

Reporting Using R and Markdown:

Part I: Markdown

Niels Hagenbuch

Roche and [Constat.ch](#)

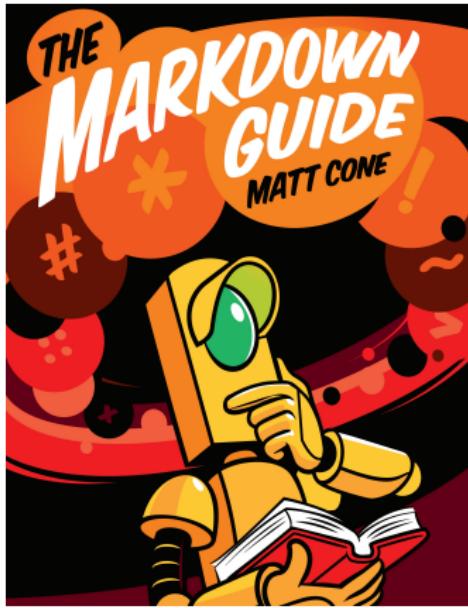
26 August 2025

Markdown

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Books

Books



Matt Cone

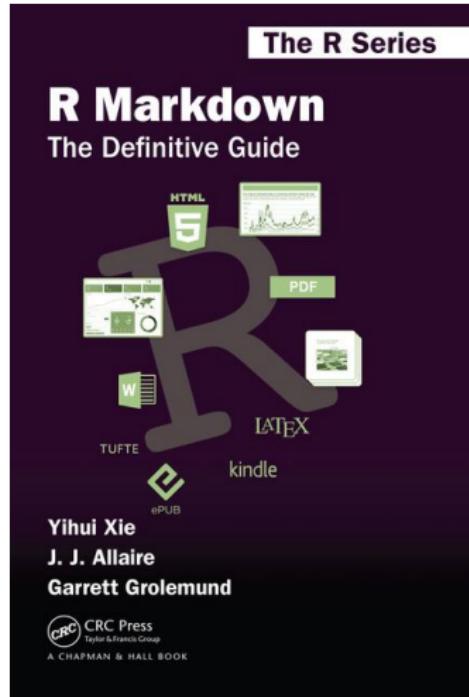
The Markdown Guide

<https://www.markdownguide.org/book>

Content available on the Web:

<https://www.markdownguide.org/>

Books

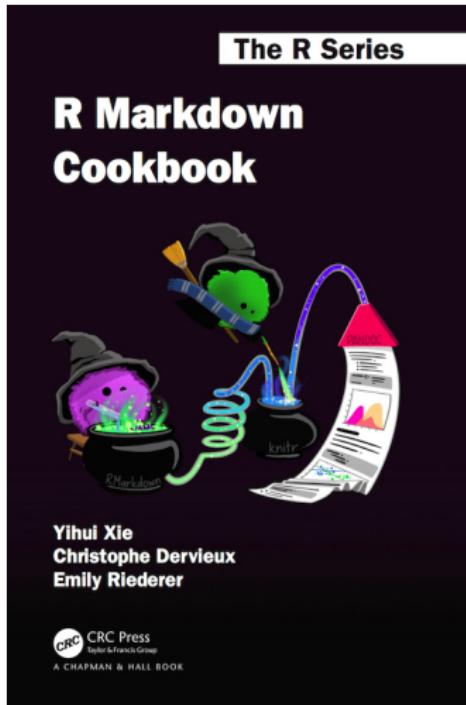


Yihui Xie, J. J. Allaire, Garrett Grolemund
R Markdown. The Definitive Guide
1st Edition
CRC Press, 2018

ISBN 978-1-138-35933-8

Content available on the Web:
<https://bookdown.org/yihui/rmarkdown/>

Books



Yihui Xie, Christophe Dervieux, Emily
Riederer

R Markdown Cookbook

1st Edition

CRC Press, 2021

ISBN 978-0-367-56383-7

Content available on the Web:

[https://bookdown.org/yihui/
rmarkdown-cookbook/](https://bookdown.org/yihui/rmarkdown-cookbook/)

Typographical Terminology

Sign	Name
.	Period, Comma
:	Colon, Semicolon
()	Parentheses
[]	(Square) brackets
{ }	Braces, curly/flower/fancy brackets, chicken lips, mustachios
 ()	Angle brackets
- -	Minus sign or hyphen, Underscore
-	en dash (“Halbgeviertstrich” or “Gedankenstrich”)
—	em dash (“Geviertstrich”, see https://en.wikipedia.org/wiki/Em_(typography))
~	Tilde
/ \	(Forward) slash, Backslash
^	Caret, hat, circumflex
*	Asterisk
‘ ’	Feet sign, Inch sign
“ ”	(Double) quotation marks
,	Apostrophe
`	Backtick, backquote
#	Number sign, hash sign, pound sign

