

R Markdown :: CHEAT SHEET



What is R Markdown?



.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 in a variety of formats, including html, pdf, MS Word, or RTF documents; html or pdf based slides, Notebooks, and more.

The screenshot shows the RStudio interface. The top pane is the R Markdown editor with the following content:

```

1 ---
2 title: "R Markdown"
3 author: "RStudio"
4 output:
5   html_document:
6     toc: TRUE
7 ---
8
9 ```{r setup, include=FALSE}
10 knitr::opts_chunk$set(echo = TRUE)
11 ```
12
13 ## R Markdown
14 This is an R Markdown document. Markdown is a simple
15 formatting syntax for authoring HTML, PDF,
16 and MS Word documents.
17
18 ```{r cars}
19 summary(cars)
20 ```
21
22 For more details on using R Markdown
23 see <http://rmarkdown.rstudio.com>.

```

The bottom pane shows the R console with the following commands:

```

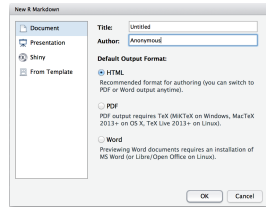
> library(rmarkdown)
> render("report.Rmd", output_file = "report.html")

```

The right pane shows the rendered HTML output, which includes a table of car statistics:

##	speed	dist
## Min.	: 4.0	Min. : 2.00
## 1st Qu.	:12.0	1st Qu.: 26.00
## Median	:15.0	Median : 36.00
## Mean	:15.4	Mean : 42.98
## 3rd Qu.	:19.0	3rd Qu.: 56.00
## Max.	:25.0	Max. :120.00

Workflow



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


render

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

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

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  `getRversion()`

```

```{r echo=TRUE}
getRversion()
```

```

GLOBAL OPTIONS
Set with `knitr::opts_chunk$set()`, e.g.

```

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

```

IMPORTANT CHUNK OPTIONS

- 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`

.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**

Parameters

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

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

```

---
params:
  n: 100
  d: !r Sys.Date()
---

```

2. **Call parameters** - Call parameter values in code as `params$<name>`

```

Today's date
is `r params$d`

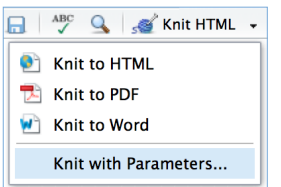
```

3. **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")))

```



Interactive Documents

Turn your report into an interactive Shiny document in 4 steps

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

The screenshot shows the R Markdown editor with the following code:

```

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

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

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

```

The rendered output shows a Shiny app with a text input field containing the number '5' and a table of car statistics:

	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()`

NOTE: Your report will be 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.





# 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<sup>2</sup>~  
~strikethrough~  
escaped: \\* \\_ \\  
endash: --, emdash: ---  
equation: \$A = \pi \* r^2\$  
equation block:

Plain text  
End a line with two spaces to start a new paragraph.  
*italics* and **bold**  
`verbatim code`  
sub/superscript<sup>2</sup>  
~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-->  
<code>Text ignored in HTML</code>  
<em>HTML ignored in pdfs</em>  
<http://www.rstudio.com>  
[[link](www.rstudio.com)]  
Jump to [Header 1](#anchor)  
image:

$$E = mc^2$$
  
block quote  


## Header1

### Header 2

#### Header 3

##### Header 4

###### Header 5

HTML ignored in pdfs  
<http://www.rstudio.com>  
link  
Jump to [Header 1](#)  
image:  
  
Caption

\* 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

• unordered list  
o sub-item 1  
o 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  
1. A list whose numbering continues after  
2. 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:  
\*\*\*

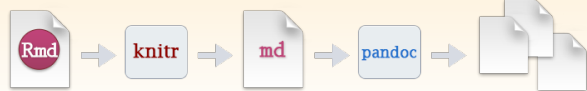
Table with 4 columns: Right, Left, Default, Center  
1. Here is the footnote. ↩

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

1. Here is the footnote. ↩

# Set render options with YAML

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

Body
```

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 to the right):

```

output: html_document:
 code_folding: hide
 toc_float: TRUE

Body
```

### 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
```

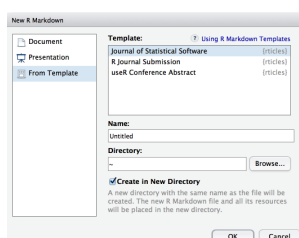
## Create a Reusable Template

1. Create a new package with an 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

```



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
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 equations	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 quarterly_report.html).	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									

## Table Suggestions

Several functions format R data into tables

eruptions	waiting
3.600	79
1.800	54
3.333	74
2.283	62

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

```
data <- faithful[1:4,]
knitr::kable(data, caption = "Table with kable")
knitr::xtable(data, caption = "Table with xtable",
 type = "html", html.table.attributes = "border=0")
stargazer::stargazer(data, type = "html", title = "Table with stargazer")
```

## 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
2. **Use citation keys in text**
3. **Render.** Bibliography will be added to end of document

```

bibliography: refs.bib
cs1: style.csl

```

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

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

