

Markdown and LaTeX introduction

[Markdown](#) is a text-to-HTML conversion tool for web writers. Markdown allows you to write using an easy-to-read, easy-to-write plain text format, then convert it to structurally valid XHTML (or HTML). A Markdown document could contain chunks of embedded graphics, source codes and LaTeX formula. [LaTeX](#) is a high-quality typesetting system; it includes features designed for the production of technical and scientific documentation. A basic knowledge about Markdown and LaTeX could let to create HTML documents such as weblogs or reports very easily. This tutorial provides a quick reference to use Markdown and LaTeX.

Markdown

The following provides a quick reference to the most commonly used Markdown syntax.

Headers

H3

H4

H5

H6

```
# Markdown
```

The following provides a quick reference to the most commonly used Markdown syntax.

```
## Headers
```

```
### H3
```

```
#### H4
```

```
##### H5
```

```
##### H6
```

Emphasis

Italic and **Bold**

```
*Italic* and **Bold**
```

~~Scratched Text~~

```
~~Scratched Text~~
```

superscript²

```
superscript^2^
```

Markdown doesn't support underline, but we can use HTML Text instead. Also, **we** can *render* almost any **HTML** code that we like such as superscript².

Markdown doesn't support underline, but we can use `<u>HTML Text</u>` instead. Also, `we` can `<i>render</i>` almost any `HTML` code that we ` `; `<kbd>like</kbd>` ` `; such as superscript`²`.

For manual line or page breaks, we can use following HTML and CSS codes:

- Line breaks:

```
<br />
```

- Print breaks:

```
<p style="page-break-after :always;"></p>
```

Lists

- Item 1
- Item 2
 - Item 2a
 - Item 2b
 - Item 2b-1
 - Item 2b-2

```
- Item 1
- Item 2
  - Item 2a (2 tabs)
  - Item 2b
    - Item 2b-1 (4 tabs)
    - Item 2b-2
```

1. Item 1
2. Item 2
3. Item 3
 - Item 3a
 - Item 3b

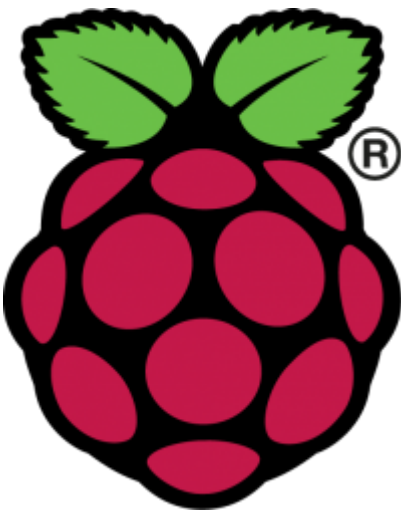
```
1. Item 1
2. Item 2
3. Item 3
  - Item 3a
  - Item 3b
```

Links

[Github](#)

```
[Github](http://www.github.com/)
```

Images



```
<p align="center">
! [Logo](https://www.raspberrypi.org/app/uploads/2018/03/RPi-Logo-Reg-SCREEN-199x250.png "Raspberry pi")
</p>
```

Note that here we used an HTML code to align center the image. Also, we can use HTML to add more styles, for example:

```
<p align="center">

</p>
```

Quotes

Imagination is more important than knowledge.

Albert Einstein

```
> Imagination is more important than knowledge.
>
> Albert Einstein
```

Hlines

Use three dashes --- to draw an horizontal line like:

```
---
```

Tables

1st Header	2nd Header	3rd Header
col 1 is	left-aligned	1
col 2 is	center-aligned	2
col 3 is	right-aligned	3

```
1st Header|2nd Header|3rd Header
---|:---:|---:
col 1 is|left-aligned|1
col 2 is|center-aligned|2
col 3 is|right-aligned|3
```

Note that we can use HTML styles to hide tables' overflow by putting them in a division like:

```
<div "margin-bottom: 1rem; overflow-x: auto;">
...
</div>
```

Also, we can use overflow-x: scroll to always scroll or overflow-x: hidden to hide them completely.

Code blocks

In Markdown, we can simply add plain code blocks to display (not evaluating) by inserting triple back quote i.e. ``` . For example:

```
norm = function(x) {
  sqrt(x%%x)
}
norm(1:4)
```

```
` ``r
norm <- function(x) {
  sqrt(x%*%x)
}
norm(1:4)
` ```
```

For inline plain codes use single back quote before and after the code, for example we defined **this codes here** in this way.

