

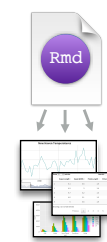
# R Markdown Cheat Sheet

learn more at [rmarkdown.rstudio.com](http://rmarkdown.rstudio.com)



## .Rmd files

An R Markdown (.Rmd) file is a record of your research. It contains the code that a scientist needs to reproduce your work along with the narration that a reader needs to understand your work.



## Reproducible Research

At the click of a button, or the type of a command, you can rerun the code in an R Markdown file to reproduce your work and export the results as a finished report.



## Dynamic Documents

You can choose to export the finished report as a html, pdf, MS Word, ODT, RTF, or markdown document; or as a html or pdf based slide show.

### Workflow

- Open a new .Rmd file** at File ► New File ► R Markdown. Use the wizard that opens to pre-populate the file with a template
- Write document** by editing template
- Knit document to create report** Use knit button or `render()` to knit
- Preview Output** in IDE window
- Publish** (optional) to web or server
- Examine build log** in R Markdown console
- Use output file** that is saved alongside .Rmd

#### .Rmd structure

**YAML Header**  
Optional section of render (e.g. pandoc) options written as key:value pairs (YAML).

- At start of file
- Between lines of ---

**Text**  
Narration formatted with markdown, mixed with:

**Code chunks**  
Chunks of embedded code. Each chunk:

- Begins with `{r}`
- ends with `}`

R Markdown will run the code and append the results to the doc.

It will use the location of the .Rmd file as the **working directory**

**Open in window**, **Save**, **Spell Check**, **Find and replace**, **Publish**, **Show outline**

**Set preview location**, **Insert code chunk**, **Go to code chunk**, **Run code chunk(s)**

**Modify chunk options**, **Run all previous chunks**, **Run current chunk**

**publish button** to accounts at: `rpubs.com`, `shinyapps.io`, `RStudio Connect`

Reload document, Find in document, File path to output document

**render()**  
Use `rmarkdown::render()` to render/knit at cmd line. Important args:

- `input` - file to render
- `output_format`
- `output_options` - List of render options (as in YAML)
- `output_file`
- `output_dir`
- `params` - list of params to use
- `envir` - environment to evaluate code chunks in
- `encoding` - of input file

### Interactive Documents

Turn your report into an interactive Shiny document in 4 steps

- Add runtime: shiny** to the YAML header.
- Call Shiny **input** functions to embed input objects.
- Call Shiny **render** functions to embed reactive output.
- Render with `rmarkdown::run` or click **Run Document** in RStudio IDE

```
---
output: html_document
runtime: shiny
---

{r, echo = FALSE}
numericInput("n",
  "How many cars?", 5)

renderTable({
  head(cars, input$n)
})
```

**How many cars?**

5

	speed	dist
1	4.00	2.00
2	4.00	10.00
3	7.00	4.00
4	7.00	22.00
5	8.00	16.00

Embed a complete app into your document with `shiny::shinyAppDir()`

*\* Your report will rendered as a Shiny app, which means you must choose an html output format, like `html_document`, and serve it with an active R Session.*

### Embed code with knitr syntax

**Inline code**  
Insert with `{r<code>}`. Results appear as text without code.

Built with `{r getRversion() }` → Built with 3.2.3

**Code chunks**  
One or more lines surrounded with `{r}` and `}`. Place chunk options within curly braces, after `r`. Insert with `{r echo=TRUE}`

```
{r echo=TRUE}
getRversion()
## [1] '3.2.3'
```

**Global options**  
Set with `knitr::opts_chunk$set()`, e.g.

```
{r include=FALSE}
knitr::opts_chunk$set(echo = TRUE)
```

**cache** - cache results for future knits (default = FALSE)

**cache.path** - directory to save cached results in (default = "cache/")

**child** - file(s) to knit and then include (default = NULL)

**collapse** - collapse all output into single block (default = FALSE)

**comment** - prefix for each line of results (default = '##')

**dependson** - chunk dependencies for caching (default = NULL)

**echo** - Display code in output document (default = TRUE)

**engine** - code language used in chunk (default = 'R')

**error** - Display error messages in doc (TRUE) or stop render when errors occur (FALSE) (default = FALSE)

**eval** - Run code in chunk (default = TRUE)

**fig.align** - 'left', 'right', or 'center' (default = 'default')

**fig.cap** - figure caption as character string (default = NULL)

**fig.height, fig.width** - Dimensions of plots in inches

**highlight** - highlight source code (default = TRUE)

**include** - Include chunk in doc after running (default = TRUE)

**message** - display code messages in document (default = TRUE)

**results** (default = 'markup')

- 'asis' - passthrough results
- 'hide' - do not display results
- 'hold' - put all results below all code

