

# R Markdown basics

ME 447/547 Visualizing Data

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# With R Markdown, prose and code are in the same script

Your portfolio is an R Markdown (.Rmd) script that includes

- the prose of your report
- executable R code for data carpentry & creating graphs
- auto-generated citations and references



**1-min overview** by RStudio



**6-min demo** by Roger Peng

# The default Rmd file reminds you of commonly used features

*File > New File > R Markdown...*

Prose and executable R code are  
in the same file

```
1 ---
2 title: "Untitled"
3 author: "Richard Layton"
4 date: "September 6, 2017"
5 output: html_document
6 ---
7
8 ```{r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10 ```
11
12 ## R Markdown
13
14 This is an R Markdown document. Markdown is
15 a simple formatting syntax for authoring
16 HTML, PDF, and MS Word documents. For more
17 details on using R Markdown see
18 <http://rmarkdown.rstudio.com>.
19
20 When you click the Knit button a
21 document will be generated that includes
22 both content as well as the output of any
23 embedded R code chunks within the document.
24 You can embed an R code chunk like this:
25
26 ```{r cars}
27 summary(cars)
28 ```
29
30 ## Including Plots
31
32 You can also embed plots, for example:
33
34 ```{r pressure, echo=FALSE}
35 plot(pressure)
36 ```
37
38 Note that the `echo = FALSE` parameter was
39 added to the code chunk to prevent printing
40 of the R code that generated the plot.
```

# Text and code output are knitted into a single output document

The *knitr* package “knits” your prose and code results together.

Our output files are **.md** for GitHub

Other output formats include:

.html

.docx

.pdf

## Untitled

Richard Layton

September 6, 2017

## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

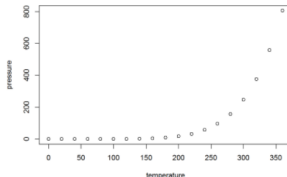
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      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
```

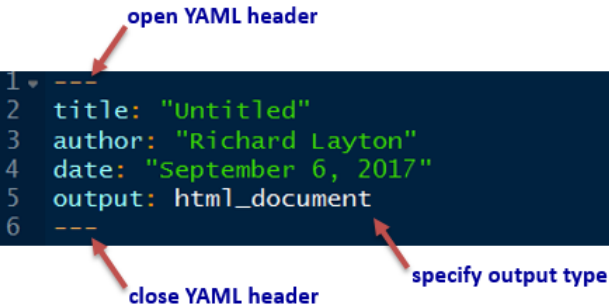
## Including Plots

You can also embed plots, for example:



Note that the `summary(cars)` command was added to the code chunk to

## The script starts with a YAML header



```
1  ---
2  title: "Untitled"
3  author: "Richard Layton"
4  date: "September 6, 2017"
5  output: html_document
6  ---
```

Annotations:

- open YAML header (points to line 1)
- close YAML header (points to line 6)
- specify output type (points to line 5)

Our output type is `github_document`

# Untitled

*Richard Layton*

*September 6, 2017*

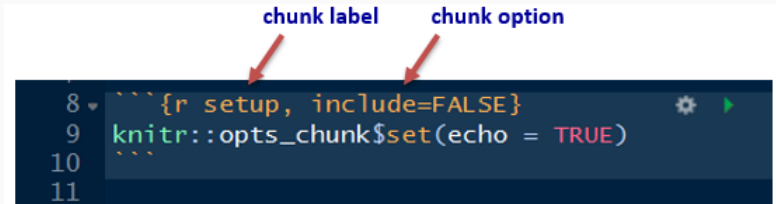
## Code chunks open and close with 3 backticks

opening tick marks

```
8 {r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10
11
```

closing tick marks

The code chunk header is `{r}`



```
8 {r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10
11
```

chunk label

chunk option

Only the `{r}` is required

The chunk label and chunk options are optional.



## Knitting options can be specified



The image shows a screenshot of an RStudio code editor with a dark theme. A code chunk is highlighted with a light blue background. The code inside the chunk is:

```
8 {r setup, include=FALSE}
9 knitr::opts_chunk$set(echo = TRUE)
10
11
```

Three red arrows point from text annotations to specific parts of the code:

- An arrow points from the text "set knitr code-chunk behavior" to the `knitr::opts_chunk$set` function call.
- An arrow points from the text "code appears in output document" to the `echo = TRUE` assignment.
- An arrow points from the text "neither code nor output appears in document" to the `include=FALSE` argument.

The list of **knitr options** is extensive.

# Use markup tags to format text

heading level-2

```
## R Markdown
```

```
This is an R Markdown document.  
is a simple formatting syntax for  
authoring HTML, PDF, and MS Word  
documents. For more details on  
Markdown see
```

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

```
When you click the Knit button, the  
document will be generated that  
both content as well as the output  
embedded R code chunks within the  
document. You can embed an R code  
like this:
```

prose

active link

bold typeface

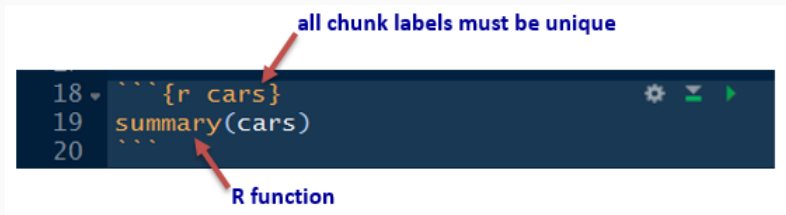
See the [R Markdown cheat sheet](#) for more detail

# R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.

When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

# Incorporating R code and output in a document



The output document will show

- The code echo
- The `summary(cars)` output table

```
summary(cars)
```

##	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

# Incorporating code output without listing the code

```
## Including Plots

You can also embed plots, fo



```
{r pressure, echo=FALSE}
plot(pressure)
```



Note that the echo = FALSE
added to the code chunk to p
printing of the R code that
plot.
```

Annotations:

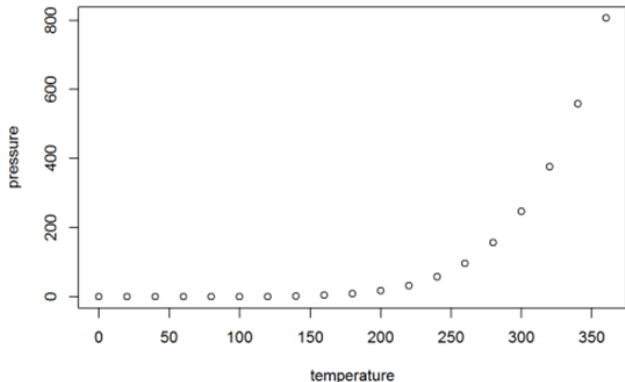
- A red arrow points from the word "plot" to the `plot(pressure)` line in the code chunk.
- A red arrow points from the text "do not echo code in document" to the `echo=FALSE` line in the code chunk.
- A red arrow points from the text "typeset text as if it were code" to the text "Note that the `echo = FALSE`" in the code chunk.

The output document will show

- No code echo
- The `plot(pressure)` output graph

# Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

# Same Rmd script with a different output type

```
1 ---
2 title: "Untitled"
3 author: "Richard Layton"
4 date: "September 6, 2017"
5 output: word_document
6 ---
7
```

## Untitled

Richard Layton

September 6, 2017

### R Markdown

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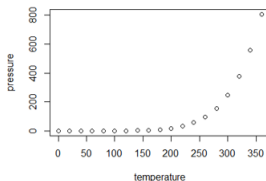
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      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
```

### Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.



# What the software is doing

**markup** We create the knittable *Rmd* file that includes both marked-up prose and executable code.



**knit** The *knitr* package executes the R code, converts the output to *markdown*, and creates a new *md* file.



**compile** The *md* file is compiled, creating a new HTML file.



# File organization

- carpentry
- data
- data-raw
- design
- figures
- manage
- practice
- reports
- resources

Portfolio **.Rmd** files reside in the **reports** directory

github\_output produces **.md** files, also in **reports**

GitHub translates **.md** files in the repo to HTML