MTH142 Intro to Stats:: CHEAT SHEET

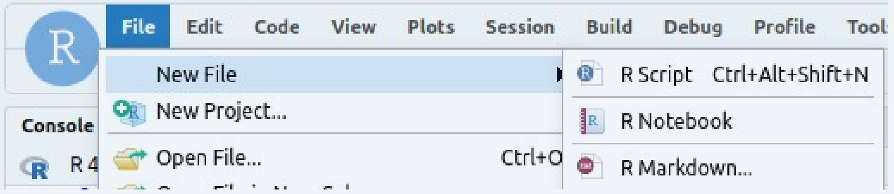
Getting started

Signing into RStudio

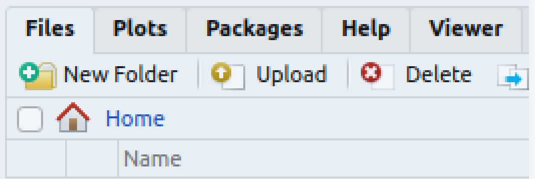
https://rstudio.hcc.edu/

Username: Your HCC email with @hcc.edu
Password: Your HCC password

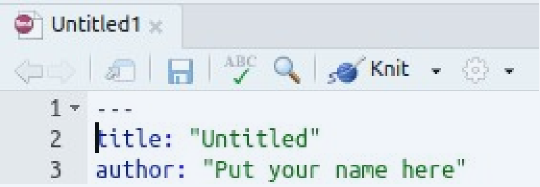
.Rmd files



Uploading a file Lower Right quadrant click upload

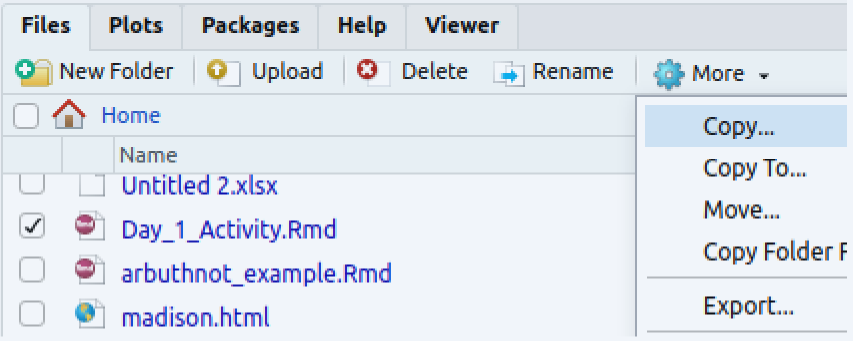


Knitting a file click the knit button and save.



```
---
title: "Untitled"
author: "Put your name here"
```

Exporting a file select file in lower right quadrant click **more** then **Export...**



Screen Shots

Mac: Shift + Command + 3

Windows: ⊞ Shift + S

Chromebook: Shift + Ctrl + ▭‖

Summary Statistics

fivenum(cars93$price)
Just the five number summary
summary(cars93)
summarizes all the variables
count(cars93,type)
counts the observations by type
count(cars93,type,drivetrain)
counts the observations by type and drive train
mean(cars93$weight, na.rm = TRUE)
calculates the mean of the weights
and removes missing values.
sd(cars93$weight)
calculates the standard deviation

Confidence Intervals

For a mean from a vector of data
t.test(cars93$weight)
produces a 95% confidence interval for the mean weights of cars sold in 1993.

For a proportion from Statistics
prop.test(x = 20, n = 60, conf.level=0.90,correct=FALSE)
produces a 90% confidence interval for the population proportion given 20 successes in 60 trials.

For mean use formula below
For the confidence interval of the mean from statistics we use the following formula: $\bar{x} \pm t^* SE$

Libraries

library(openintro)
library(tidyverse)
library(broom)

To get more info on a dataset, load a library then use ?
library(openintro)
?cars93

Variables

a_variable = c(1,2,3)
takes the vector 1,2,3 and saves it as a variable with the assignment operator

Math Type

Use **$$** to enclose math type.

μ	σ
$\bar{x}$	$\hat{p}$
H_o	α
$\ne$	$\approx.$
$\sim$	

View Data Sets

cars93 is the data set
glimpse(data = cars93)
head(cars93)
First six rows **(**tail() works too)
view(cars93)
makes window for all data
names(cars93)
show variable names only

Graphs

box plots
```
ggplot(data = cars93,
       mapping = aes(x = weight, fill = type)) +
  geom_boxplot()
```

histograms
```
ggplot( cars93, aes(x = weight)) +
  geom_histogram()
```

bar
```
ggplot(cars93) +
  geom_bar(aes(x=type, fill= drivetrain))
```

scatter plots
```
ggplot(data=cars93, aes(x = weight, y = mpg_city)) +
  geom_point()+
  geom_smooth(method = "lm", se=FALSE)
```

titles and labs
```
ggplot(cars93) +
  geom_bar(aes(x=type, fill= drivetrain))+
  labs( title = “title”,
        x = “x axis label”)
```

