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# HDS Tutorial 3

| Brittany Blankinship | 26 & 27 October 2021 |

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the world

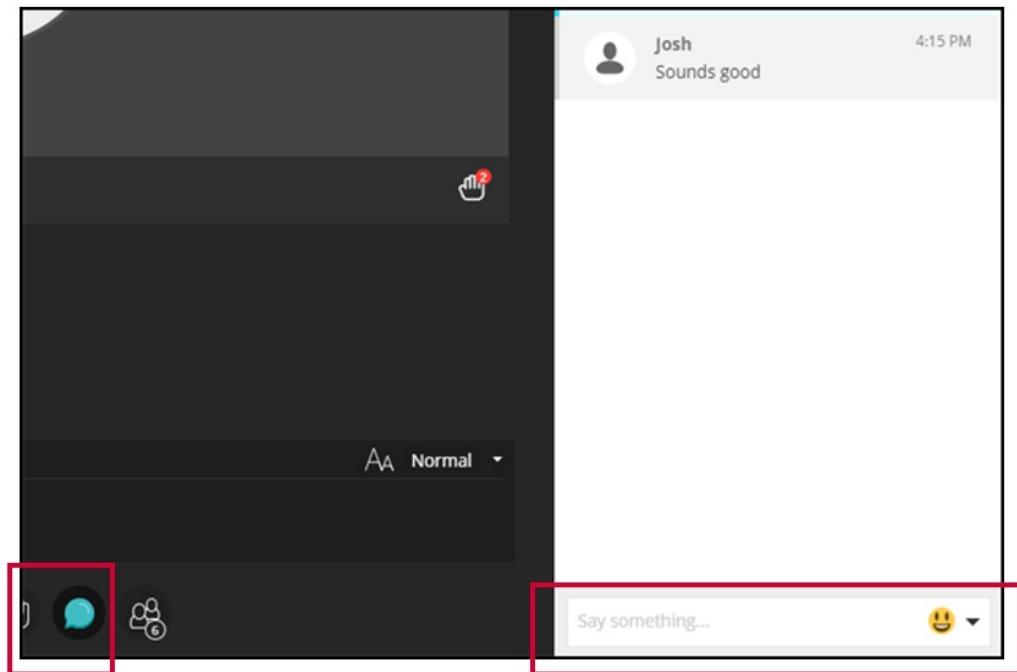
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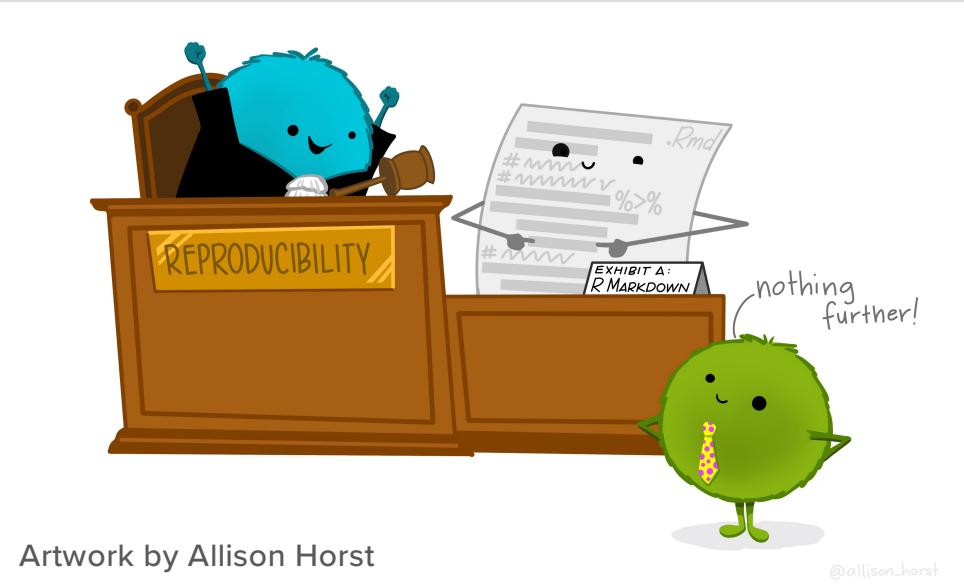


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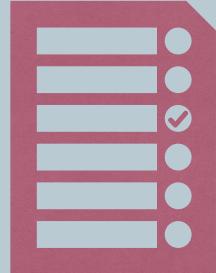
# HDS Tutorial 3

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# Agenda



- What is R Markdown
- Why use R Markdown
- Demonstration
- Resources for further study
- Q&A



Are you using R on your own  
device, Noteable, or both?