WYSIWYG – What You See Is What You Get

The screenshot shows a Microsoft Word document window titled "Test [Compatibility Mode]". The ribbon menu is visible at the top, and the "Home" tab is selected. The toolbar below includes icons for Paste, Cut, Copy, Paste Special, Undo, Redo, Find, Replace, and Search in Document. The font ribbon shows "Calibri" and "12pt". The text color palette includes black, blue, red, and yellow. The styles ribbon shows "Normal" and "Title 1". The main content area contains three lines of text: "Line 1", "Line2, in bold", and "Line 3: QWERTYUIOP".

Line 1

Line2, in bold

Line 3: QWERTYUIOP

For the origin of the catchphrase, popular in the early 1970s, see Ceruzzi 2012, p. 118f., and Geraldine (starting at 1:45): <https://www.youtube.com/watch?v=kmOyZfwhn4Y>

Programmed Typesetting – L^AT_EX

```
\documentclass{article}
\usepackage{amsmath}
\title{\LaTeX}

\begin{document}
\maketitle
\LaTeX{} is a document preparation system for
the \TeX{} typesetting program. It offers
programmable desktop publishing features and
extensive facilities for automating most
aspects of typesetting and desktop publishing,
including numbering and cross-referencing,
tables and figures, page layout,
bibliographies, and much more. \LaTeX{} was
originally written in 1984 by Leslie Lamport
and has become the dominant method for using
\TeX; few people write in plain \TeX{} anymore.
The current version is \LaTeXe.

% This is a comment, not shown in final output.
% The following shows typesetting power of LaTeX:
\begin{align}
E_0 &\doteq mc^2 \\
E &\doteq \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}
\end{align}
\end{document}
```

L^AT_EX

L^AT_EX is a document preparation system for the TeX typesetting program. It offers programmable desktop publishing features and extensive facilities for automating most aspects of typesetting and desktop publishing, including numbering and cross-referencing, tables and figures, page layout, bibliographies, and much more. L^AT_EX was originally written in 1984 by Leslie Lamport and has become the dominant method for using TeX; few people write in plain TeX anymore. The current version is L^AT_EX 2 ϵ .

$$E_0 = mc^2 \quad (1)$$

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}} \quad (2)$$

Programmed Typesetting – Markdown

- A lightweight markup language, introduced in 2004
- Ideal for creating documents, books, websites, presentations, technical documentation, etc. (see <https://tinyurl.com/37sj3jyh>)
- Strikes the right balance between power and simplicity
- Easy to learn and simple to use
- Has replaced the WYSIWYG editors on GitHub and Reddit

- The syntax is readable and unobtrusive
- Source code can be opened by any editor on any operating system
- Markdown documents are converted to HTML and can be displayed within any web browser
- Online editor: <https://dillinger.io/>
- Excellent introduction: <https://www.markdownguide.org/book>

Programmed Typesetting – Markdown

Text using Markdown syntax	Corresponding HTML produced by a Markdown processor	Text viewed in a browser
<p>Heading =====</p> <p>Sub-heading =====</p> <p>Paragraphs are separated by a blank line.</p> <p>Two spaces at the end of a line produces a line break.</p> <p>Text attributes <code>_italic_</code>, <code>*bold*</code>, <code>'monospace'</code>.</p> <p>Horizontal rule: ---</p> <p>Strikethrough: --strikethrough--</p> <p>Bullet list:</p> <ul style="list-style-type: none">* apples* oranges* pears <p>Numbered list:</p> <ol style="list-style-type: none">1. lather2. rinse3. repeat <p>An [example](http://example.com).</p> <p>!([Image])(Icon-pictures.png "icon")</p> <p>> Markdown uses email-style > characters for blockquoting.</p> <p>Inline <code><abbr title="Hypertext Markup Language">HTML</abbr></code> is supported.</p>	<pre><h1>Heading</h1> <h2>Sub-heading</h2> <p>Paragraphs are separated by a blank line.</p> <p>Two spaces at the end of a line
produces a line break.</p> <p>Text attributes italic, bold, <code>monospace</code>.</p> <p>Horizontal rule:
<hr /> <p>Strikethrough:
strikethrough <p>Bullet list:
 apples oranges pears <p>Numbered list:
 lather rinse repeat <p>An example.
 <p>
 <blockquote> <p>Markdown uses email-style &gt; characters for blockquoting.</p> </blockquote> <p>Inline <abbr title="Hypertext Markup Language">HTML</abbr> is supported.</p></pre>	<p>Heading</p> <p>Sub-heading</p> <p>Paragraphs are separated by a blank line.</p> <p>Two spaces at the end of a line produces a line break.</p> <p>Text attributes <i>italic</i>, bold, monospace .</p> <p>Horizontal rule:</p> <p>Strikethrough:</p> <p>strikethrough</p> <p>Bullet list:</p> <ul style="list-style-type: none">• apples• oranges• pears <p>Numbered list:</p> <ol style="list-style-type: none">1. lather2. rinse3. repeat <p>An example.</p>  <p>Markdown uses email-style > characters for blockquoting.</p> <p>inline HTML is supported.</p>

