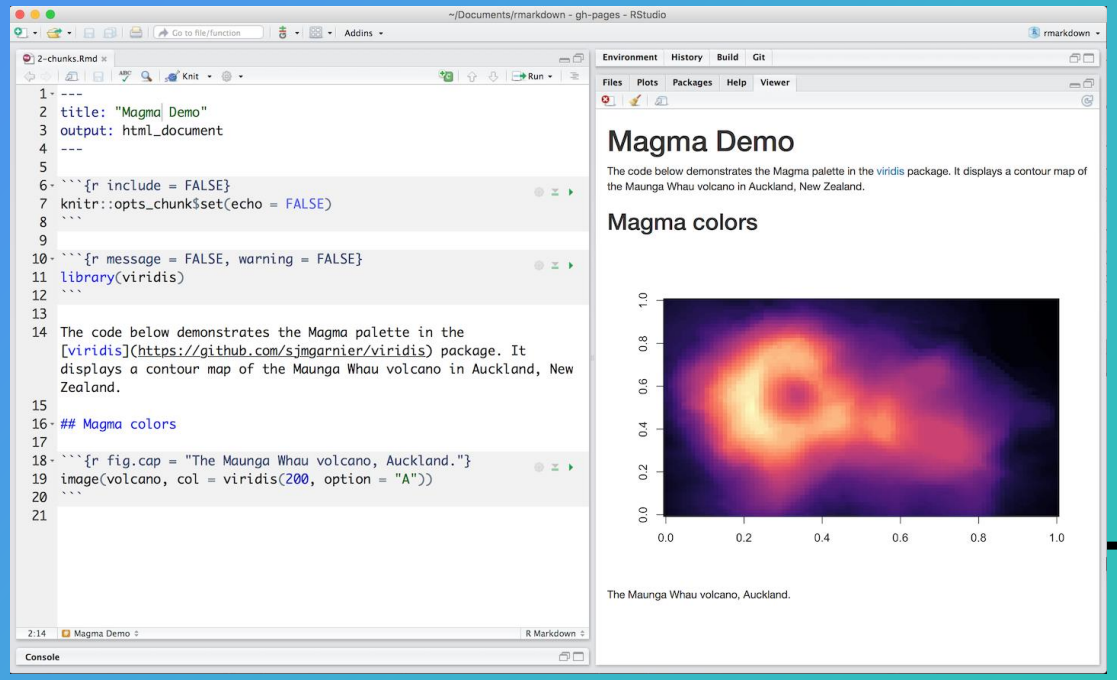
INTERACTIVE LESSONS WITH LEARNR & SHINY

Quick start guide



R Markdown

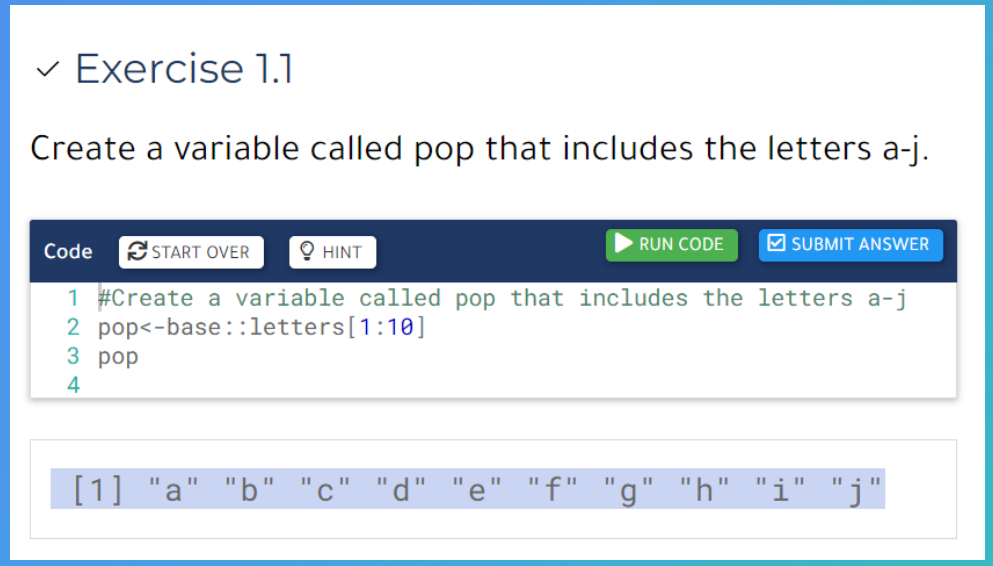
LearnR is based on R Markdown

Combines text, formatting and R code

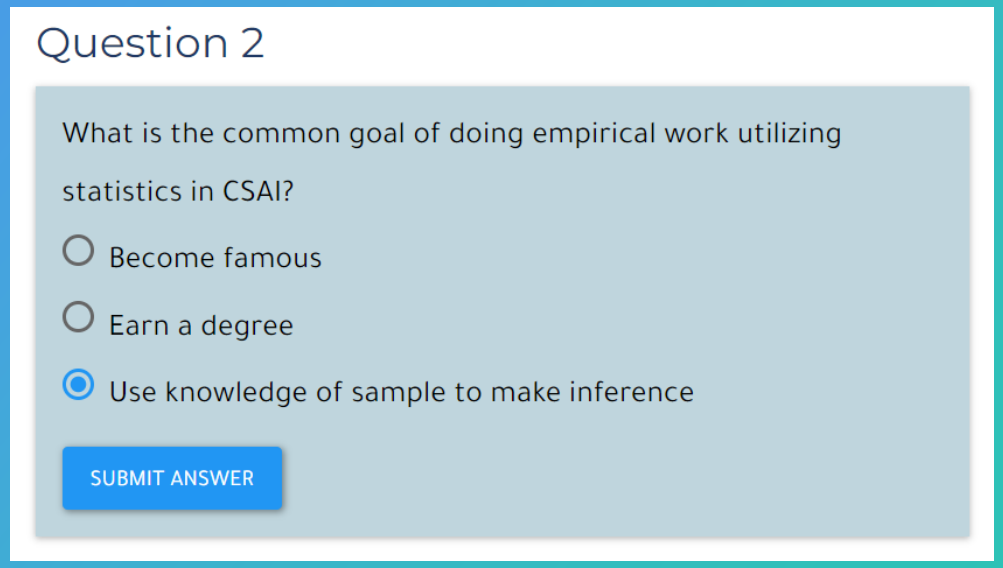
Many options for output: latex documents, presentations or websites

