

Introduction to R Markdown

XDASI 2021

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What is it?

This is an R Markdown presentation.

Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents.

For more details on using R Markdown consult the R Markdown page on the course website.

Overview

R markdown is a convenient way to present your R scripts that allows you to:

- ▶ Embed R code
- ▶ Run R code chunks
- ▶ Display R graphics output
- ▶ Annotate and explain your code
- ▶ Display mathematical equations (LaTeX)

You will be handing in all of your homework as .Rmd documents.

How to do it

From within RStudio, you need to do four things:

1. Create an .Rmd document
2. Write some text
3. Write some code
4. Render the document

Step 1: Create an .Rmd document

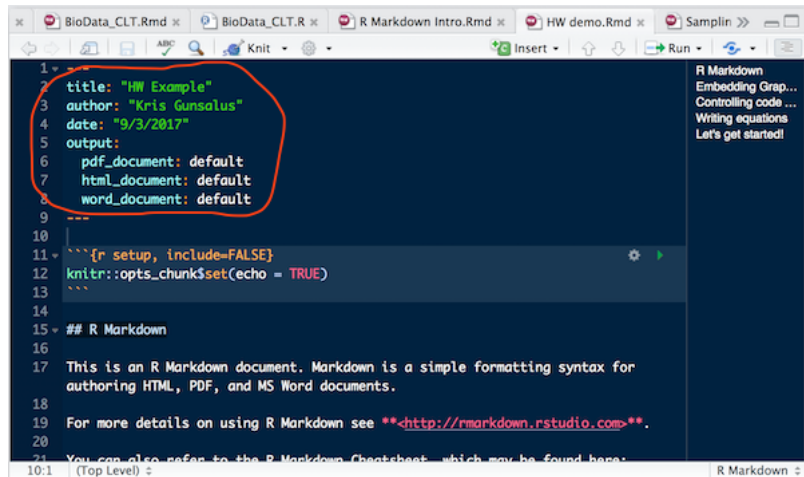
In the RStudio menu, select **File => New File => R Markdown**

...

- ▶ Give your document a title.
- ▶ Add your name.
- ▶ Add the date.
- ▶ Select **HTML** or **PDF** (you can change this later).

YAML header

- ▶ “YAML ain’t markup!”
- ▶ Encodes some metadata about the document



The screenshot shows an RStudio interface with several open files: BioData_CLT.Rmd, BioData_CLT.R, R Markdown Intro.Rmd, HW demo.Rmd, and Samplin. The active file is R Markdown Intro.Rmd. The editor displays a YAML header (lines 1-8) and R code blocks (lines 11-13). The YAML header is circled in red. The R code block contains a chunk setup and a chunk option. The document body (lines 15-21) contains a title, author, date, and output settings. The right sidebar shows the R Markdown menu with options: Embedding Grap..., Controlling code ..., Writing equations, and Let's get started!.

```
1 ---
2 title: "HW Example"
3 author: "Kris Gunsalus"
4 date: "9/3/2017"
5 output:
6   pdf_document: default
7   html_document: default
8   word_document: default
9 ---
10
11 ```{r setup, include=FALSE}
12 knitr::opts_chunk$set(echo = TRUE)
13 ```
14
15 ## R Markdown
16
17 This is an R Markdown document. Markdown is a simple formatting syntax for
18 authoring HTML, PDF, and MS Word documents.
19
20 For more details on using R Markdown see \*\*<http://rmarkdown.rstudio.com>\*\*.
21
22 You can also refer to the R Markdown Cheatsheet, which may be found here:
```

Step 2: Add some text

- ▶ Use R Markdown tags to format the document (it's simple!)
- ▶ Headers, paragraphs, lists, etc. each use special symbols
- ▶ Use escape char \ for special symbols like Greek letters
- ▶ Use \$ and \$\$ for LaTeX-formatted equations