Source: <https://en.wikipedia.org/wiki/Markdown> (2020.01.16)



Programmed Typesetting – R Markdown

R Markdown:

- R Markdown is a “flavour” of Markdown with extended syntax
- All \LaTeX symbols available
- Formula writing inline and centered on separate lines
- Sections as tabs
- Code is displayed in shaded boxes
- Syntax-highlighting with colours (when using knitr)

Other Markdown flavours:

- Python-Markdown
- Github Flavoured Markdown (GFM)
- Music Markdown
- Mathpix Markdown (for chemistry)

R Markdown

We will use RStudio as our Markdown application:

<https://rmarkdown.rstudio.com/>

RStudio processes the Markdown file and offers as output formats

- HTML
- Word
- PDF (requires L^AT_EX)
- HTML slides
- PDF slides (requires L^AT_EX)

Other applications that support Markdown:

<https://www.markdownguide.org/tools/>

Markdown

→ Open file ExampleCode.Rmd

How to Start: Markdown and R Markdown

Markdown documents do not need a specific header. Simply start writing.

R Markdown documents begin with a YAML header.

The basic form is:

```
---
```

```
title: ""
```

```
author: ""
```

```
date: ""
```

```
output: html_document
```

```
---
```

General Rule

General rule in Markdown:

Add an
empty line
before and after
everything you write!

Text using Markdown syntax	Text viewed in a browser
<pre>Heading ===== Sub-heading ----- Paragraphs are separated by a blank line. Two spaces at the end of a line produces a line break. Text attributes <i>italic</i>, **bold**, <code>monospace</code>. Horizontal rule: --- Strikethrough: ~~strikethrough~~ Bullet list: * apples * oranges * pears Numbered list: 1. lather 2. rinse 3. repeat An [example](http://example.com). ![Icon-pictures.png "icon"] > Markdown uses email-style > characters for blockquoting. Inline <abbr title="Hypertext Markup Language">HTML</abbr> is supported.</pre>	<p>Heading</p> <p>Sub-heading</p> <p>Paragraphs are separated by a blank line.</p> <p>Two spaces at the end of a line produces a line break.</p> <p>Text attributes <i>italic</i>, bold, <code>monospace</code>.</p> <p>Horizontal rule:</p> <p>Strikethrough:</p> <p>Bullet list:</p> <ul style="list-style-type: none">• apples• oranges• pears <p>Numbered list:</p> <ol style="list-style-type: none">1. lather2. rinse3. repeat <p>An example.</p>  <p>Markdown uses email-style > characters for blockquoting.</p> <p>Inline HTML is supported.</p>

Structuring the Document

Headings: #, ##, ###, ...,

Headings for sections can be created using the #

You can use up to 6 heading levels.

Using 7 or more # is ignored, and text is displayed like normal text.

```
# Heading level 1
```

```
## Heading level 2
```

```
### Heading level 3
```

```
#### Heading level 4
```

```
...
```

Headings: #, ##, ###, . . . , #####

An alternative for **headings with only two levels**:
any number of == and -- on the line below the text.

Heading level 1

=====

Heading level 2

or:

Heading level 1

==

Heading level 2

--

R Markdown – Parallel Sections in Tabs: .{tabset}

Sections can be organised in parallel: the content is put under horizontal tabs instead of vertically (less scrolling).

```
## Results  
  
### Tables  
...  
  
### Plots  
...  
  
## Discussion  
...
```

```
## Results {.tabset}  
  
### Tables  
...  
  
### Plots  
...  
  
## Discussion  
...
```

R Markdown – Parallel Sections in Tabs: .{tabset}

The following section headings one level lower in the hierarchy (= more #) than where {.tabset} starts are all made into a tab.