**tidy** - tidy code for display (default = FALSE)

**warning** - display code warnings in document (default = TRUE)

Options not listed above: `R.options`, `aniopts`, `autodep`, `background`, `cache.comments`, `cache.lazy`, `cache.rebuild`, `cache.vars`, `dev`, `dev.args`, `dpi`, `engine.opts`, `engine.path`, `fig.asp`, `fig.env`, `fig.ext`, `fig.keep`, `fig.lp`, `fig.path`, `fig.pos`, `fig.process`, `fig.retina`, `fig.scap`, `fig.show`, `fig.showtext`, `fig.subcap`, `interval`, `out.extra`, `out.height`, `out.width`, `prompt`, `purl`, `ref.label`, `render`, `size`, `split`, `tidy.opts`

### Parameters

Parameterize your documents to reuse with different inputs (e.g., data sets, values, etc.)

- Add parameters**  
Create and set parameters in the header as sub-values of `params`

```
---
params:
  n: 100
  d: !r Sys.Date()
---
```
- Call parameters**  
Call parameter values in code as `params$<name>`

```
Today's date
is {r params$d}
```
- Set parameters**  
Set values with **Knit with parameters** or the `params` argument of `render()`:

```
render("doc.Rmd",
  params = list(n = 1, d = as.Date("2015-01-01")))
```

## Pandoc's Markdown

Write with syntax on the left to create effect on right (after render)

### Plain text

End a line with two spaces to start a new paragraph.

*\*italics\** and **\*\*bold\*\***

``verbatim code``

`sub/superscript^2~`

`~~strikethrough~~`

escaped: `\* \_ \\`

endash: `--`, emdash: `---`

equation: `$A = \pi * r^2$`

equation block:

`$$E = mc^2$$`

`> block quote`

`# Header1 {#anchor}`

`## Header 2 {#css_id}`

`### Header 3 {.#css_class}`

`#### Header 4`

`##### Header 5`

`##### Header 6`

`<!--Text comment-->`

`\textbf{Tex ignored in HTML}`

`<em>HTML ignored in pdfs</em>`

`<http://www.rstudio.com>`

`[link](www.rstudio.com)`

`Jump to [Header 1](#anchor)`

`image:`

`![Caption](smallorb.png)`

`* unordered list`

`+ sub-item 1`

`+ sub-item 2`

`- sub-sub-item 1`

`* item 2`

`Continued (indent 4 spaces)`

`1. ordered list`

`2. item 2`

`i) sub-item 1`

`A. sub-sub-item 1`

`(@) A list whose numbering`

`continues after`

`(@) an interruption`

`Term 1`

`: Definition 1`

`| Right | Left | Default | Center |`

`|-----|:|:|:|:|:|:|`

`| 12 | 12 | 12 | 12 |`

`| 123 | 123 | 123 | 123 |`

`| 1 | 1 | 1 | 1 |`

`- slide bullet 1`

`- slide bullet 2`

`(>- to have bullets appear on click)`

`horizontal rule/slide break:`

`***`

`A footnote [^1]`

`[^1]: Here is the footnote.`

### Plain text

End a line with two spaces to start a new paragraph.

*italics* and **bold**

`verbatim code`

`sub/superscript^2`

`strikethrough`

escaped: `* \_ \\`

endash: `--`, emdash: `---`

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`#### Header 4`

`##### Header 5`

`##### Header 6`

`<!--Text comment-->`

`\textbf{Tex ignored in HTML}`

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`<http://www.rstudio.com>`

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`| 123 | 123 | 123 | 123 |`

`| 1 | 1 | 1 | 1 |`

`- slide bullet 1`

`- slide bullet 2`

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When you render, R Markdown  
1. runs the R code, embeds results and text into .md file with knitr  
2. then converts the .md file into the finished format with pandoc



Set a document's default output format in the YAML header:

```
---
output: html_document
---
```

### output value

output value	creates
html_document	html
pdf_document	pdf (requires Tex)
word_document	Microsoft Word (.docx)
odt_document	OpenDocument Text
rtf_document	Rich Text Format
md_document	Markdown
github_document	Github compatible markdown
ioslides_presentation	ioslides HTML slides
slidy_presentation	slidy HTML slides
beamer_presentation	Beamer pdf slides (requires Tex)

Customize output with sub-options (listed at right):

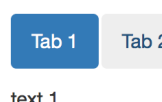
```
---
output:
  html_document:
    code_folding: hide
    toc_float: TRUE
---
```

### html tabsets

Use .tabset css class to place sub-headers into tabs

```
# Tabset {.tabset .tabset-fade .tabset-pills}
## Tab 1
text 1
## Tab 2
text 2
### End tabset
```