Have you installed all of the  
necessary packages for  
R Markdown?

Have you already looked through some  
of this week's content  
(i.e., opened the R Markdown practice  
document?)

*You might be thinking...*

**Okay...but why R Markdown,  
why should we not just stick  
with script files?**

# An R Markdown workflow is...

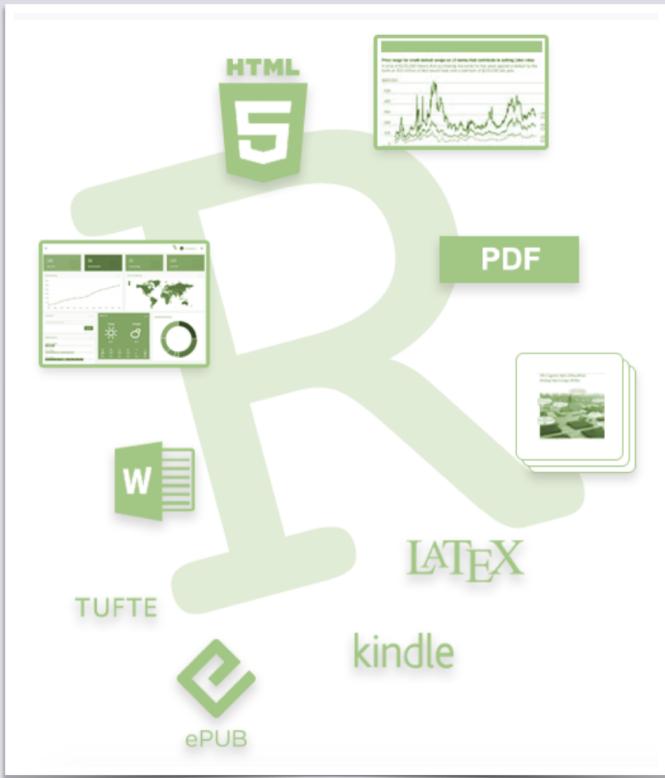
**Less**

↓ Error-prone

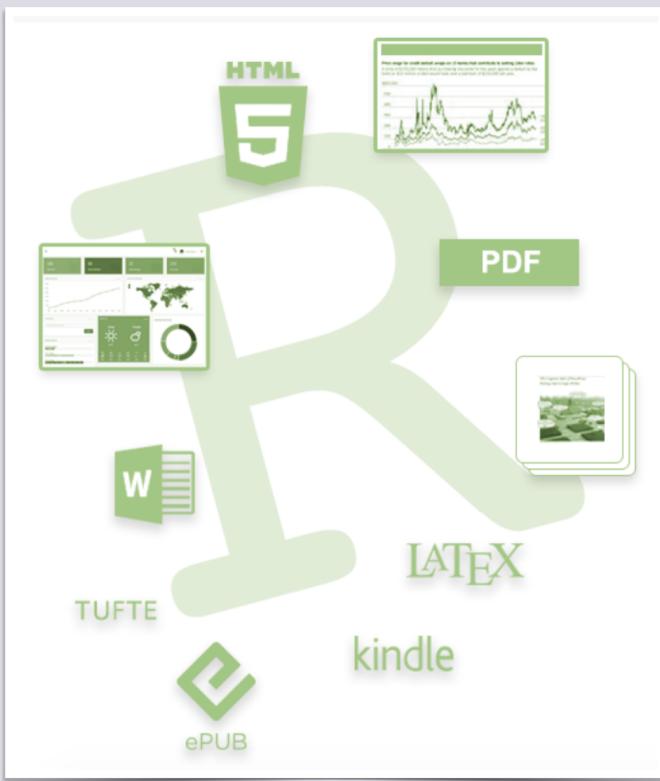
↓ Time consuming (once you get the  
hang of it)