The structure of the content in the sections is not changed, section headings of lower levels can be used.

The next section heading equal (same number of #) or higher (= fewer #) than where {.tabset} was used turns tabset mode off.

Notice: Text search will not find any results in tabs that are not on display!

→ See file ExampleCode.Rmd and rendered result.

R Markdown – Table of Contents

Extend output: in the YAML to:

```
---
```

```
title: ""
author: ""
date: ""
output:
  html_document:
    toc: true
---
```

Notice the indentation using 2 and 4 spaces!

R Markdown – More Output Options

```
output:  
  html_document:  
    number_sections: true  
    toc: true  
    toc_float:  
      collapsed: false  
      smooth_scroll: true
```

Option	Effect of true
number_sections:	The sections are numbered
toc:	Add a table of contents
toc_float:	Put ToC in a panel on the left (default: top)
collapsed:	Show only level 1 headings (one #)
smooth_scroll:	Scroll (instead of jump)
toc_depth:	Control depth of displayed heading levels

R Markdown – Cross References: {# }, [](#)

Headings can be **labelled** and **referenced** via a link (similar to L^AT_EX's `\label{}` and `\ref{}`).

After the heading, on the same line, add an anchor (also called target or link): `{#marker}`

Reference is made by `[visible text] (#marker)`

```
## Mathematical Background {#Sec:Math}
```

Very complicated things are shown here.

But farther, farther down the document...

See also in Section `[Mathematics] (#Sec:Math)`.

Notice: Markers in tabs that are not on display can not be reached!

Paragraphs

Paragraphs are created by using a blank line.

Text of paragraph 1, like lorem Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt
labore et dolore magna aliqua.

In paragraph 2, it goes on like ut enim ad minim veniam, ab
exercitation ullamco laboris nisi ut aliquip ex ea commodo
consequat. Duis aute irure dolor in reprehenderit in dolore.

Paragraph 3: Esse cillum dolore eu fugiat nulla pariatur.
cupidatat non proident, sunt in culpa qui officia deserunt.

Horizontal Rules: ---, ___, ***

Horizontal rules (or lines) are created by three or more hyphens ---
underscores ___
or asterisks ***

Some text.

Continue text.

Style Elements

Mark-ups: , * *, ** **, __ __

As **mark-up**, only *italic* and **bold** are possible.

To make a word italic use one underscore or one *asterisk*.

re*bell*ion!

To make a word **bold** use two **asterisks** or
two underscores.

con**stella**tion

Emphasis: Italic vs. Bold

DIFFERENZIERENDE TYPOGRAPHIE

Zur Typographie wissenschaftlicher Bücher

Die Seiten vieler wissenschaftlicher Bücher sehen auf den ersten Blick aus, als ob sie *linear* gelesen werden; es gibt auch viele Parallelen. Auch ein Wissenschaftler soll beim Lesen nicht von der Umgebung abgelenkt werden; auch er liest folgerichtig aufbauend; auch hier wären auffällige Schriften fehl am Platz.

Doch ist der Wissenschaftler – im Gegensatz zum »Feierabendleser« – ein routinierter Berufsleser, der weniger Lese-Komfort braucht. Das ist der Grund dafür, daß man bei wissenschaftlichen Büchern häufig längere und enger gestaltete Zeilen findet, kleinere Schriftgrade und vollere Seiten. Es ist oft wichtiger, viel Stoff gedrängter, als weniger Information großzügiger zu bringen.

Es gibt noch einen wichtigen Unterschied zum normalen »Lesebuch«: der Text ist anders strukturiert, er ist oft in sich stark differenziert. Ein Wissenschaftler, ein Student *liest* nicht nur *in* seinem Buch, er *arbeitet mit* seinem Buch, oft arbeitet er mit mehreren Büchern gleichzeitig. Von einem zum anderen wechselnd, sucht er bestimmte Begriffe auf, unterstreicht, kommentiert, exzerpiert. Dieser Arbeitsweise muß die Typographie entgegenkommen.

Bei der differenzierenden Typographie hat jede inhaltliche Textqualität ihr typographisches Äquivalent. Dieses Grundprinzip sei an einem Beispiel aus der Praxis dargestellt: Bei einem musikwissenschaftlichen Werk über die Oper sollen – innerhalb von Komponisten-Kapiteln – einzelne Begriffe unterscheidbar sein. Der NAME DER OPER soll anders aussehen als *LITERATUR ZUR OPER*, und die *Anfangsworte einer Arie* wiederum anders. Doch es könnte auch verlangt werden, daß DER NAME DES KOMPONISTEN und DER NAME DER OPER unterschiedlich erscheinen, dazu die NAMEN VON VERGLEICHSSOPERN, ferner *Literatur zur Oper* und schließlich die Anfangsworte einer Arie. Halbfette Auszeichnungen würden nicht verwendet; sie würden sich hierarchisch über die anderen Qualitäten schieben. Sie könnten für **übergeordnete Begriffe** verwendet werden. Wenn noch weitere Differenzierungen gefordert würden, müßte man zur Schriftmischung greifen.