50 ▾ ## Writing equations

51

52 The above is a **density plot** for the ***Standard Normal Distribution***:

53

54 $f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$

$$f(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

55

Step 3: Embedded chunks of R code

- ▶ Insert blocks of code using
 - ▶ the RStudio menu: Insert => R
 - ▶ keyboard shortcut: Command+Option+i (Mac) or Control+Option+i (PC)
- ▶ Code blocks are enclosed by “`{r}`” and `***`
- ▶ Comments start with `#`



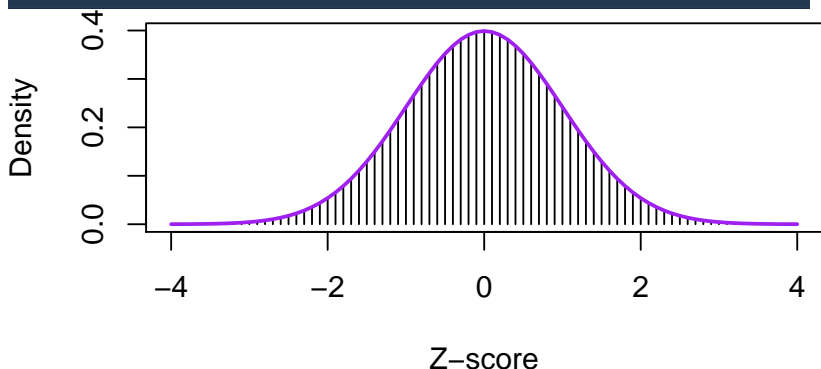
The screenshot shows the RStudio code editor with a dark theme. Lines 24 through 29 are visible. Line 25 contains the opening chunk header ````{r test}`, which is highlighted with an orange box. Line 26 is a comment `# This is a block of code.`. Line 27 contains the R code `hiya <- paste("Hello", "world!", sep = " ")`. Line 28 contains `hiya`. Line 29 contains the closing chunk header `````, also highlighted with an orange box. To the right of the code are icons for settings, a dropdown menu, and a run button. Below the code editor, the console shows the output `[1] "Hello world!"`.

```
24  
25 ```{r test}  
26 # This is a block of code.  
27 hiya <- paste("Hello", "world!", sep = " ")  
28 hiya  
29 ```  
[1] "Hello world!"
```


Including graphics

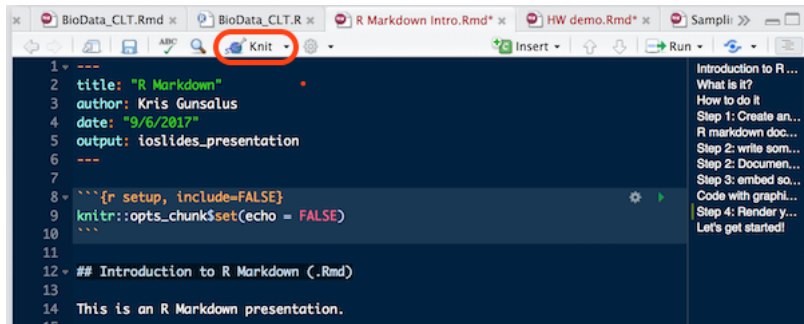
- ▶ `echo=FALSE` to hide the code; `eval=FALSE` to hide execution result (TRUE by default)
- ▶ Can specify size

```
```{r normal_plot, echo=TRUE, eval=TRUE, fig.width=4, fig.height=3,  
fig.align="left" }
x<-seq(-4,4,0.1)
y <- dnorm(x)
plot(x,y,type="h", xlab="Z-score", ylab="Density")
lines(x,y,col="purple", lwd=2)
```
```



Step 4: Render your document

- ▶ Click the **Knit** button to generate a document that includes both content as well as the output of any embedded R code chunks within the document.
- ▶ Knit your document to **HTML** or **PDF**, **Word**, or a variety of other formats (e.g. slide presentations).



Let's get started!

Exercise

- ▶ Open the R project you just created
- ▶ Start an R Markdown document
 - ▶ You will see some placeholders
 - ▶ Replace these with some of your own text and code
- ▶ Knit your .Rmd file to html or pdf
 - ▶ Note that it will automatically be saved when you knit it