YAML header

At the top of a Markdown document, we can insert the following meta data such that:

```
---
title: "Page Title"
subtitle: "Page sub-title"
author: "Author name"
description: "This is a test"
institute: "MU"
date: "20/02/2020"
abstract: "YAML "
keywords:
  - key1
  - key2
tags:
  - tag1
  - tag2
---
```

Mathematical formula

We can use LaTeX to write mathematical equations in Markdown. To write inline LaTeX formula use a single **\$** before and after the equation and use a double **\$** to display equations.

LaTeX

The following provides a quick reference of the most commonly used LaTeX syntax. You may find a more extensive references about mathematical formulas at [LaTeX Wikibooks](#).

LaTeX equations

Inline equation: *equation*

```
Inline equation: $equation$
```

Display equation:

equation

```
Display equation: $$equation$$
```

Operators

- $x + y$
- $x - y$
- $x \times y$
- $x \div y$
- $\frac{x}{y}$

- \sqrt{x}

- $x + y$
- $x - y$
- $x \times y$
- $x \div y$
- $\frac{x}{y}$
- \sqrt{x}

Symbols

- $\pi \approx 3.14159$
- ± 0.2
- $\frac{0}{1} \neq \infty$
- $0 < x < 1$
- $0 \leq x \leq 1$
- $x \geq 10$
- $\forall x \in (1,2)$
- $\exists x \notin [0,1]$
- $A \subset B$
- $A \subseteq B$
- $A \cup B$
- $A \cap B$
- $X \implies Y$
- $X \impliedby Y$
- $a \rightarrow b$
- $a \longrightarrow b$
- $a \Rightarrow b$
- $a \implies b$
- $a \propto b$

- $\pi \approx 3.14159$
- $\pm, 0.2$
- $\frac{0}{1} \neq \infty$
- $0 < x < 1$
- $0 \leq x \leq 1$
- $x \geq 10$
- $\forall, x \in (1,2)$
- $\exists, x \notin [0,1]$
- $A \subset B$
- $A \subseteq B$
- $A \cup B$
- $A \cap B$
- $X \implies Y$
- $X \impliedby Y$
- $a \rightarrow b$
- $a \longrightarrow b$
- $a \Rightarrow b$
- $a \implies b$
- $a \propto b$

- \bar{a}
- \tilde{a}
- \breve{a}
- \hat{a}
- a'
- a^\dagger
- a^*
- a^\star

- \mathcal{A}
- \mathfrak{a}
- \cdots
- \vdots
- $\#$
- $\$$
- $\%$
- $\&$
- $\{ \}$
- $-$

- `$\bar a$`
- `$\tilde a$`
- `$\breve a$`
- `$\hat a$`
- `$a^ \prime$`
- `$a^ \dagger$`
- `$a^ \ast$`
- `$a^ \star$`
- `$\mathcal A$`
- `$\mathrm a$`
- `\cdots`
- `\vdots`
- `$\#$`
- `$\$$`
- `$\%$`
- `$\&$`
- `$\{ \}$`
- `$_ $`

Space

- Horizontal space: `\quad`
- Large horizontal space: `\qquad`
- Small space: `\,`
- Medium space: `\:`
- Large space: `\;`
- Negative space: `\!`

Greek alphabets

Small Letter	Capital Letter	Alternative
α <code>\alpha</code>	A <code>A</code>	
β <code>\beta</code>	B <code>B</code>	
γ <code>\gamma</code>	Γ <code>\Gamma</code>	
δ <code>\delta</code>	Δ <code>\Delta</code>	
ϵ <code>\epsilon</code>	E <code>E</code>	ε <code>\varepsilon</code>
ζ <code>\zeta</code>	Z <code>Z</code>	
η <code>\eta</code>	H <code>H</code>	
θ <code>\theta</code>	Θ <code>\Theta</code>	ϑ <code>\vartheta</code>
ι <code>\iota</code>	I <code>I</code>	

Small Letter	Capital Letter	Alternative
κ \kappa	K K	\varkappa \varkappa
λ \lambda	Λ \Lambda	
μ \mu	M M	
ν \nu	N N	
ξ \xi	Ξ \Xi	
o \omicron	O O	
π \pi	Π \Pi	ϖ \varpi
ρ \rho	P P	ϱ \varrho
σ \sigma	Σ \Sigma	ς \varsigma
τ \tau	T T	
v \upsilon	Υ \Upsilon	
ϕ \phi	Φ \Phi	φ \varphi
χ \chi	X X	
ψ \psi	Ψ \Psi	
ω \omega	Ω \Omega	