Die Auszeichnungen bei wissenschaftlichen Büchern dienen nicht in erster Linie der hierarchischen Über- und Unterordnung, sondern der eindeutigen Unterscheidbarkeit gleichwichtiger Begriffe. Deshalb verwenden wir die Formulierung **DIFFERENZIERENDE TYPOGRAPHIE**. Die verschiedenen Auszeichnungsarten haben aber unvermeidlich ein unterschiedliches optisches Gewicht, das bei der Zuordnung sorgfältig abgewogen werden muß.

Mark-ups:

- **initial**
- **italicised**
- **capitals**
- **italicised capitals**
- **small capitals**
- **spaced**
- **mixture of fonts
(sans-serif)**
- **bold**

Strong Emphasis

Bold and *italic* can be combined.

Very Important

___Very Important___

--*Very Important*--

Very Important

Subscript and Superscript: ~ ~, ^ ^

Markdown allows for `subscript` and `superscript`

The expression to be **subscripted** is enclosed in **two** tildes ~ ~

The expression to be **superscripted** is enclosed in **two** carets ^ ^

No spaces allowed!

H^2^O is water and $C^6^H^{12}O^6$ is glucose.

2^{64} is a lot!

$\sim\text{Hell}\sim\text{Earth}^\sim\text{Heaven}^\sim$

Dashes: --, ---

As in **LATEX** and Word, the **en dash** is accessed by two adjacent minus signs --

For the **em dash**, use three minus signs ---

Open 9--5 (Mon--Fri).

95%-confidence interval: 1.03--2.80

Price: 18.---;

Europeans -- refined as they are -- use the en dash.

American typographers---real men---use the em dash.

Strikethrough: ~~ ~~

Perhaps useful when exchanging and editing documents is the **strikethrough** (~~ before and after a word).

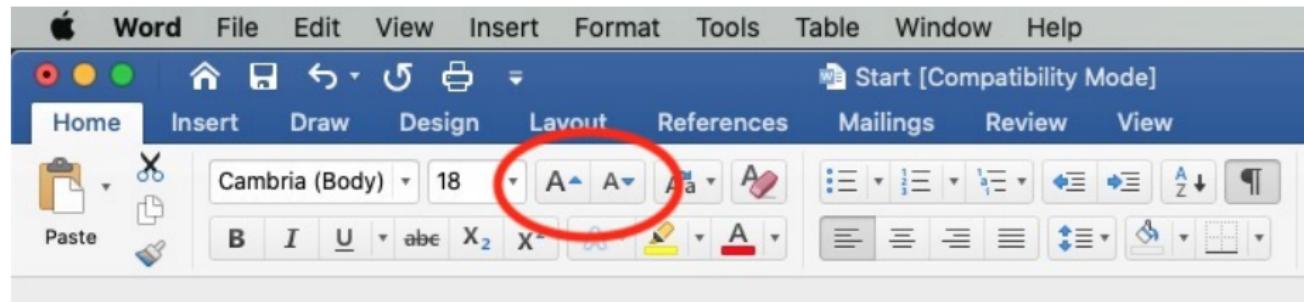
The world is ~~flat~~ round.

Spaces are allowed.

Font Size

In Markdown, it is not possible to control the font size.

- A **HTML document** can be viewed in a browser which allows “zooming.”
- In **Word**, fonts can be adjusted in size whilst maintaining scalar relationships via the **Increase Font Size** and **Decrease Font Size** buttons.



Quotes

Blockquotes: >, >>

To create a blockquote, add an **angle bracket** > in front of a paragraph.

Multiple paragraphs require a > on the empty line.

Note: Nested blockquotes (>>) appear only in HTML.

The following quote is from the lost novel of Kleist:

```
> Lorem ipsum dolor sit amet, consectetur adipiscing eo,  
> sed do eiusmod tempor incididunt ut labore et dolore:  
>  
>> Exercitation ullamco laboris nisi ut aliquip ex ea  
>> commodo consequat. Duis aute irure dolor in reprehensi  
>  
> Finis terrae hic advenit.
```

And so on.

