

# 2017-01-23-intro-rstudio-rmarkdown

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## Today's topics

- Introduction to RStudio
- Introduction to R Markdown

## RStudio

- An integrated development environment (IDE) for R

## Components of RStudio

- Code editor
- R console
- Integrated help
- Image viewer
- Integration with git and other version-control packages
- Project management

## RStudio in the cloud

- RStudio can be run in a browser from a server running RStudio Server
- Demo
  - Running this under Amazon Web Services (AWS) free tier
- Instructions for doing this yourself can be found [here](#)

## R Markdown

- Markdown
  - Mark-up language to make it easy to write HTML
- R Markdown special type of Markdown
  - Allows for “literate” programming, mixing text, analysis, figures
  - Adds to Markdown syntax

## Markdown syntax

- Text formatting
  - *italics* by surrounding text with single asterisks or underscores: ***italics*** or **italics**
  - **boldface** by surrounding text with double asterisks or underscores: ***boldface*** or **boldface**
  - ~~strikethrough~~ by surrounding text with double tildes: **~~strikethrough~~**
  - Clickable URLs by surrounding link text with square brackets and URL with parentheses: **[Clickable URLs] (<http://www.psu.edu>)**

## Markdown syntax

- Paragraph formatting
  - Headings with level specified by the number of hash (#) marks
  - Lists (bullet and enumerated)
  - Block quotes
  - Code blocks

---

```
# This is a Heading 1
## This is a Heading 2
### This is a Heading 3
```

I put these in quotes here because these hash marks also separate different slides (more on this later).

---

- An item
  - A nested item
    - \* A doubly-nested item
- Another item

Code:

```
- An item
  - A nested item
    - A doubly-nested item
- Another item
```

---

1. An enumerated item
  - A nested item
2. A second enumerated item

Code:

```
1. An enumerated item
  - A nested item
1. A second enumerated item
```

Notice how the numbers are incremented automatically!

---

```
Four score and seven years ago, some famous President spoke infamous words that would live on
throughout history. These words are famous enough that I want to highlight them with a block
quote.
```

```
> Four score and seven years ago, some famous President
> spoke infamous words that would live on throughout history.
> These words are famous enough that I want to highlight them with a block quote.
```

## More on Markdown syntax

- Images can be inserted using this syntax ![Alt text](/path/to/img.jpg)
- Clickable links using <http://www.psu.edu>
- Comments – won't print in rendered output – <!-- This is a comment -->

## R Markdown additions

- .Rmd extension
- Combine text, code, images, figures, video
- “Computable” reports, documents, slide shows, notebooks
- Output in multiple formats from the same file (next week)

## Make some data

```
x = rnorm(n = 100, mean = 0, sd = 1)    #  $N(0, 1)$ 
y = rnorm(n = 100, mean = 2, sd = 0.5) #  $N(2, 0.5)$ 
```

## Summary of x, y

```
summary(x)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
## -2.01400 -0.54740  0.09514  0.13220  0.89060  2.63600
```

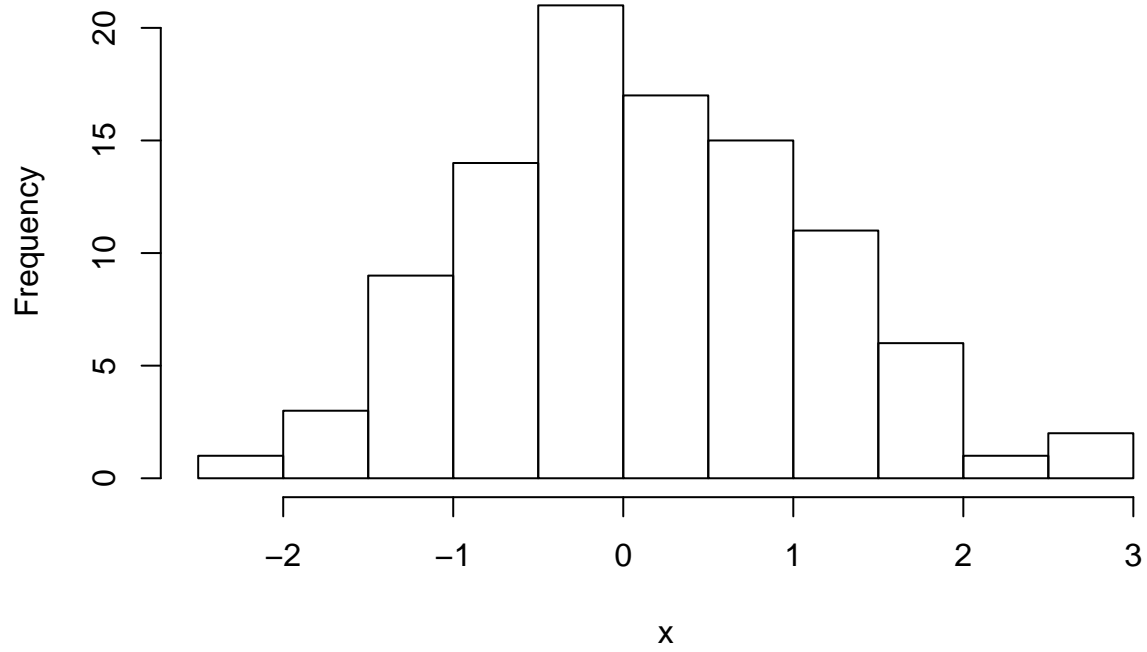
```
summary(y)
```

```
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
##  0.3225  1.5760  2.0000  1.9360  2.2890  2.9070
```

