R Programming For Natural Resource Professionals

Lab 1: Introduction to R markdown, basic math, objects

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TNR 163

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"Special characters" in R

- Certain characters (letters, symbols, etc.) have specific meaning in R so they need to be treated different.

  ```
  $ * + . ? [ ] ^ { } | ( ) \
  ```

- These require using an escape character "\"

- File paths are the most common issue
  - Windows file paths look like: G:\My Drive\. Won't work in R.
  - Need to use "G:\\My Drive\\" or "G:/My Drive/."

Challenges of working in a computer lab

- Save your scripts to OneDrive
- We'll start working in "Projects" next week which will help
- Packages may need to be reinstalled (still figuring this one out for UWSP's computer labs)
  - This will need to happen on your personal/work computer
  - You're welcome to use your own computer in class rather than the lab's
  - Tools exist for package portability, but we likely won't cover them

The "Library" code block

Specific to this course, but you might find helpful elsewhere.

```r
18    ```{r}
19    ### Set up you workspace with the necessary data and packages
20    list.of.packages <- c("remotes") ## Vector of required packages for the assignment
21    new.packages <- list.of.packages[!(list.of.packages %in% installed.packages()[, "Package"])] ## Check to see if these packages are installed
22    if(length(new.packages))
23      install.packages(new.packages) ## Install the packages that aren't installed
```

R markdown

- Platform for generating reports with embedded code
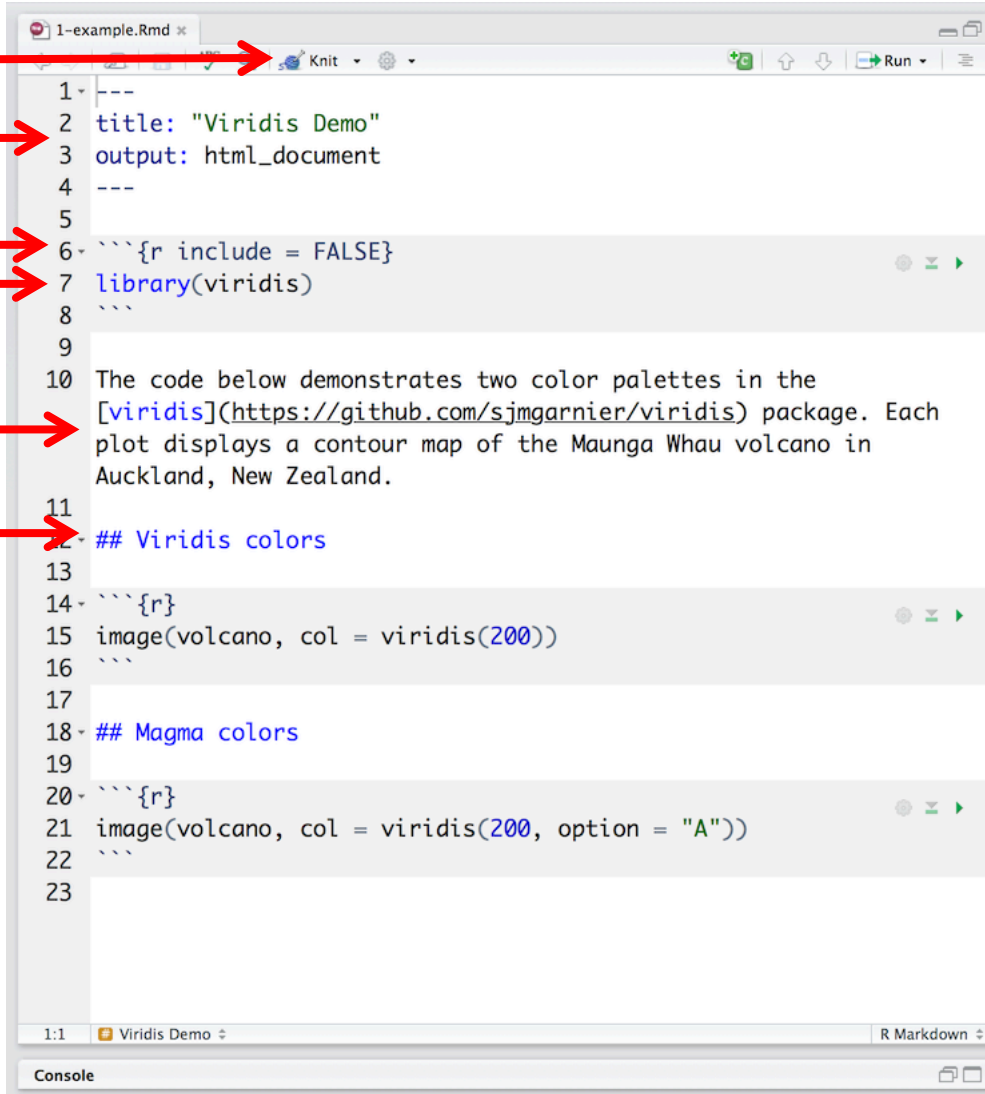
R markdown

