

R Markdown formatting and maths examples

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This document provides examples of writing symbols and formulas in *RMarkdown*.

For each example in this file:

1. The code displayed in the gray box is the source code, which you can include in your *RMarkdown* file to include math formulas.
2. The formulas and text below the gray boxes represent the sample output of the source code in the gray box.

Please note that:

1. The examples are not meant to indicate absolute choices of notation, as notations vary in different subjects/settings.
2. You are not required to know or write all the symbols/codes displayed below, but this document can assist you in checking the source code for specific symbols/formulas when needed.

Examples

This is an inline equation $a = b + c$. This is a displayed equation

```
\[
a = b + c.
\]
```

Note that the displayed equation is on a line by itself.

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$$a = b + c.$$

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This is italic *_abcd_* / **abcd**, and this is boldface ****abcd**** / **__abcd__**.
You can also do ****_bold italics_****.

This is italic *abcd* / *abcd*, and this is boldface **abcd** / **abcd**. You can also do ***bold italics***.

This is a list with three levels:

- ```
1. item 1
2. item 2
 - item
 a. another level
```

```
 b. abcabc
- item
```

Notice that to add more levels all you need to do is to indent with a tab (or two spaces)

This is a list with three levels:

1. item 1
2. item 2
  - item
    - a. another level
    - b. abcabc
  - item

Notice that to add more levels all you need to do is to indent with a tab (or four spaces)

---

the set of all real numbers  $\mathbb{R}$

the set of all natural numbers  $\mathbb{N}$

the set of all rational numbers  $\mathbb{Q}$

the set of all real numbers  $\mathbb{R}$

the set of all natural numbers  $\mathbb{N}$

the set of all rational numbers  $\mathbb{Q}$

---

The percent character needs to be escaped with a backslash:

\$100 \%\$

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100%

---

Common mathematical operators. When in math mode, use `~` or `\quad` to impose spacing:

$a+b$ ,  $a/b$ ,  $a^b$ ,  $a \times b$ ,  $a \cdot b$

$a = b$ ,  $a \neq b$ ,  $a < b$ ,  $a \leq b$ ,  $a > b$ ,  $a \geq b$ .

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$\frac{a}{b}$ ,  $\frac{f_1(a)}{f_2(b)+f_3(c)}$

---

Greek letters:

$\alpha$ ,  $\beta$ ,  $\mu$ ,  $\lambda$ ,  $\tau$ ,  $\xi$ ,  $\epsilon$

Greek letters:

$\alpha, \beta, \mu, \lambda, \tau, \xi, \epsilon, \pi$

---

A set of identically distributed variables following a normal distribution with mean  $\mu=0$  and standard deviation  $\sigma = 1$ :

$X_1, \dots, X_n \sim \mathcal{N}(\mu=0, \sigma=1)$

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Superscripts and subscripts:

$a_b, \quad a^b, \quad a^{10}, \quad b^{-1}$

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$b^{1/2} = \sqrt{b}$

---

Use `\left` and `\right` together with parentheses, brackets etc. to automatically adjust the size:

$\left[a, \frac{b}{c}\right]$

$\left\{\sum_{n=1}^{\infty} \frac{1}{n}\right\}$

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Top annotations:

$\tilde{X}, \quad \widetilde{X}, \quad \hat{X}, \quad \widehat{X}, \quad \overline{X}$

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---

Set operations:

$A \cap B, \quad A \cup B$

$\bigcap_{k=1}^K A_k, \quad \bigcup_{k=1}^K A_k$

$A \backslash B$

$a \in \mathbb{R}, \quad a \notin \mathbb{R}$

`\emptyset`

`A \subteq B`

Set operations:

$A \cap B, \quad A \cup B$

$\cap_{k=1}^K A_k, \quad \cup_{k=1}^K A_k$

$A \setminus B$

$a \in \mathbb{R}, \quad a \notin \mathbb{R}$

$\emptyset$

$A \subseteq B$

$\{w_1, w_2, \dots, w_K\}$

---

Multi-level subscripting:

`A_i`, `A_{i_1}`

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$A_i, A_{i_1}$

---

Some math font styles:

`\mathbf{A}`, `\mathcal{A}`, `\mathbb{A}`, `\mathit{A}`

Some math font styles:

$\mathbf{N}, \mathcal{N}, \mathbb{N}, N$

Expressions:

`\{(a,b) | a + b = 3 \}`

`A := \{1,2\}`

`X_i < \text{q25} - 1.5 \times \text{IQR}, \quad \text{or} \quad X_i > \text{q75} + 1.5 \times \text{IQR}`

`\rm Cov(X, Y), \quad \rm Var(X)`

`\sum_{i=0}^{\infty} a_i, \quad \prod_{i=0}^{\infty} a_i`

`\{n\}\choose{k} = \frac{n!}{k!(n-k)!}`

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$\{(a,b)|a+b=3\}$

$A := \{1,2\}$

$X_i < \text{q25} - 1.5 \times \text{IQR}, \quad \text{or} \quad X_i > \text{q75} + 1.5 \times \text{IQR}$

$\text{Cov}(X,Y), \text{Var}(X)$

$$\sum_{i=0}^{\infty} a_i, \quad \prod_{i=0}^{\infty} a_i$$

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

---

Conditional functions:

```
\[
F(x) = \begin{cases}
1 & \text{\mbox{if } } x = 0 \\
0 & \text{\mbox{otherwise} } \\
\end{cases}
\]
```

Conditional functions:

$$F(x) = \begin{cases} 1 & \text{if } x = 0 \\ 0 & \text{otherwise} \end{cases}$$

Integrals, limits, partial derivatives, gradients:

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

$\frac{\partial}{\partial x} f, \frac{\partial^2}{\partial x^2} f$

$\nabla f(\vec{x})$

$\underset{n \rightarrow \infty}{\lim} f(n)$

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$$\nabla f(\vec{x})$$

$$\lim_{n \rightarrow \infty} f(n)$$

---

Norms:

$\|A\|_2$

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