## Histogram of x

```
hist(x)
```

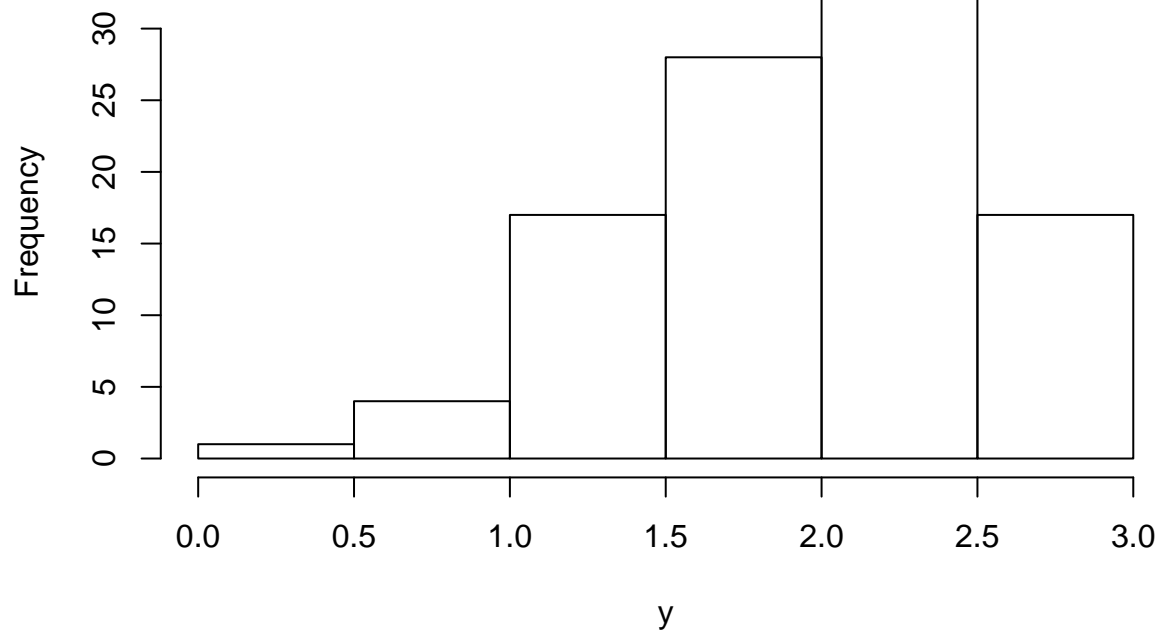
**Histogram of x**



**Histogram of y**

```
hist(y)
```

**Histogram of y**



## Embed figure saved locally

```

```

height parameter is optional, but useful.

---

## Embed figure from the web

```

```

---

## Embed YouTube video

```
<iframe width="420" height="315" src="https://www.youtube.com/embed/9hUy9ePyo6Q" frameborder="0" allowfullscreen></iframe>
```

- YouTube gives you code to cut and paste.
- 

## Printing computed variables

```
summ.x = summary(x)
summ.y = summary(y)
names(summ.x) # Figure out variable names for indexing
```

```
## [1] "Min." "1st Qu." "Median" "Mean" "3rd Qu." "Max."
```

---

*Index by variable name:* X lies within the range of [-2.014, 2.636].

*Index by numeric index:* The (y-x) difference in means is 1.8038.

*Calculate and report:* The correlation between x and y is 0.1082552.