Why use R markdown?

- Versatility: output as HTML, Word, PDF, and more
- Code and text side-by-side
- A lot of formatting can be automated
- Standardize reports and documents

Anatomy of a R markdown document

Anatomy of a R markdown document

YAML header ➡️

YAML Header

- "Yet another markup language"

- High level formatting such as font size, figure size, title, subtitles, etc.

- Specify outputs:
  ```
  output: pdf_document
  output: word_document
  output: rtf_document
  output: md_document
  ```



```
1-example.Rmd

1   ---
2   title: "Viridis Demo"
3   output: html_document
4   ---
5
6   ```{r include = FALSE}
7   library(viridis)
8   ```
9
10  The code below demonstrates two color palettes in the
    [viridis](https://github.com/sjmgarnier/viridis) package. Each
    plot displays a contour map of the Maunga Whau volcano in
    Auckland, New Zealand.
11
12  ## Viridis colors
13
14  ```{r}
15  image(volcano, col = viridis(200))
16  ```
17
18  ## Magma colors
19
20  ```{r}
21  image(volcano, col = viridis(200, option = "A"))
22  ```
23

1:1   Viridis Demo                                    R Markdown

Console
```
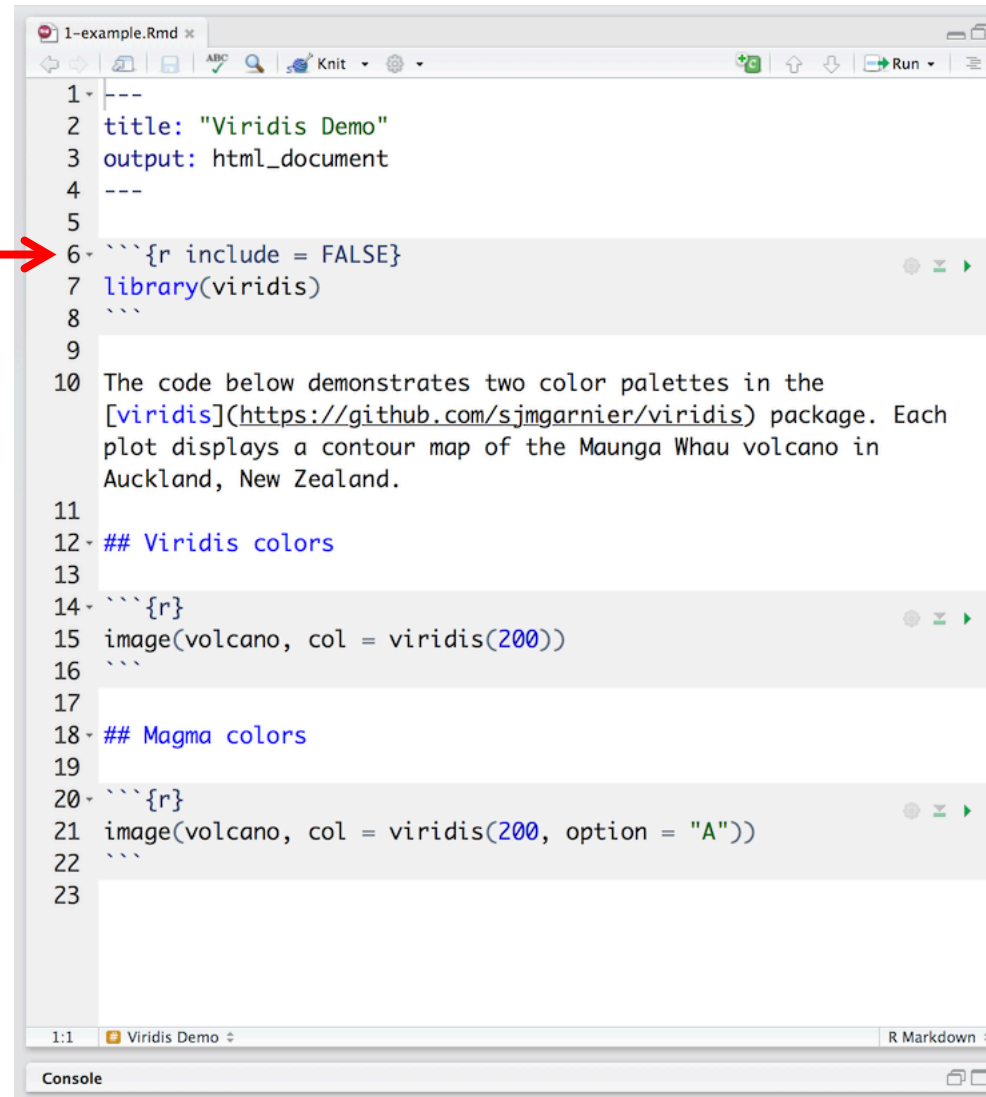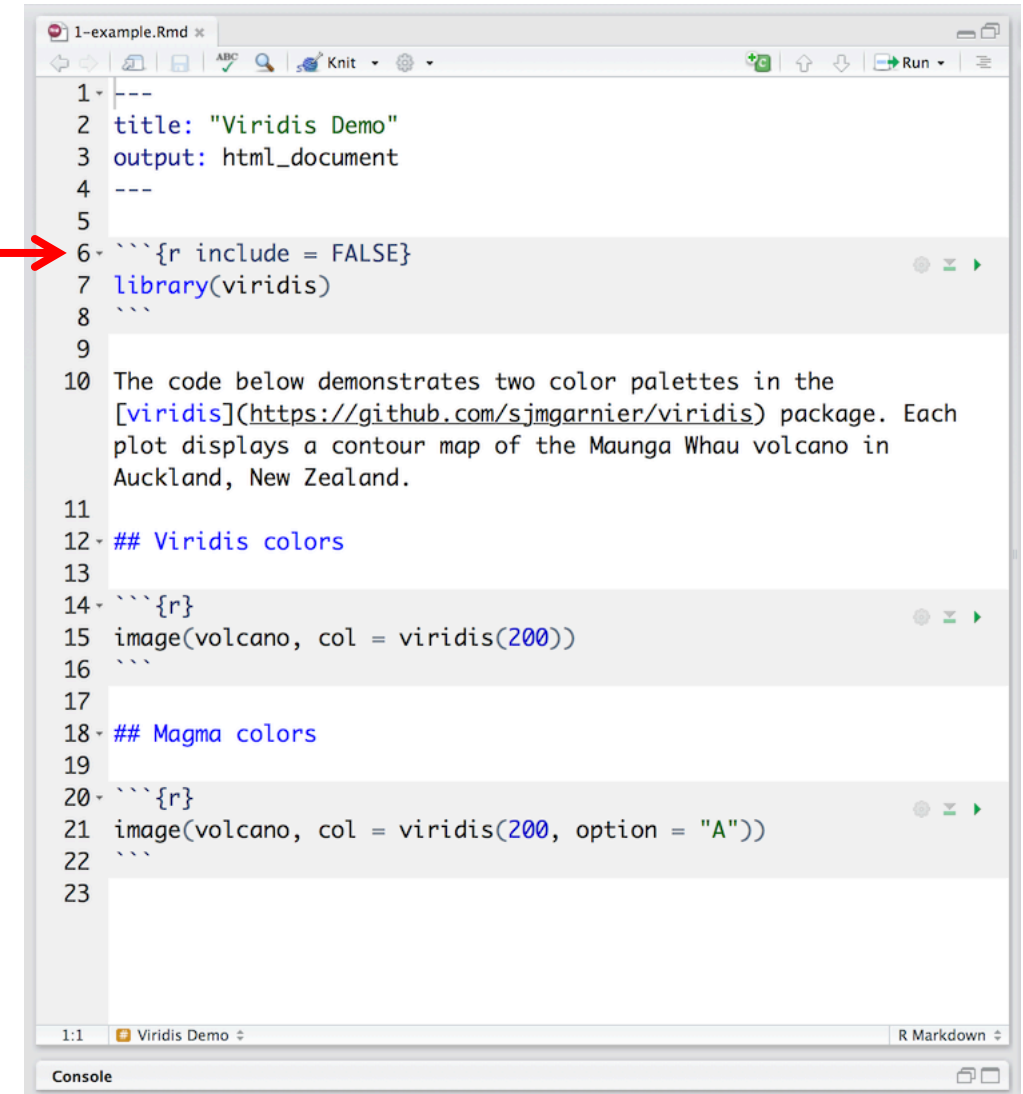
Anatomy of a R markdown document