Lists, Tables, Images, Footnotes

Organise Items: Ordered Lists

Ordered lists start with a **number**, followed by a **period**.

From then on, the numbers do not have to be ordered.

Without any text in between, the numbers keep increasing.

- 1. First item
- 2. Second item
- 3. Third item

- 1. First item
- 1. Second item
- 1. Third item

- 1. First item
- 7. Second item
- 4. Third item

Organise Items: Ordered Lists

With text in between, the numbering starts anew.

We have:

1. First item
2. Second item
3. Third item

Then,

1. First item
1. Second item
1. Third item

followed by

1. First item
7. Second item
4. Third item

Organise Items: Ordered Lists

The ordering starts with the first stated number!

Try this:

13. First item

2. Second item

3. Third item

1. First item

1. Second item

1. Third item

8. First item

14. Second item

12. Third item

Organise Items: Ordered Lists

Nested ordered lists can be created by inserting **4 spaces for indentation**.

1. First item
 1. First subitem
 2. Second subitem
 3. Third subitem
2. Second item
 1. First subitem
 4. Second subitem
1. Third item
 6. First subitem
 1. Second subitem
 1. Third subitem

Organise Items: Unordered Lists

For an **unordered list**, use **hyphens** `-`, **plus signs** `+`, or **asterisks** `*`

The signs `-`, `+`, and `*` are interchangeable, but for compatibility, pick one and stick with it.

Nesting is achieved by **indentation with 4 spaces**.

- Mangos
- Oranges
- Apples
 - Granny Smith
 - McIntosh
 - Gala
- Strawberries
 - red
 - green

Organise Items: Unordered Lists

After two levels of nesting, the last symbol is repeated.

- Holla
 - die
 - Waldfee!
 - yawn...

Organise Items in Lists

Ordered lists and **unordered lists** can be mixed:

Insert 4 spaces for indentation.

1. First item
 - This here
 - That yonder
2. Second item

Like last year.

* Proceed as follows:

1. Lather
2. Rinse
3. Repeat

* Infinite loop

Tables: | | |, |---|---|

Tables are created by stating the column names,
separated by the **pipe sign** |,
and three or more **hyphens** --- on **line 2**, thus defining the **header**.

The column entries are again separated by the **pipe sign** |.

A nice table:

Col 1	Col 2
word	number
booktitle	Quite long

Continue text.

For compatibility, put a pipe at the beginning and the end of each row.

Tables: | | |, |---|---|

Cell widths do not matter, cells are left-aligned, and pipes are optional at the beginning or the end.

“Compact mode”:

```
Col 1 | Col 2  
-|-  
word | number  
booktitle | Quite long
```

Alignment Within Tables: | :---| ---:| :---:|

A **colon** :-- at the left end of the hyphens aligns the text in the column to the left (default).

A colon --: at the right end of the hyphens aligns the column to the right.

Colons at both ends :--: center the text.

Col 1	Col 2	Col 3
:-----:	-----:	:-----
a	uno	451
ebcudo	doubletriplet	887-x-23

Tables: | | |, |---|---|

Recommendation:

As long as compact mode works, use it.

For bigger tables, use

https://www.tablesgenerator.com/markdown_tables

Inserting Images: ,

Images with a caption can be inserted anywhere.

Syntax: `![caption](filename "tooltip title")`

A caption (below the image) can be put within the brackets [] .

Note: If there is no caption, the (empty) brackets are still required!

A “tooltip title” (the little box that pops up when the mouse hovers over the image) can be put within the parentheses (appear only in HTML).

```
![Flora and Rosa in 2025.](cows.jpg "Ja mei!")
```

Footnotes and References: [^], [^]:

A **footnote** appears as a superscript number while the text is added at the bottom of the page.

- In HTML, the number is a link; by clicking the number/link, the cursor jumps to the content of the footnote.
- In Word, the number is a text element. Hovering over it displays the content of the footnote.

Insertion of the footnote:

Within brackets, a caret followed by an identifier: [^*identifier*]

- The identifier can be a number or a word; no spaces, no tabs.
- Identifiers are turned automatically into increasing numbers.

... running text with a footnote,[^1] followed by more footnotes,[^NoteGenes] and a reference.[^Xiao2019]

Footnotes and References: [^], [^]:

The text of the footnote can be put almost anywhere in the document (not in lists, tables, or quotes).

Footnote text:

- The identifier is repeated, followed by a colon [^*identifier*]:
- If there are paragraphs, the text is indented with 4 spaces.