An introduction: https://rmarkdown.rstudio.com/lesson-1.html

a



b



LearnR

Used to create interactive tutorials

Includes: runnable and submittable exercise chunks for R (a), interactive quiz chunks (b)

How you can use it:
https://education.rstudio.com/blog/2020/05/learnr-for-remote/

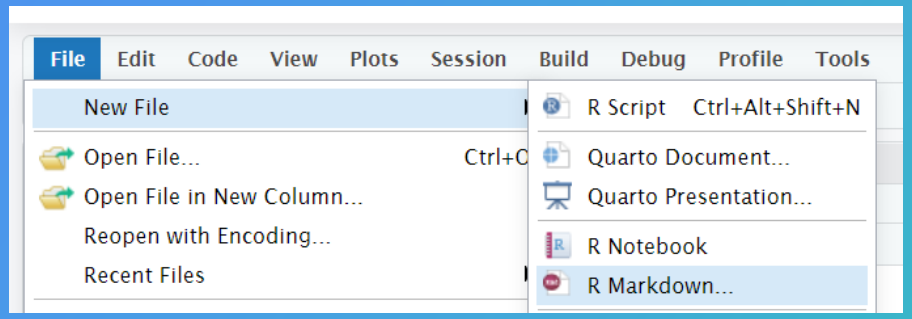
Documentation:

https://rstudio.github.io/learnr/articles/learnr.html

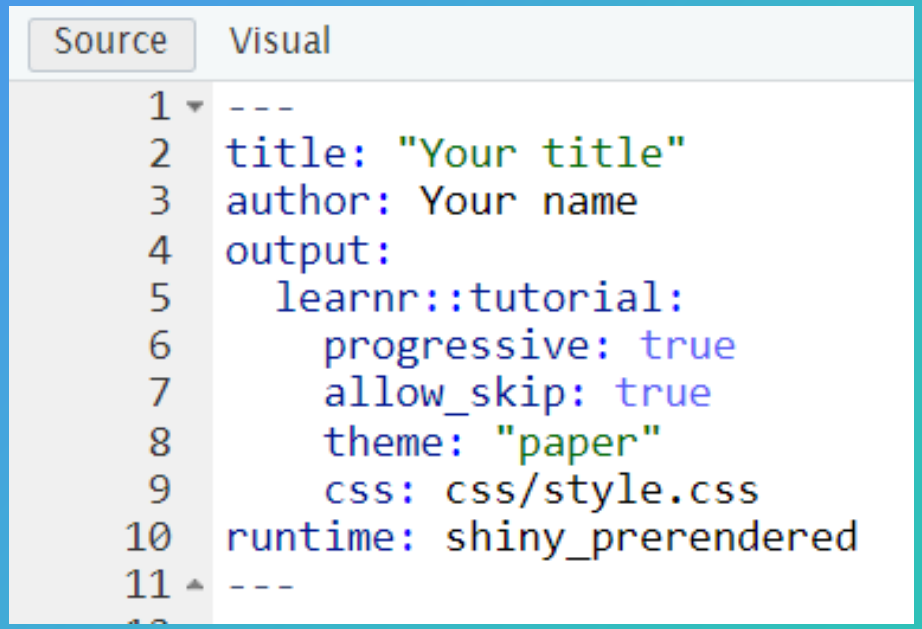
RStudio Cloud

RStudio

1



2



Creating a document

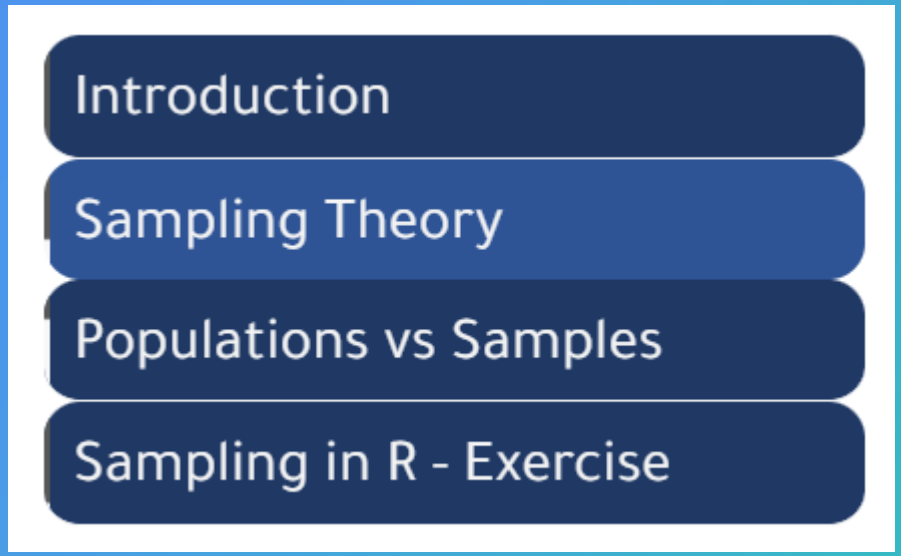
1. Create an R Markdown document using Rstudio or Rstudio Cloud

2. Create a header in the beginning of your document between --- tags

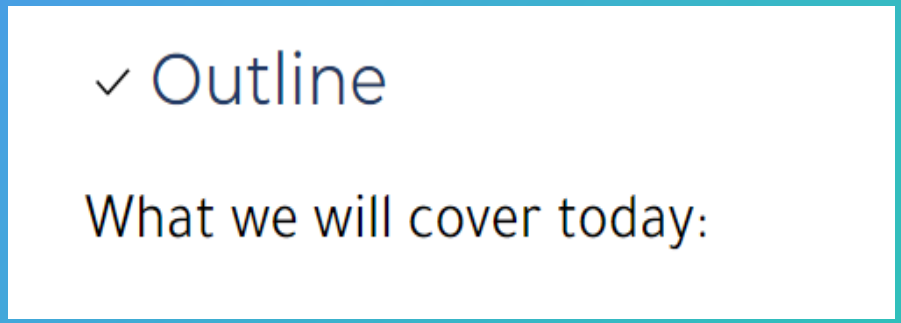
Progressive: true means that content is displayed in chunks when you press continue instead of all at once