Code chunk parameters ➡️

OPTION	DEFAULT	EFFECTS
echo	TRUE	display code in output document
error	FALSE	TRUE (display error messages in doc) FALSE (stop render when error occurs)
eval	TRUE	run code in chunk
include	TRUE	include chunk in doc after running
message	TRUE	display code messages in document
warning	TRUE	display code warnings in document
results	"markup"	"asis" (passthrough results) "hide" (don't display results) "hold" (put all results below all code)
fig.align	"default"	"left", "right", or "center"
fig.alt	NULL	alt text for a figure
fig.cap	NULL	figure caption as a character string
fig.path	"figure/"	prefix for generating figure file paths
fig.width & fig.height	7	plot dimensions in inches
out.width		rescales output width, e.g. "75%", "300px"
collapse	FALSE	collapse all sources & output into a single block
comment	"##"	prefix for each line of results
child	NULL	files(s) to knit and then include
purl	TRUE	include or exclude a code chunk when extracting source code with knitr::purl()

See more options and defaults by running **str(knitr::opts_chunk$get())**

```
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22 ```
23
```

Console

Viridis Demo

R Markdown

Anatomy of a R markdown document

Code chunk parameters ⟶

Global parameter specification

```
```{r setup, include = FALSE}
opts_chunk$set(echo = FALSE, message = FALSE)
```
```

Anatomy of a R markdown document

Table formatting

`library(kableExtra)`

Code chunks →

Anatomy of a R markdown document

italics

bold

`code`

[links](rmarkdown.rstudio.com)