**More**

- ✓ Dynamic
- ✓ Reproducible
- ✓ Transparent



- Create dynamic documents that combine code, output (including figures + tables), and writing
- Same document holds code & narrative surrounding the data -- an authoring framework for data science!
- Can be used to...
  - Reproduce your analyses
  - Collaborate and share code with others
  - Communicate your findings with others (even those who do not understand code)



- Present analyses in high quality documents, reports, and presentations
- Support dozens of output formats, like PDFs, Word files, slideshows, and more
- Documents are fully reproducible — you can update your document at any time by re-knitting the code chunks
- Productive notebook interface weaves together narrative text & code to produce elegantly formatted output
- Can use multiple languages including R, Python, and SQL

# R Markdown as...

1. Literate Programming
2. A Data Product
3. A Control Document
4. Templating

Credit: Thomas Mock's blog  
(Customer Success Manager @ Rstudio)  
<https://themockup.blog/posts/2020-07-25-meta-markdown/>

# R Markdown: Literate Programming

**Goal:** Capture code, text/comments, and output in a single document

MVP of reproducibility

- HAS to run successfully to save/knit the output
- Self-documenting (code is embedded)
- Self-contained workspace

Exploratory Data Analysis

# R Markdown: As a data product

**Goal:** Generate output natively in R for general consumption

- Presentations (ppt, web-formats – xaringan, LaTeX formats - Beamer)
- Dashboards (flexdashboard)
- Reports (HTML, Word, PDF)
- Websites & Blogs (blogdown , distill)
- Books & Manuscripts (bookdown)

# R Markdown: As control document

**Goal:** Scale data science tasks, automate the boring stuff, create robust pipelines

- Automation with parameters
- Child documents
- R Markdown for emails with `blastula`

# R Markdown: As templating

**Goal:** Don't repeat yourself, generate *input* templates or *output* documents from code

- Knit with `knit::render()` which lets you generate R Markdown outputs programmatically with code
- Looping outputs
- Templating engines `whisker` or `usethis::use_template()`

# (1) YAML = metadata

- Save output options here
- Different syntax/language than the rest of the document
- Watch out for your spaces!

```
---
```

```
author: Your name here
title: Your title here
output: html_document
```

```
---
```

```
---
```

```
author: Your name here
title: Your title here
output:
  html_document:
    toc: true
    toc_float: true
    theme: flatly
```

```
---
```

# (2) Text & (3) Code

- Code chunks!
- You can think of each chunk sort of like a mini-script file within the larger document
- Text written following Markdown

syntax	becomes
Plain text End a line with two spaces to start a new paragraph. <i>*italics*</i> and <u>_italics_</u> <b>**bold**</b> and <u>_bold__</u> <sup>superscript^2^</sup> <del>~~strikethrough~~</del> [link](www.rstudio.com)	Plain text End a line with two spaces to start a new paragraph. <i>italics</i> and <i>italics</i> <b>bold</b> and <b>bold</b> <sup>superscript2</sup> <del>strikethrough</del> <a href="#">link</a>
# Header 1	<b>Header 1</b>
## Header 2	<b>Header 2</b>
### Header 3	<b>Header 3</b>
#### Header 4	Header 4
##### Header 5	Header 5
###### Header 6	Header 6



# (3b) Global Setup chunk

- A special chunk label: `setup`
- Typically the first chunk
- All following chunks will use these options because it sets globally the chunk options – hence “global set up chunk”
- Set `include = FALSE` so that is is not printed out
- You can (and should) use individual chunk options too

```
9
10  ````{r setup, include=FALSE}
11  knitr::opts_chunk$set(
12    echo = TRUE,
13    warning = FALSE,
14    message = FALSE)
15  ```
16
```

# Code Chunk Options

option	default	effect
eval	TRUE	Whether to evaluate the code and include its results
echo	TRUE	Whether to display code along with its results
warning	TRUE	Whether to display warnings
error	FALSE	Whether to display errors
message	TRUE	Whether to display messages
tidy	FALSE	Whether to reformat code in a tidy way when displaying it
results	"markup"	"markup", "asis", "hold", or "hide"
cache	FALSE	Whether to cache results for future renders
comment	"##"	Comment character to preface results with
fig.width	7	Width in inches for plots created in chunk
fig.height	7	Height in inches for plots created in chunk