Equations

$$\mathbb{N} = \{a \in \mathbb{Z} : a > 0\}$$

```
$$\mathbb{N} = \{ a \in \mathbb{Z} : a > 0 \}$$
```

$$\forall x \in X \quad \exists y \leq \epsilon$$

```
$$\forall x \in X \quad \exists y \leq \epsilon$$
```

$$X \sim \textit{Normal}(\mu, \sigma^2)$$

```
$$\color{blue}{X \sim \textit{Normal}(\mu, \sigma^2)}$$
```

$$P\left(A=2 \left| \frac{A^2}{B} > 4 \right.\right)$$

```
$$P \left( A=2 \ , \ \middle| \ , \ \dfrac{A^2}{B}>4 \ \right)$$
```

$$f(x) = x^2 - x^{\frac{1}{\pi}}$$

```
$$f(x) = x^2 - x^{\frac{1}{\pi}}$$
```

$$f(X,n) = X_n + X_{n-1}$$

$$f(X,n) = X_n + X_{n-1}$$

$$f(x) = \sqrt[3]{2x} + \sqrt{x-2}$$

$$f(x) = \sqrt{3}\sqrt{2x} + \sqrt{x-2}$$

$$e = \sum_{n=0}^{\infty} \frac{1}{n!}$$

$$e = \sum_{n=0}^{\infty} \frac{1}{n!}$$

$$\prod_{i=1}^n x_i - 1$$

$$\lim_{x \rightarrow 0^+} \frac{1}{x} = \infty$$

$$\int_a^b y \, \mathrm{d}x$$

$$\log_a b = 1$$

$$\log_a a = 1$$

$$\min(P) = \max_{i:S_i \in S} S_i$$

$$\max(S) = \max_{i:S_i \in S} S_i$$

$$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

$$\frac{n!}{k!(n-k)!} = \binom{n}{k}$$

$\frac{b}{a+b} = 3$, therefore we can set $a = 6$

$$\text{\texttt{\textbackslashtext{\textbackslashdfrac{b}{a+b}=3, \textbackslash:} therefore we can set \textbackslash: a=6}}$$

Functions

$$f(x) = \begin{cases} 1/d_{ij} & \text{when } d_{ij} \leq 160 \\ 0 & \text{otherwise} \end{cases}$$


```
$$
f(x)=
\begin{cases}
1/d_{ij} & \text{when } d_{ij} \leq 160 \\
0 & \text{otherwise}
\end{cases}
$$
```

Matrices

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$$

```
$$
\begin{matrix}
1 & 2 & 3 \\
4 & 5 & 6 \\
7 & 8 & 9
\end{matrix}
$$
```

$$M = \begin{bmatrix} \frac{5}{6} & \frac{1}{6} & 0 \\ \frac{5}{6} & 0 & \frac{1}{6} \\ 0 & \frac{5}{6} & \frac{1}{6} \end{bmatrix}$$

```
$$
M =
\begin{bmatrix}
\frac{5}{6} & \frac{1}{6} & 0 \\
\frac{5}{6} & 0 & \frac{1}{6} \\
0 & \frac{5}{6} & \frac{1}{6}
\end{bmatrix}
$$
```

$$M = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

```
$$
M =
\begin{bmatrix}
1 & 0 \\
0 & 1
\end{bmatrix}
\begin{bmatrix}
1 & 0 \\
0 & 1
\end{bmatrix}
$$
```

$$M = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

```
$$
M =
\begin{pmatrix}
1 & 0 \\
0 & 1
\end{pmatrix}
\begin{pmatrix}
1 & 0 \\
0 & 1
\end{pmatrix}
$$
```

$$A_{m,n} = \begin{pmatrix} a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\ a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{m,1} & a_{m,2} & \cdots & a_{m,n} \end{pmatrix}$$

```
$$
A_{m,n} =
\begin{pmatrix}
a_{1,1} & a_{1,2} & \cdots & a_{1,n} \\
a_{2,1} & a_{2,2} & \cdots & a_{2,n} \\
\vdots & \vdots & \ddots & \vdots \\
a_{m,1} & a_{m,2} & \cdots & a_{m,n}
\end{pmatrix}
$$
```

Font sizes

Hello!
Hello!
Hello!
Hello!
Hello!
Hello!
Hello!
Hello!

```
$\Huge Hello!$
$\huge Hello!$
$\LARGE Hello!$
$\Large Hello!$
$\large Hello!$
$\normalsize Hello!$
$\small Hello!$
$\scriptsize Hello!$
$\tiny Hello!$
```

Example:

Font size is small, eg. $\sum x_i = 10$

```
$$\small \text{Font size is small, eg. }\sum{x_i = 10}$$$
```

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