



# Intro to R

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*Cushing/Whitney Medical Library*

# What is R?

R is a language and environment for data manipulation, calculation and graphical display

Includes:

- \* Data handling and storage
- \* Suite of operators
- \* Tools for data analysis
- \* Conditionals, loops, user-defined functions, input and output facilities

# R vs Python

R

Python

Purpose

Focuses on user friendly data analysis, statistics and graphical models

Emphasizes productivity and code readability

User base

R has been used primarily in academics in research.

\* Data scientists \* Statisticians

Python is used by programmers that turn to data science.

\* Developers \* Programmers

Specialty

\* Statistical tests and models are easy in R

\* Flexible for creating new tools

# R vs RStudio

## **R: The programming language**

- \* Open source programming language
- \* You do not need to use Rstudio to run R

[www.r-project.org](http://www.r-project.org)



## **Rstudio: The graphical user interface**

- \* Integrated development environment (IDE)
- \* Privately run company
- \* You do need R to use Rstudio

[www.rstudio.com](http://www.rstudio.com)



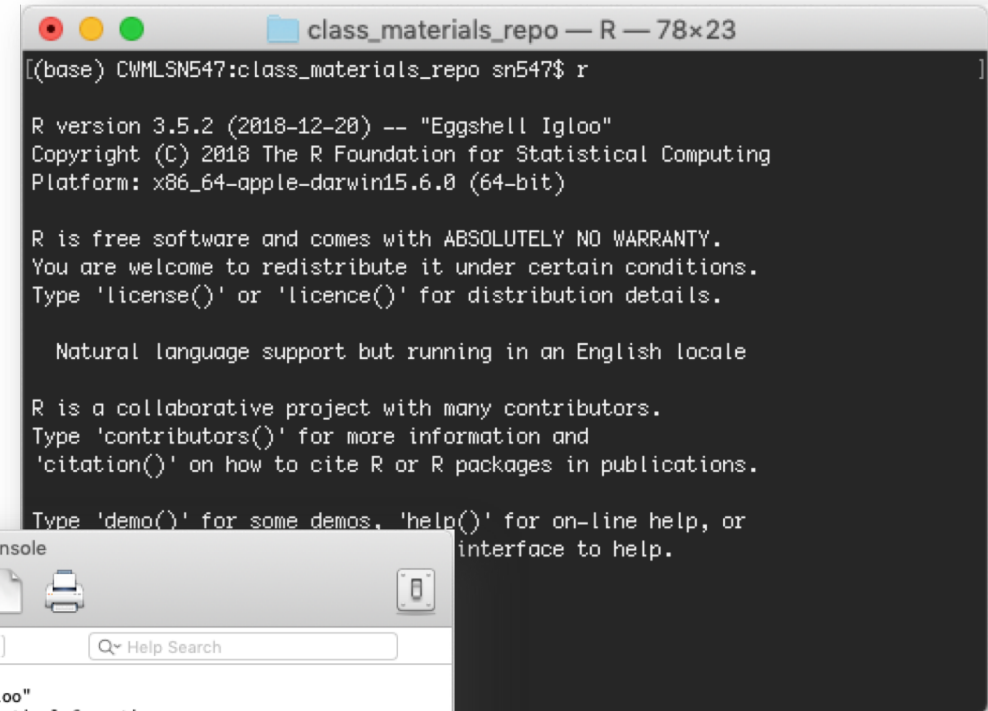
# Where can you run R?