For more details visit [yihui.name/knitr/](http://yihui.name/knitr/)

# Chunk Labels

GOOD

`my-plot`

`myplot`

`myplot1`

`myplot-1`

`MY-PL0T`

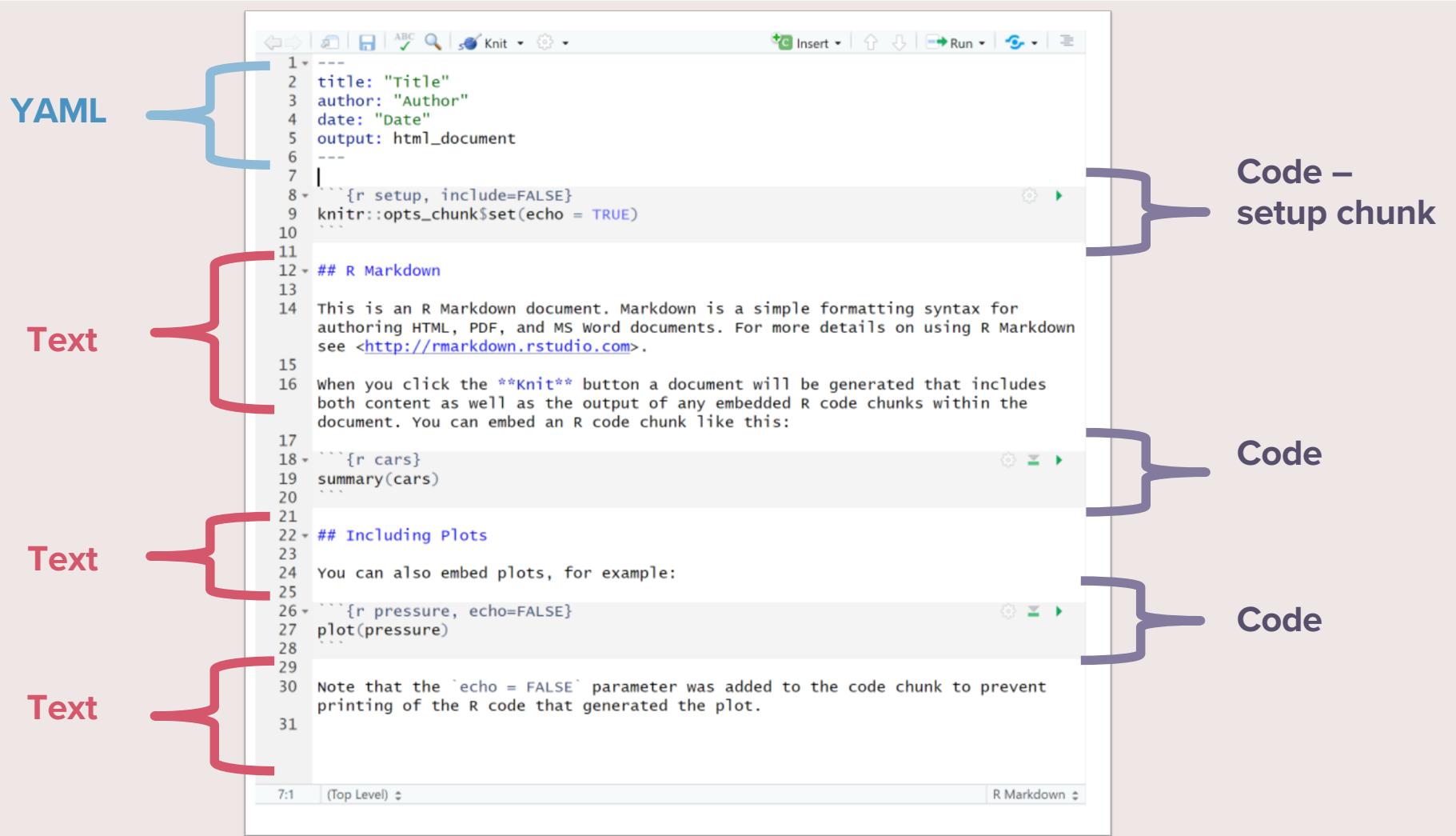
BAD

`my_plot`

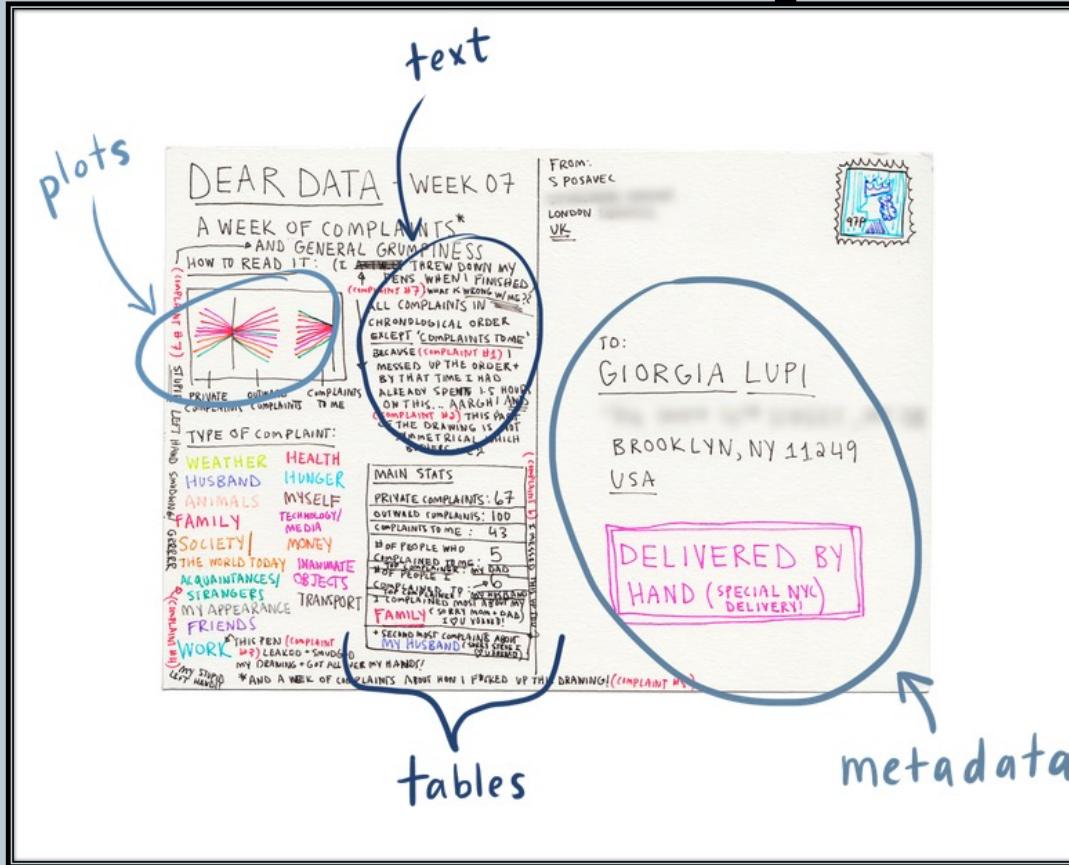
`my plot`

`everything else!`

- Place between curly braces  
`{r label}`
- Separate options with commas  
`{r label, option1=value}`
- No duplicate chunk labels! You will get an error



# RMarkdown as a postcard



Credit: Allison Hill  
<https://www.apreshill.com/>



If you have not  
done so  
already, try the  
following  
tutorial

<https://commonmark.org/help/tutorial/>

Takes about 10 minutes

01

## Introduction

Each lesson introduces a single Markdown concept with an example. When you see a red pulsing circle in the example, select to examine it for details.

After studying the example, try a few practice exercises with your new knowledge. Skip to any lesson at any time via the navigation controls. Experiment and have fun!

This tutorial is open source – [help us improve it!](#)

BEGIN LESSON →

WHAT IS MARKDOWN?