Allow_skip allows students to skip exercises/chunks if set to true

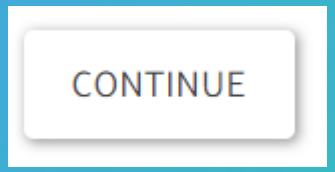
a



b



c



Document structure

Creates linked sections in the sidebar (a)

Creates sub-sections that don't go in the sidebar (b)

Both section types can be set to load only when "continue" is pressed (c)

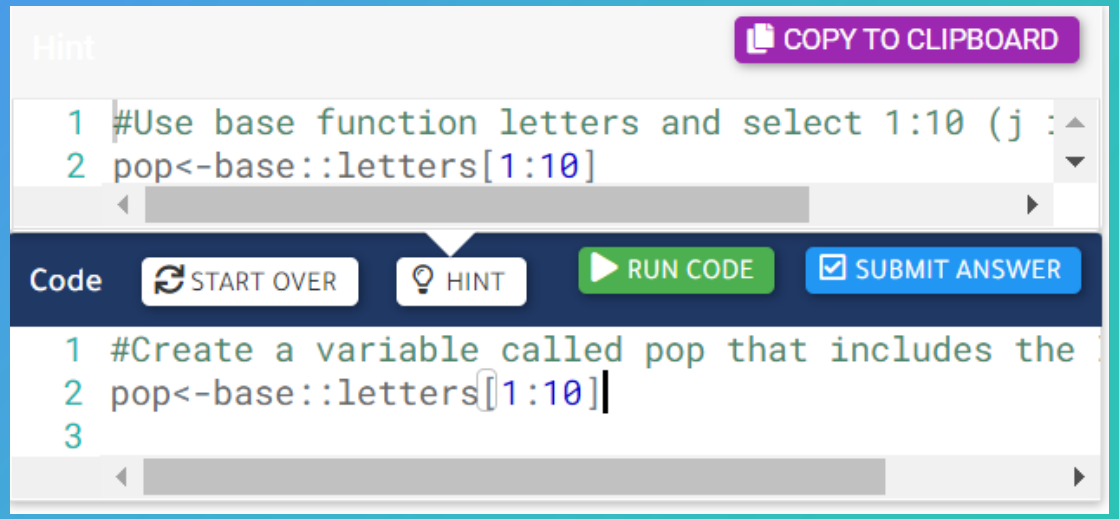
(See progressive: true on the last slide)

a

```
### Exercise 1.2

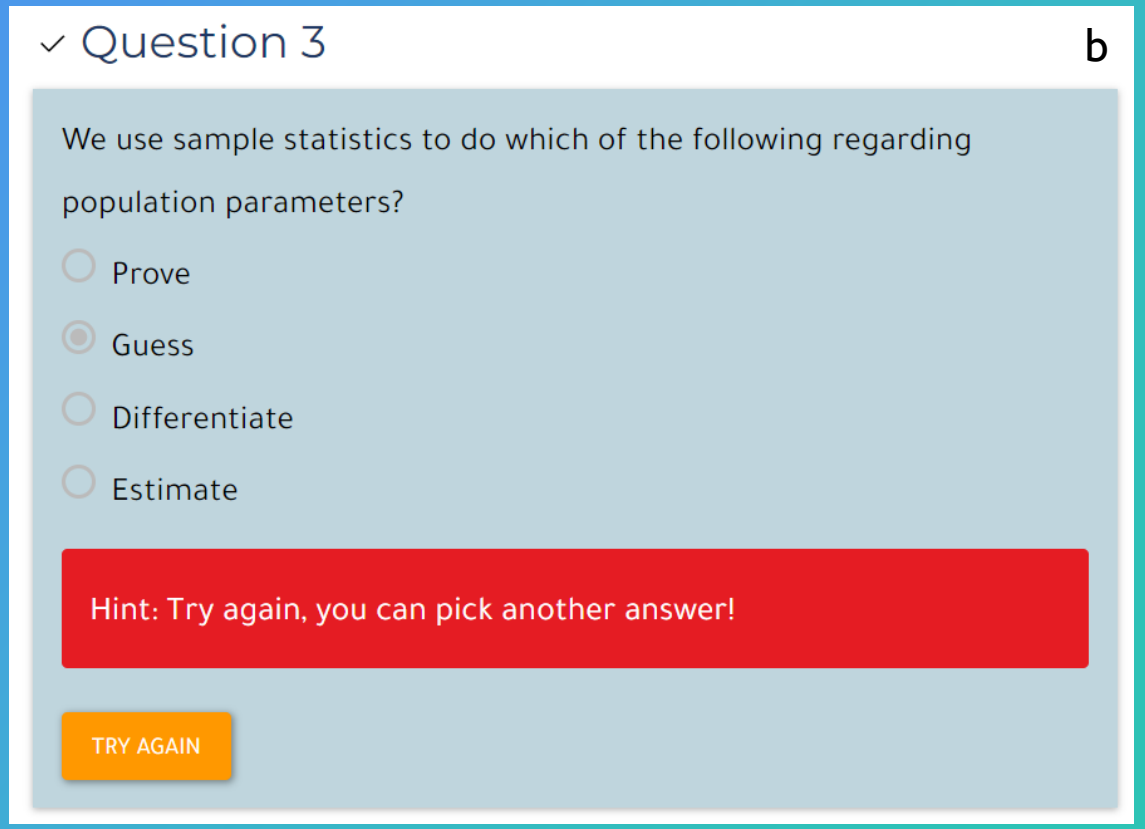
Create a variable called samp1 by sampling the population using the sample() function

You can do this by using sample() function included in R. When you're done, type samp1
to see the results.