... running text with a footnote, [^1] followed by more footnotes, [^NoteGenes] and a reference. [^Xiao2019]

[^1]: Just a small note.

[^NoteGenes]: Here, genes are explained.

[^Xiao2019]: Xiao L, BRAC-5 in Cancer. JAMA 2019. 47(1):12--19.

The text could continue here.

Footnotes and References: [^], [^]:

Example with paragraphs:

This is a simple footnote,[^2] and this one is longer.[^big]

[^2]: Cf. Thomson and Thompson (1934).

[^big]: We can have paragraphs and style elements.

Use **4 spaces** as _indentation_.

Another paragraph in the footnote.

HERE, the main text continues.

Links and Email Addresses

Inserting Links: [](), []("")

To insert a **link**, use the syntax `[link text](URL)`

The link text in brackets is displayed, the URL in parentheses is invisible.

“Tooltip titles” (the little box that pops up when the mouse hovers over a link) can be put within the parentheses (appear only in HTML).

Bold and italic can be added.

R is on [CRAN] (<https://cran.r-project.org/>).

R is on [CRAN] (<https://cran.r-project.org/> "Official Home of R").

Use *[R] (<https://cran.r-project.org/>)*.

Use **[R] (<https://cran.r-project.org/>)**.

Use ***[R] (<https://cran.r-project.org/>)***!

Adding a Link to an Image: [! []("")]()

To add a **link to an image**, enclose the code that inserts the image within the brackets (the image is now the “link text” to be displayed), and add the URL in parentheses.

Syntax: [! [caption] (filename "tooltip title")] (URL)

```
[! [Flora and Rosa in 2025.] (cows.jpg "Ja mei!")] (https://zalp.ch/)
```

Whether the tooltip title is in the image or in the link, does not matter; in case two titles are present, the one for the image is shown.

Links and Email Addresses: < >

Displayed links and email addresses can be marked in the text using **angle brackets**: < >

Bold and italic can be applied.

For further questions, visit <<https://rmarkdown.rstudio.com/>>
or write to <r.mark@down.com>.

For anything else, mail to ***<bundesrat@bundeshaus.ch>***.

For compatibility, replace spaces within a URL with %20:

<<https://www.website.com/example page one>>

<<https://www.website.com/example%20page%20one>>

Mathematical Expressions

R Markdown – Mathematical Expressions

R Markdown offers many of \LaTeX 's mathematical typesetting features.

RStudio displays the resulting expression live in a floating window.

Word can not process all symbols that HTML or PDF can.

Inline-syntax: Enclose the expression within two dollar signs \$ \$

Formula-syntax: Use two dollar signs on each side \$\$ \$\$

The identity $e^{i\pi} + 1 = 0$ is attributed to Euler.

Binomial density function

```
$$f(k; n, \pi) = {n \choose k} \pi^k (1 - \pi)^{n - k}$$
```

In standard Markdown, \$\$ \$\$ corresponds to \$ \$ in Extended Syntax.

Mathematical Formulas in a Web Browser

All browsers can display mathematical formulas using the MathJax JavaScript library.

However, contact with the Internet is required!

In case the symbols or formulas are not rendered correctly, try the **Native MathML** add-on:

Firefox:

<https://addons.mozilla.org/en-US/firefox/addon/native-mathml/>

Chrome:

<https://chrome.google.com/webstore/detail/native-mathml/lcadkflijmcmcf1pdbnamejlejmpcplg>

Frequently Used Symbols

L <small>A</small> T <small>E</small> X	Symbol
a^2	a^2
e^{c + d}	e^{c+d}
x_i	x_i
y_{j, k}	$y_{j,k}$
\ldots	\dots
a \cdot b	$a \cdot b$
x_1 \cdots x_n	$x_1 \cdots x_n$
\sum_{i = 1}^n	$\sum_{i=1}^n$
\prod_{i = 1}^n	$\prod_{i=1}^n$
\frac{a + b}{cd}	$\frac{a+b}{cd}$
\leftarrow	\leftarrow
\rightarrow	\rightarrow
\alpha \ldots \omega	$\alpha \dots \omega$
A \ldots \Omega	$A \dots \Omega$

Some Examples

Syntax	Symbol
<code>h_i</code>	h_i
<code>\text{h}_i</code>	h_i
<code>\mathrm{h}_i</code>	h_i
<code>\bf{h}_i</code>	\mathbf{h}_i
<code>{\bf{h}}_i</code>	\mathbf{h}_i
<code>\mathbf{h}_i</code>	\mathbf{h}_i
<code>\hat{w}</code>	\hat{w}
<code>\widehat{w}</code>	\widehat{w}
<code>\bar{w}</code>	\bar{w}
<code>\overline{w}</code>	\overline{w}

