Thanks For Reading! 😊



Check out **my other articles** and follow me on **Medium**

Khelifi Ahmed Aziz

---

## Sign up for The Daily Pick

By Towards Data Science

Hands-on real-world examples, research, tutorials, and cutting-edge techniques delivered Monday to Thursday. Make learning your daily ritual. [Take a look](#)

Your email

---



Get this newsletter

By signing up, you will create a Medium account if you don't already have one. Review our [Privacy Policy](#) for more information about our privacy practices.

[Data Science](#)

[Jupyter Notebook](#)

[Markdown](#)

[Latex](#)

[Math](#)

[About](#) [Help](#) [Legal](#)

Get the Medium app