List of Standard Error formulas

$$SE = \sqrt{\frac{p(1-p)}{n}}$$
SE for a single proportion

$$SE = \frac{\sigma}{\sqrt{n}} \approx \frac{s}{\sqrt{n}}$$
SE for a single mean or paired means.

$$SE = \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$$
SE for two means (not paired)

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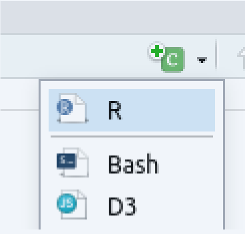
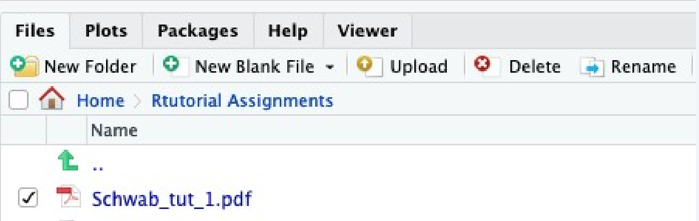
R Markdown cont.

New chunk click the green c+ and select r



Rename a file
Click the box next to the file and chose rename.



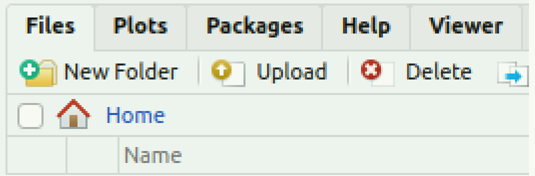
Uploading Data

1. Copy and paste data into a spreadsheet.

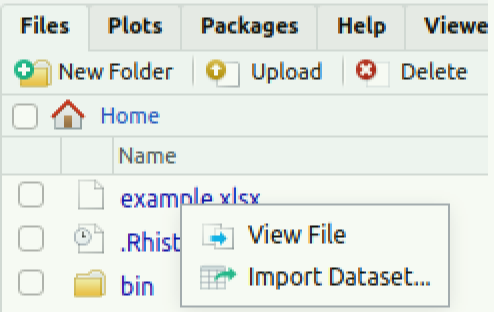
2. Variables are column headers (no spaces in variable name)

3. Save as an .xls file to your computer (no spaces in file names)

4. Upload .xls file



5. Click on the file you uploaded > Import Dataset



normal distribution

Pnorm(q= 1, mean=0 ,sd=1)
Outputs the probability if z=1 from a standard normal dist.

qnorm(p = 0.01,mean=0, sd=1)
Outputs the z-score if probability=0.01

$$z^* = \frac{\hat{p} - p}{(SE)}$$

student t distribution

pt(1,df=11, lower.tail = FALSE)
outputs the p-value if t = 1 and 11 degrees of freedom on the upper tail of the distribution

qt(0.01,df=11)
outputs the t-score if probability = 0.01

$$t^* = \frac{\bar{x} - \mu}{SE}$$

simulation

```
library(infer)

# 1. Make a vector to mimic data

more_than_1_relationship <- c(
  rep(TRUE, 152),
  rep(FALSE, 51)
)
# 2. change the vector to a data frame

more_than_1_relationship <- as.data.frame(more_than_1_relationship)

# 3 run infer chain

set.seed(2024)

null_distn_one_prop <- more_than_1_relationship  |>
specify(response = more_than_1_relationship, success = "TRUE") |>
hypothesize(null = "point", p = 0.5) |>
generate(reps = 10000, type = "draw") |>
calculate(stat = "prop")

# 4 Take a look at the distribution

visualise(data = null_distn_one_prop)

get_p_value(x = null_distn_one_prop,
            obs_stat = 0.749,
            direction = 'greater')
```

Hypothesis Tests

Proportions
prop.test(x=20, n=60, p=0.5, correct=FALSE)
Outputs the results of hypothesis test with 20 successes in 60 trials

Single Mean
t.test(cars93$weight, mu=2000, alternative="g"**)**
Outputs of a right tailed hypothesis test with parameter mu=2000.

Difference of Means
t.test(time_hrs~division,data=nyc_marathon, alternative="t")
Computes the difference of men and women winning times in NYC marathon

ANOVA
cars_anova<-aov(weight~type,data=cars93)
performs the analysis of variance and saves it as a variable "cars_anova"
anova(cars_anova)
outputs the summary of the analysis

Linear Regression
cars_linear<-lm(price~weight,data=cars93)
performs the linear regression and saves it as a variable "cars_linear"
summary(cars_linear)
outputs the linear summary of the regression

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