- Intro ■
- Emphasis ■
- Paragraphs ■
- Headings ■
- Blockquotes ■
- Lists ■
- Links ■
- Images ■
- Code ■
- Nested Lists ■
- The End ■

# R Studio also has a longer self-paced tutorial

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

R Markdown from R Studio

## Introduction

[How It Works](#)

[Code Chunks](#)

[Inline Code](#)

[Code Languages](#)

[Parameters](#)

[Tables](#)

[Markdown Basics](#)

[Output Formats](#)

[Notebooks](#)

[Slide Presentations](#)

[Dashboards](#)

[Websites](#)

[Interactive Documents](#)

## Introduction

### Overview

R Markdown provides an authoring framework for data science. You can use a single R Markdown file to both

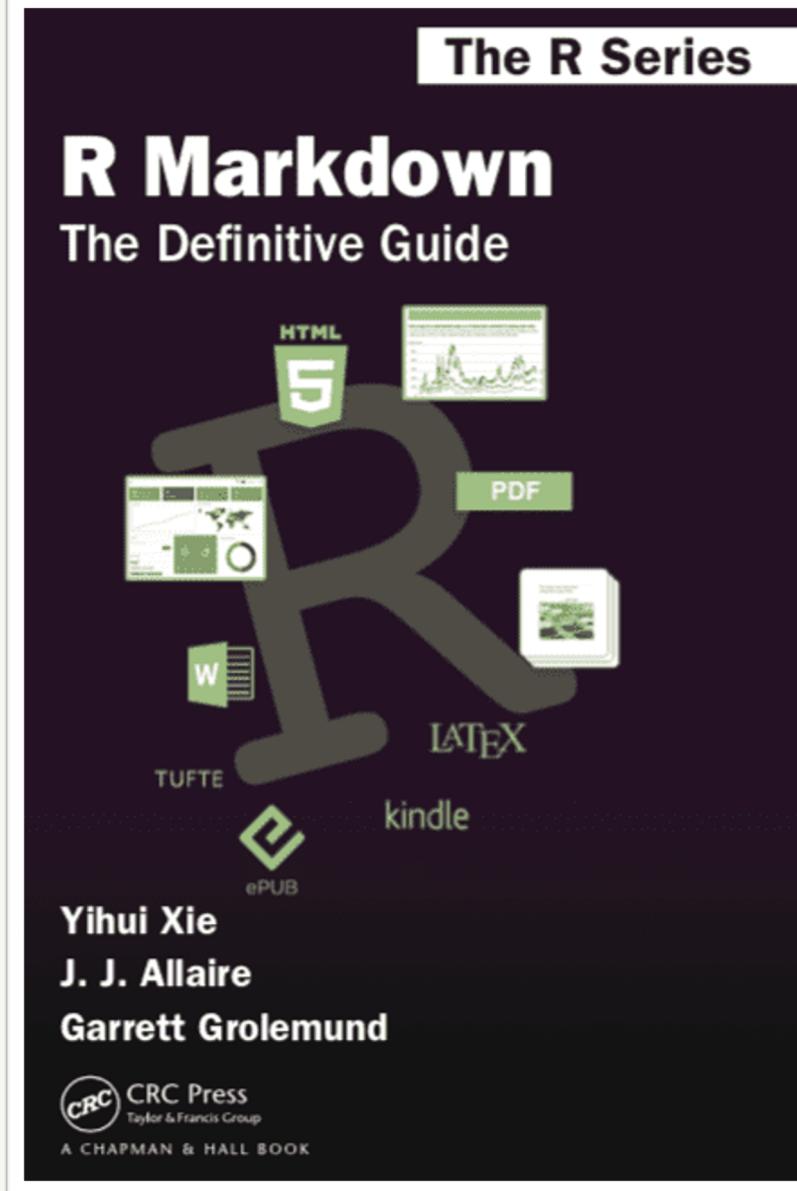
- save and execute code
- generate high quality reports that can be shared with an audience

R Markdown documents are fully reproducible and support dozens of static and dynamic output formats. This 1-minute video provides a quick tour of what's possible with R Markdown:



# General go-to R Markdown resource

<https://bookdown.org/yihui/rmarkdown/>  
By 2 of the authors of the knitr package!



# Questions?

If you have not done so already,  
please fill out the mid-term  
course survey!

[https://edinburgh.onlinesurveys.ac.uk/health-data-science-  
september-2021-mid-term-feedback](https://edinburgh.onlinesurveys.ac.uk/health-data-science-september-2021-mid-term-feedback)