```{r ex2, exercise=TRUE}
#Create a variable called samp1 by sampling the population using the sample() function


```
```{r ex2-hint}
#Use function sample(), to find out more you can type ?sample and run code to get help
samp1<-sample(pop,size=4,replace=FALSE)
```
```{r ex2-check}
#store
```
```

b



Creating an exercise

Exercises go between ```{r label, exercise=TRUE} ``` tags, where label is a unique label for your exercise (a)

Optionally, hints can be added that either give the entire solution or suggestions when prompted. (a,b)

The solution can also be checked (r ex2-check) automatically, but it requires you to provide accepted solutions. (a)

Note that variables are not saved between code chunks, so ideally the exercises should be self-encompassing

a

```
### Question 3

```{r Quiz3,  echo=FALSE}
 question("We use sample statistics to do which of the following
regarding population parameters? ",
    answer("Prove"),
    answer("Guess"),
    answer("Differentiate"),
    answer("Estimate", correct = TRUE),
    incorrect = "Hint: Try again, you can pick another answer!",
    allow_retry = TRUE
    )
```
```

b



Creating a quiz

Quizzes go between ```{r label} ```

tags, where label is a unique label for your quiz (a)

The basic structure is:

Question("Your question"

answer("A")

answer("B", correct = TRUE)

The "incorrect" parameter allows you to pick what the students see when they get the wrong answer (b)

"Allow_retry" determines whether students can submit another attempt if they choose the wrong answer (a)

```r
```{r, Quiz3R, echo = FALSE, warning = FALSE, message=FALSE, out.width="100%", fig.align = "center"}