Spacing in Math Mode

\TeX	Output	Space
a \! b	<i>ab</i>	Negative space of $-\frac{3}{18}$ quad
a b	<i>ab</i>	The space is ignored in math mode
a \, b	<i>a b</i>	$\frac{3}{18}$ quad
a \,: b	<i>a b</i>	$\frac{4}{18}$ quad
a \; b	<i>a b</i>	$\frac{5}{18}$ quad
a \ b	<i>a b</i>	Circa interword spacing
a \ \ b	<i>a b</i>	
a \quad b	<i>a b</i>	A quad is a bit wider than the 'M' character
a \qquad b	<i>a b</i>	

aa \! bb cc \, dd \,: ee \; ff \quad gg \ \ hh \quad\quad ii \qquad jj
aabbcdd ee ff gg hh ii jj

R Markdown – Mathematical Formulas

For further examples, refer to the **R Markdown Book**:

<https://bookdown.org/yihui/rmarkdown/markdown-syntax.html#math-expressions>

For an excellent overview on mathematical typesetting in \LaTeX ,
Chapter 3 in **Tobias Oetiker's Introduction** is highly recommended:

<https://tobi.oetiker.ch/lshort/lshort.pdf>

Also extremely helpful to find \LaTeX symbols:

<http://detexify.kirelabs.org/classify.html>

Escapes, Displaying Code, Line Breaks, Comments, Deep Dive

The Great Escape: \

To **display the signs used for controlling Markdown**, use the backslash \ as escape character.

Char.	Name	Function within Markdown
#	Number sign (or hash)	Heading level 1
.	Period after a number	Starts an ordered list
-	Minus sign (hyphen)	Starts an unordered list
+	Plus sign	Starts an unordered list
*	Asterisk	Starts an unordered list
>	Angle bracket	Quote
	Pipe	Column separator in tables
\	Backslash	Escape character
'	Tick mark	Display code in-line

Escaping: Examples

```
\* makes text *italic*
```

```
\> at the beginning is possible
```

Symbol	Name

-----	-----
\\	pipe

Use !\\[]() to insert an image.

Nifty, the \\", innit?

Displaying Code

To show **code in monospace font** and inside a box, use **4 spaces for indentation**.

When the code blocks are in a list, use 8 spaces.

Note: Neither Markdown nor R Markdown produces line numbers.

But see also: <https://tinyurl.com/38y5p43t>

Some Code:

```
int main(void) {  
    printf("hello, world\n");  
    return 0;  
}
```

Displaying Code In-line: ` `

Within text, use **backtick marks** ` before and after.

In Python, type `print("hello, world")`, without `\\n`.

Backticks Within Code

The backtick is escaped with the backslash \`

Ticks within code are escaped by outer double ticks.

The \` sign is used for code.

In Markdown, write ``show `code` here``.

Line Breaks:

Add **2 spaces** after the last word of the line you want to break.

This_line_ends_here..

And_continues_on_this_line.

Without_the_two_spaces,

this_part_will_be_wrapped_back_up.

- Trailing whitespace is hard to detect!
- British typography uses two spaces after every sentence.
- Some Markdown flavours allow one or two backslashes (\ and \\).
- Some Markdown flavours allow L^AT_EX's \newline

Recommendation: Use an explicit

This line ends here.

And continues on this line.

The Whole World in Your Hands

Since Markdown is converted to HTML, you can use HTML instructions and **all HTML character entities** directly:

<https://web.archive.org/web/20220329173245/https://dev.w3.org/html5/html-author/charref>

```
<br>

&copy; &reg; &trade;

&Cconint; &rarrpl;

&ndash; &mdash;

&blk14;

&Ascr; &Bfr; &Copf; &Dcy;
```

HTML Comments: <!-- -->

Comments are enclosed in <!-- --> and can be multiline.

HTML comments are not nestable.

Work with PDF output as well.

```
The world is <!--not--> flat!
```

```
<!-- This is an out-commented line -->
```

```
HTML allows multiline out-commenting:
```

```
<!--## Beginning
```

```
Stately, plump Buck Mulligan came from the stairhead, bearing a  
bowl of lather on which a mirror and a razor lay crossed.  
-->
```

Deep Dive

The backend in RStudio that renders Markdown code to HTML, PDF, and Word is Pandoc.

To exploit its full power, see

<https://pandoc.org/MANUAL.html#pandocs-markdown>

References

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