

# Reproducible Report with R Markdown

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# R Markdown

# What is R Markdown?

- R Markdown document allow reproducible report for data science.
- You can run R code and generate quality report.

Source: <https://rmarkdown.rstudio.com/lesson-1.html>

# Why should we bother learning R Markdown?

- made some changes to the data? Just generate a new report in seconds!
- need to include some more analyses and plots? Just add in some R code and generate a new report in seconds!
- need to share the report but too lazy to edit? Compile and share nicely prepared report!
- etc etc etc. . .

# Main sources for learning

- Main website: <https://rmarkdown.rstudio.com/>
- Most important, cheatsheet!: <https://github.com/rstudio/cheatsheets/raw/master/rmarkdown-2.0.pdf>

# R Markdown Basics

# Install rmarkdown package

```
install.packages("rmarkdown")
```



# Install LaTeX package for PDF

- Windows & MacOS – MikTeX @ <https://miktex.org/download>
- Linux – texlive.

So you can generate PDF output.

# New .Rmd file

- From menu, select **File > New file > R script**
- Edit the **Title** and **Author** fields.
- Choose any of the **Default Output Format**.
- A basic template will be generated.

- Click on **Knit** menu. You may click on the dropdown menu for more options.
- Compare the contents in the `.Rmd` file and your output.

- Anything that are included in between the two ---.
- Basically we have the title, author, date and output.
- This can be further customized.

- In between the opening three backticks ````` and closing three backticks `````. Can be any code here.
- Include the opening as ````{r}` to specify the chunk as R code.

# Header levels

- First level, second level and third level are preceded by #, ## and ###.
- Add more # for more header sublevel.

- 1 Customize the template with your own analyses and plots based on four previous sessions.
- 2 Explore chunk options (refer to R Markdown Cheatsheet). More important ones are:
  - ▶ `echo`
  - ▶ `eval`
  - ▶ `comment`

# Table



# Basic table

A sample table like this:

```
| Right | Left | Default | Center |
|---:|:---|---|:---:|
| 12 | 12 | 12 | 12 |
| 123 | 123 | 123 | 123 |
| 1.0 | 1.0 | 1.0 | 1.0 |
```

Table: Sample table

Becomes:

**Table 1:** Sample table

Right	Left	Default	Center
12	12	12	12
123	123	123	123
1.0	1.0	1.0	1.0

# Table (from data frame)

```
```${r}  
library(knitr)  
kable(head(iris))  
```
```

## Table (from data frame)

| Sepal.Length | Sepal.Width | Petal.Length | Petal.Width | Species |
|--------------|-------------|--------------|-------------|---------|
| 5.1          | 3.5         | 1.4          | 0.2         | setosa  |
| 4.9          | 3.0         | 1.4          | 0.2         | setosa  |
| 4.7          | 3.2         | 1.3          | 0.2         | setosa  |
| 4.6          | 3.1         | 1.5          | 0.2         | setosa  |
| 5.0          | 3.6         | 1.4          | 0.2         | setosa  |
| 5.4          | 3.9         | 1.7          | 0.4         | setosa  |

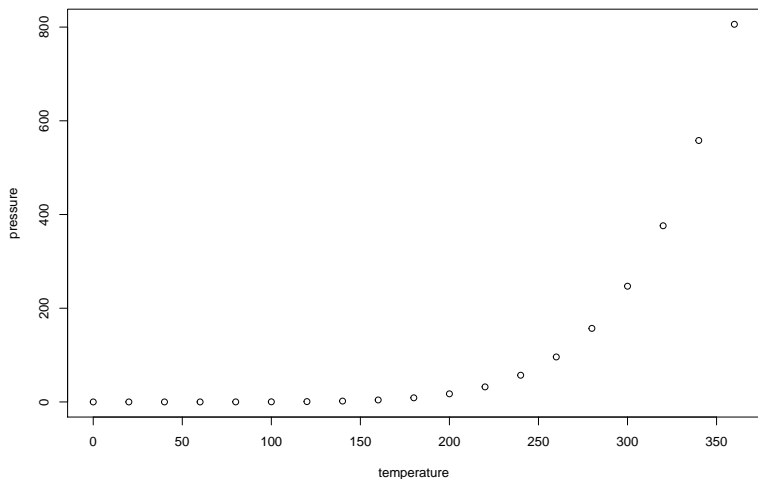
You can explore the following packages for table:

- `kableExtra`
- `stargazer`

## Plot, figure and image

```
```{r, fig.cap="Sample caption", echo=FALSE}  
plot(pressure)  
```
```

becomes



**Figure 1:** Sample caption

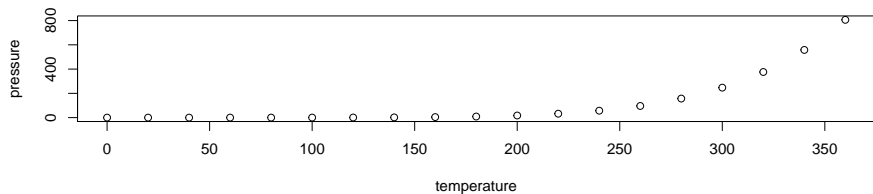


## Plot size – fig.height(in inch)

```
```{r, fig.cap="Sample caption", echo=FALSE, fig.height=3}  
plot(pressure)  
```
```

becomes

# Plot size – fig.height(in inch)



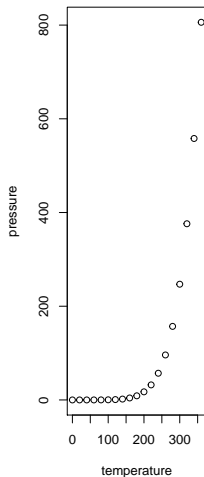
**Figure 2:** Sample caption

## Plot size – fig.width (in inch)

```
```{r, fig.cap="Sample caption", echo=FALSE, fig.width=3}  
plot(pressure)  
```
```

becomes

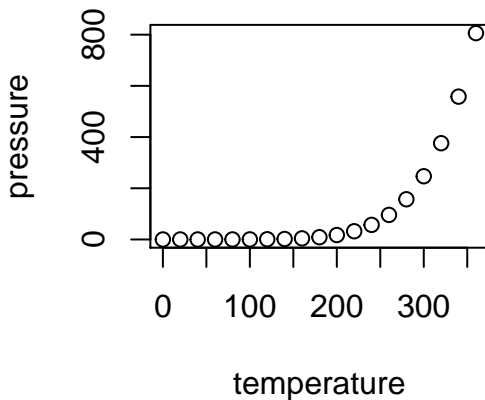
# Plot size – fig.width (in inch)



**Figure 3:** Sample caption

```
```{r, fig.cap="Sample caption", echo=FALSE, fig.width=3,  
fig.asp=1}  
plot(pressure)  
```
```

becomes



Simply:

```
![caption] (image_path)
```

Add width to change the size.

```
![caption] (image_path){width=}
```

```
![Sample image](smile.png)
```

becomes





**Figure 5:** Sample image

```
! [Sample image] (smile.png) {width=25%}
```

becomes



**Figure 6:** Sample image

- 1 Create a report containing tables, figures and images.

## Inline output

Usually, using code chunk,

```
mean(iris$Petal.Width)
```

```
## [1] 1.199333
```

# Inline output

Can be included in between the text, for example

```
The mean of petal width is r mean(iris$Petal.Width).
```

becomes

```
The mean of petal width is 1.1993333.
```

# Equation



# Mathematical equation

- Needs knowledge of LaTeX.

# Inline equation

The equation is `$y = \beta_0 + \beta_1 x$`

The equation is  $y = \beta_0 + \beta_1 x$

# Display equation

The equation is,

```
$$y = \beta_0 + \beta_1 x$$
```

The equation is,

$$y = \beta_0 + \beta_1 x$$

- 1 Create a report containing inline outputs and equations.

- Customizing YAML header
  - ▶ include references.
  - ▶ include customized PDF document header using LaTeX.

Allaire, J., Horner, J., Xie, Y., Marti, V., & Porte, N. (2018). *Markdown: 'Markdown' rendering for r*. Retrieved from <https://CRAN.R-project.org/package=markdown>

Allaire, J., Xie, Y., McPherson, J., Luraschi, J., Ushey, K., Atkins, A., ... Iannone, R. (2018). *Rmarkdown: Dynamic documents for r*. Retrieved from <https://CRAN.R-project.org/package=rmarkdown>

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