### Tabset



text 1

End tabset

## Set render options with YAML

sub-option	description	html	pdf	word	odt	rtf	md	github	ioslides	slidy	beamer
citation_package	The LaTeX package to process citations, natbib, biblatex or none		X				X				X
code_folding	Let readers to toggle the display of R code, "none", "hide", or "show"	X									
colortheme	Beamer color theme to use										X
css	CSS file to use to style document	X							X	X	
dev	Graphics device to use for figure output (e.g. "png")	X	X				X	X	X	X	X
duration	Add a countdown timer (in minutes) to footer of slides										X
fig_caption	Should figures be rendered with captions?	X	X	X	X				X	X	X
fig_height, fig_width	Default figure height and width (in inches) for document	X	X	X	X	X	X	X	X	X	X
highlight	Syntax highlighting: "tango", "pygments", "kate", "zenburn", "textmate"	X	X	X						X	X
includes	File of content to place in document (in_header, before_body, after_body)	X	X		X		X	X	X	X	X
incremental	Should bullets appear one at a time (on presenter mouse clicks)?								X	X	X
keep_md	Save a copy of .md file that contains knitr output	X		X	X	X			X	X	
keep_tex	Save a copy of .tex file that contains knitr output		X								X
latex_engine	Engine to render latex, "pdflatex", "xelatex", or "luaLatex"		X								X
lib_dir	Directory of dependency files to use (Bootstrap, MathJax, etc.)	X							X	X	
mathjax	Set to local or a URL to use a local/URL version of MathJax to render	X							X	X	
md_extensions	Markdown extensions to add to default definition or R Markdown	X	X	X	X	X	X	X	X	X	X
number_sections	Add section numbering to headers	X	X								
pandoc_args	Additional arguments to pass to Pandoc	X	X	X	X	X	X	X	X	X	X
preserve_yaml	Preserve YAML front matter in final document?										X
reference_docx	docx file whose styles should be copied when producing docx output			X							
self_contained	Embed dependencies into the doc	X								X	X
slide_level	The lowest heading level that defines individual slides										X
smaller	Use the smaller font size in the presentation?										X
smart	Convert straight quotes to curly, dashes to em-dashes, ... to ellipses, etc.	X								X	X
template	Pandoc template to use when rendering file	X	X		X					X	X
theme	Bootswatch or Beamer theme to use for page	X									X
toc	Add a table of contents at start of document	X	X	X		X	X	X			X
toc_depth	The lowest level of headings to add to table of contents	X	X	X		X	X	X			
toc_float	Float the table of contents to the left of the main content	X									

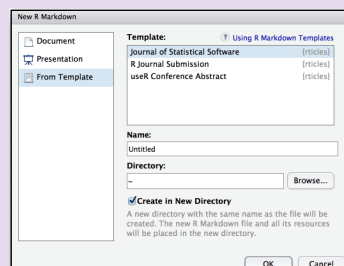
Options not listed: extra\_dependencies, fig\_crop, fig\_retina, font\_adjustment, font\_theme, footer, logo, html\_preview, reference\_odt, transition, variant, widescreen

## Create a Reusable template

- 1 Create a new package with a inst/rmarkdown/templates directory
- 2 In the directory, Place a folder that contains:
  - template.yaml (see below)
  - skeleton.Rmd (contents of the template)
  - any supporting files
- 3 Install the package
- 4 Access template in wizard at File > New File > R Markdown

### template.yaml

```
---
name: My Template
---
```



## Table suggestions

Several functions format R data into tables

eruptions	waiting
3.600	79
1.800	54
3.333	74
2.283	62

1	3.60	79.00
2	1.80	54.00
3	3.33	74.00
4	2.28	62.00

	eruptionswaiting	
1	3.600	79
2	1.800	54
3	3.333	74
4	2.283	62

data <- faithful[1:4, ]

```
````{r results = 'asis'}
knitr::kable(data, caption = "Table with kable")
````
```

```
````{r results = "asis"}
print(xtable::xtable(data, caption = "Table with xtable"),
      type = "html", html.table.attributes = "border=0")
````
```

```
````{r results = "asis"}
stargazer::stargazer(data, type = "html",
  title = "Table with stargazer")
````
```

Learn more in the stargazer, xtable, and knitr packages.

## Citations and Bibliographies

Create citations with .bib, .bibtex, .copac, .enl, .json, .medline, .mods, .ris, .wos, and .xml files

- 1 Set bibliography file and CSL 1.0 Style file (optional) in the YAML header

```
---
bibliography: refs.bib
csl: style.csl
---
```

- 2 Use citation keys in text

Smith cited [smith04].  
Smith cited without author [-smith04].  
smith04 cited in line.

- 3 Render. Bibliography will be added to end of document

Smith cited (Joe Smith 2004).  
Smith cited without author (2004).  
Joe Smith (2004) cited in line.