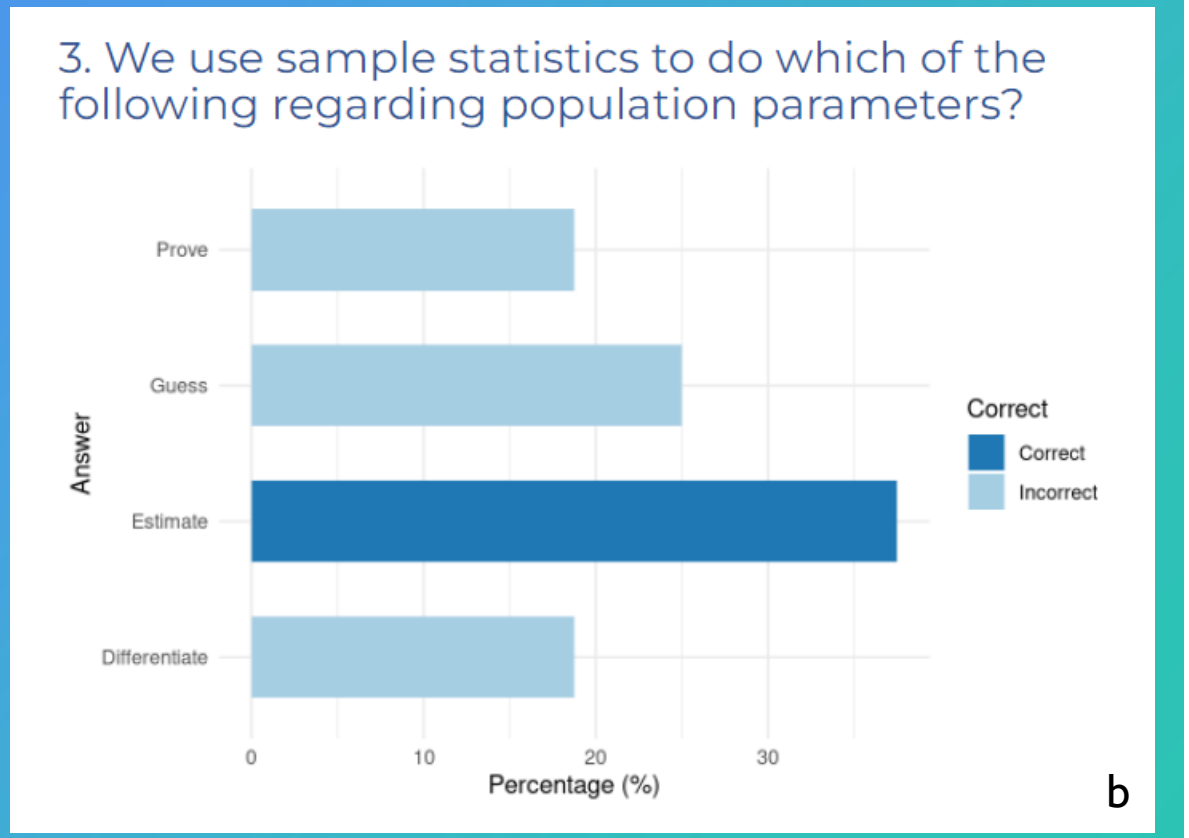
quizdata <- read_sheet(g_sheet)
quizdata <- data.frame(quizdata)

answers <- subset(quizdata, quizdata$label == "Quiz3",)
answers[answers=="<NA>"] <- NA
answers <- na.omit(answers)

answers_count <- as.data.frame(answers %>%
  count(answer))
total_n = nrow(answers)
answers_count$percentage <- (answers_count$n/total_n)*100
answers_count$correct <- ifelse(answers_count$answer == "Estimate", "Correct", "Incorrect")

ggplot(answers_count,
       aes(x = percentage,
           y = answer,
           fill=correct
           )
       ) +
  geom_col(width=0.6) +theme_minimal() + scale_fill_brewer(palette="Paired", direction=-1)  +
  xlab("Percentage (%)") + ylab("Answer") + labs(fill = "Correct")
```
```

a



b

Visualizing the results

If you connect the file students use to a database, you can collect and visualize their progress and quiz results

quizdata is the variable where the data from your database goes (Google Sheets also works for this at a small scale, MySQL is recommended at a larger scale) (a)

Change quizdata$label to the label of the quiz you are getting results for and the first variable in answers_count$answer to the correct answer (a)

This way, you can see what students answered in real time (b)

Publishing options

RStudio Cloud

https://rstudio.cloud/plans/compare

Requires student accounts (free for up to 25 hours per month)

Reduced cost instructor version available for more hours

Shiny.io

https://www.shinyapps.io/

Free for up to 5 applications and 25 active hours per month

RStudio Server

https://www.rstudio.com/products/workbenchhttps://www.rstudio.com/products/workbench/comparison/h/comparison/

Has open source and paid options

Open source requires a Linux server

RStudio / R

R Markdown

LeanrR

Shiny

Resources

https://www.rstudio.com/resources/cheatsheets/

https://www.rdocumentation.org/

https://education.rstudio.com/teach/tools/

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https://rmarkdown.rstudio.com/lesson-15.HTML

https://rmarkdown.rstudio.com/docs/

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

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https://rstudio.github.io/learnr/

https://rstudio.github.io/learnr/articles/learnr.html

https://education.rstudio.com/blog/2020/05/learnr-for-remote/

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https://www.shinyapps.io/

https://docs.rstudio.com/shinyapps.io/

https://shiny.rstudio.com/images/shiny-cheatsheet.pdf