~~strikethrough~~

Superscript: ^2^

Subscript: ~2~
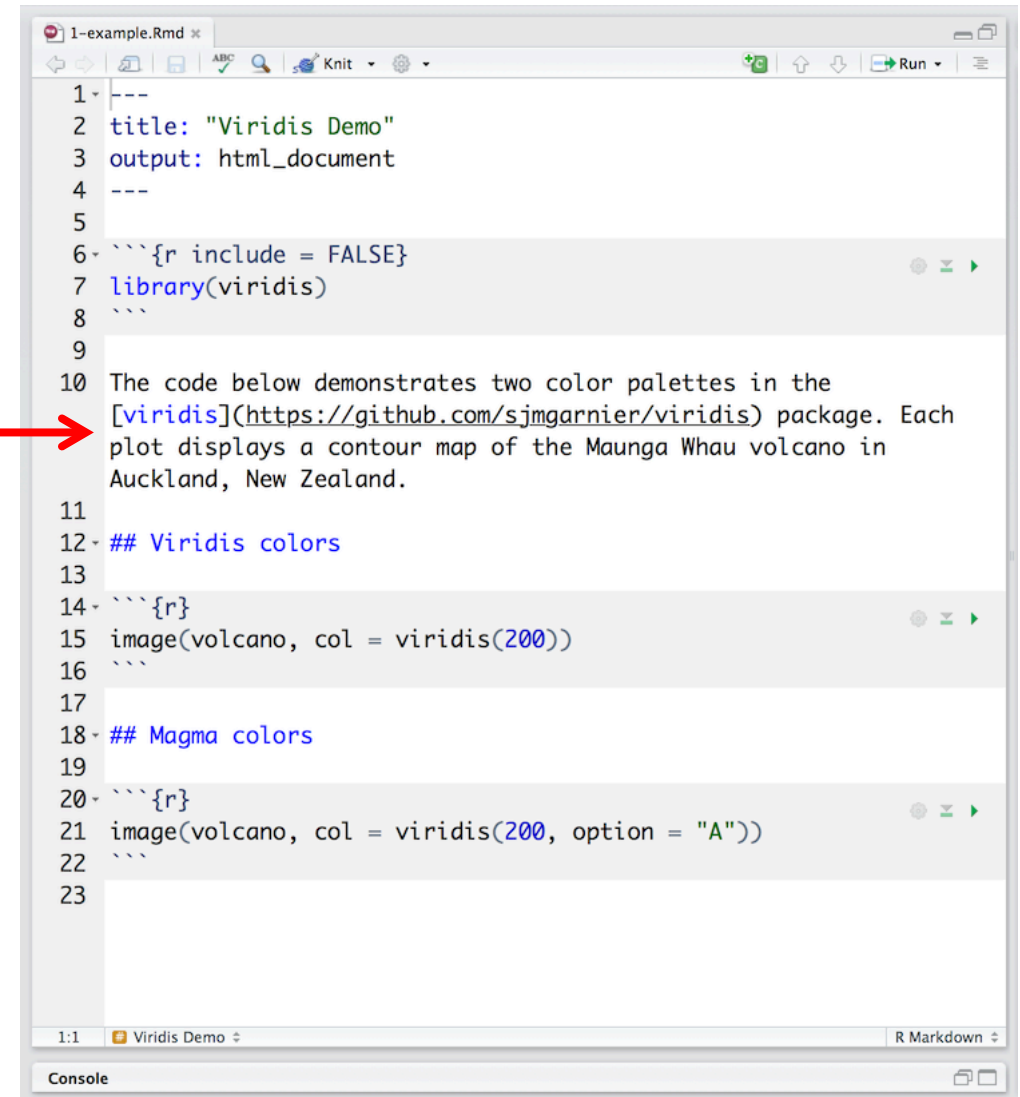
Bulleted lists: (*, +, <tab><tab>-)

Quotations: >

Greek letters: Δ or δ

Plain text narrative →

Homework reminders

Currently planning on some time in class on Wednesdays to work on homework assignments but that may change.

Use your resources (internet, colleagues, instructor, help files), but cite them.

- Either list who you worked with for specific questions or credit them in a comment near the top of the document.
- Do not turn in identical assignments.
- You won't necessarily receive all answers during instruction.
- Turn in via email (jhomola@uwsp.edu). Send both the .rmd and .html knitted version.

Strive for efficient coding. If a problem can be solved using substantially less code, you will not receive full credit.