## GUI

- \* Rstudio

## CUI

- \* Command prompt (Windows)
- \* Terminal (Mac & Linux)
- \* R Console



```
class_materials_repo — R — 78x23
[(base) CWMLSN547:class_materials_repo sn547$ r

R version 3.5.2 (2018-12-20) -- "Eggshell Igloo"
Copyright (C) 2018 The R Foundation for Statistical Computing
Platform: x86_64-apple-darwin15.6.0 (64-bit)

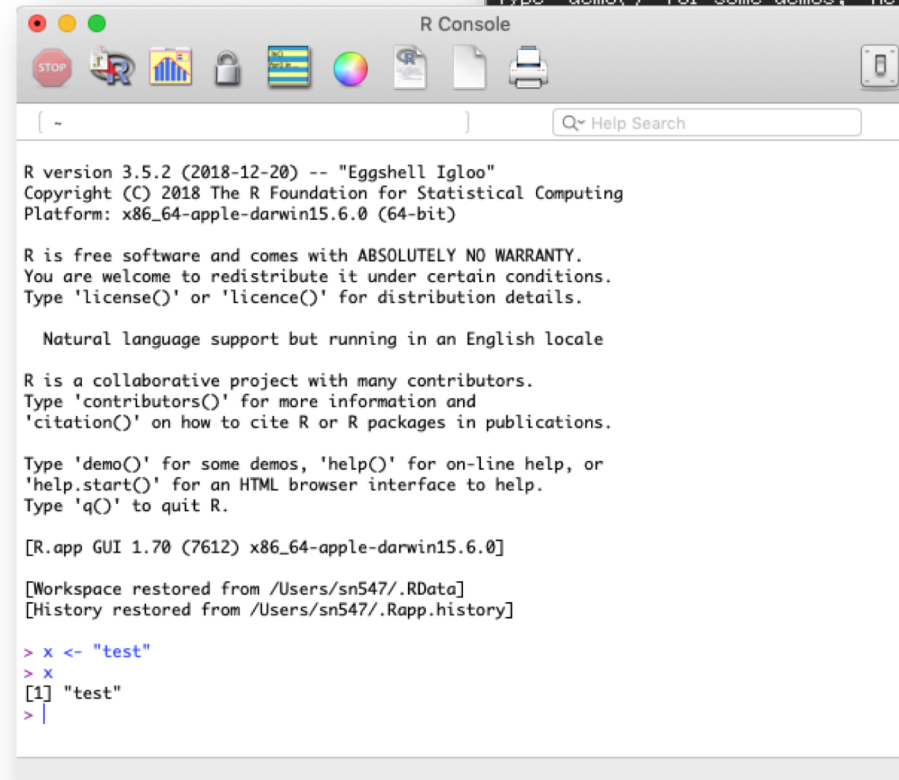
R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.interface()' for an HTML browser interface to help.
```

^Terminal window



```
R Console

[ - ] Q- Help Search

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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

[R.app GUI 1.70 (7612) x86_64-apple-darwin15.6.0]

[Workspace restored from /Users/sn547/.RData]
[History restored from /Users/sn547/.Rapp.history]

> x <- "test"
> x
[1] "test"
> |
```

^R console

# R Packages

## Search through all R packages

- \* <https://www.r-pkg.org/>

## Packages of note

- \* bioconductor (and biomaRt)
- \* Seurat for scRNA analysis  
([https://satijalab.org/seurat/v3.1/pbm3k\\_tutorial.html](https://satijalab.org/seurat/v3.1/pbm3k_tutorial.html))
- \* tidyverse (dplyr, tidyr, stringr, lubridate, ggplot2)
- \* readxl
- \* haven

# R Syntax

```
> myString <- "Hello, World!"  
> print(myString)  
[1] "Hello, World!"
```

```
> install.packages("package_name")  
> library(package_name)
```

Note: R is case sensitive

# Continue learning after this class

## Recommended tutorials

- [Analyzing Patient Data](#)
- [Genomics Data Analysis and Visualization](#)
- [Introduction to R and Bioconductor](#)

## Texts

- [A Little Book for Biomedical Statistics \(2016\)](#)
- [PH525x series – Biomedical Data Science](#)



# Finding help with R

## Cushing/Whitney Medical Library

- \* StatLab consultations
- \* Data Librarian consultations

## Within R

- \* `?function_name`
- \* `help(function_name)`

## On the web

- \* [R Project Manuals and FAQs](#)
- \* [Stack Overflow | Use the R tag](#)
- \* [Rseek | R search engine](#)
- \* [R-bloggers | R news and tutorials](#)
- \* [Rstudio cheat sheet printouts](#)

# Demo topics

1. Mathematic operators (larger list [here](#))
2. Comparison operators
3. Vectors
4. Reading in files
5. Dataframes