2017-01-23-intro-rstudio-rmarkdown

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2017-01-03

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)
```

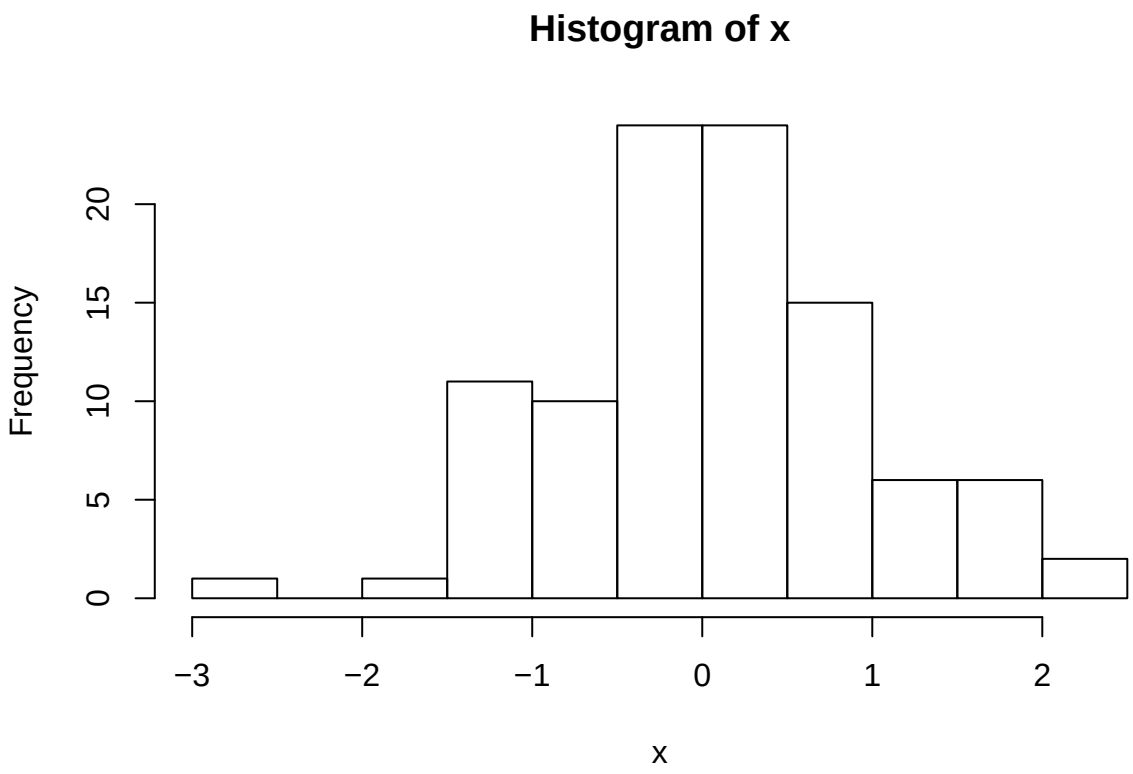
```
##     Min.  1st Qu.   Median     Mean  3rd Qu.     Max.
## -2.64700 -0.44000  0.04649  0.05095  0.59890  2.34700
```

```
summary(y)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.886   1.608   1.858   1.934   2.266   2.817
```

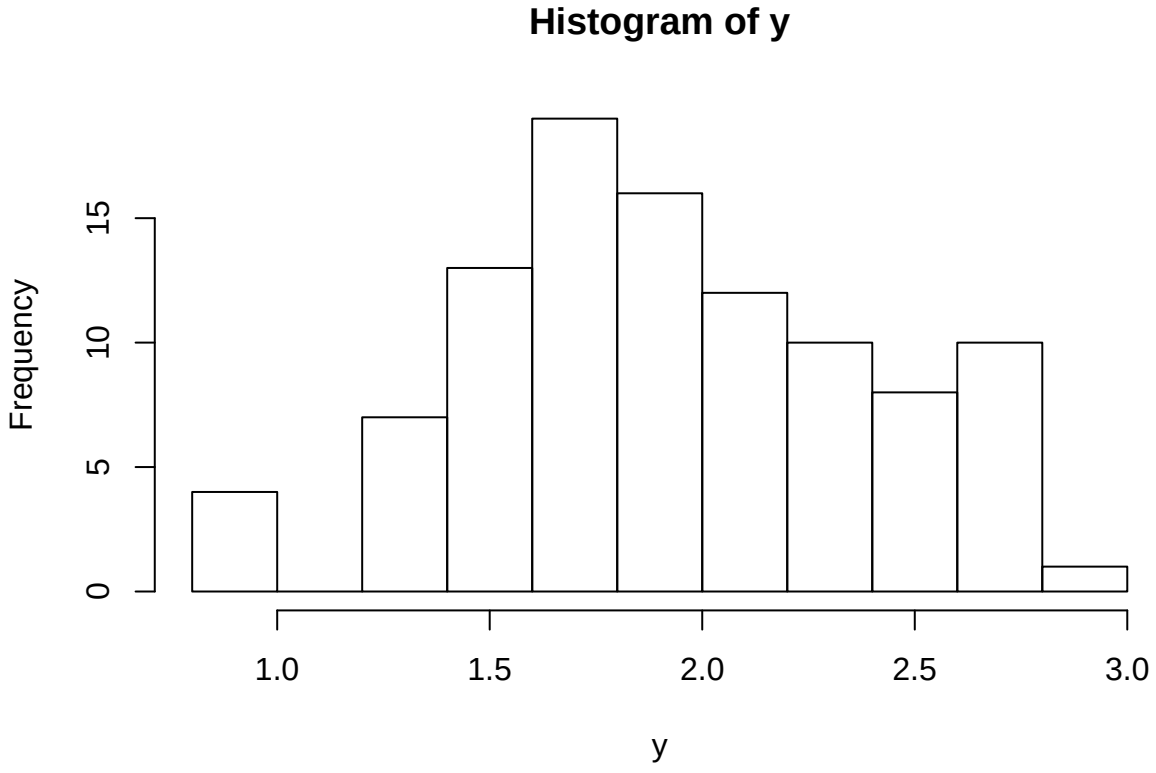
Histogram of x

```
hist(x)
```



Histogram of y

```
hist(y)
```



Embed figure saved locally

```
<img src="../img/my-img.jpg" height=500px>
```

height parameter is optional, but useful.

Embed figure from the web

```
<img src="http://cdn.abclocal.go.com/content/wpvi/images/cms/280434_1280x720.jpg" width=900px>
```

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 [-2.647, 2.347].

Index by numeric index: The (y-x) difference in means is `1.88305`.

Calculate and report: The correlation between x and y is 0.0926533.