R Introduction

STAT 432, Spring 2018, Dalpiaz

Friday, January 19

Administration

Questions? Comments? Concerns?

Note that Homework 00 is “due” next Friday.

What the heck *is* R?

- R is a programming language designed specifically for statistical computing and graphics.
- R is an interactive interface to many different tools.
- R is based on the S language, which was developed by Bell laboratories.
- R is free, specifically open source.
    - "Think free as in free speech, not free beer."
    - R and RStudio are actually both.
- R is cool.

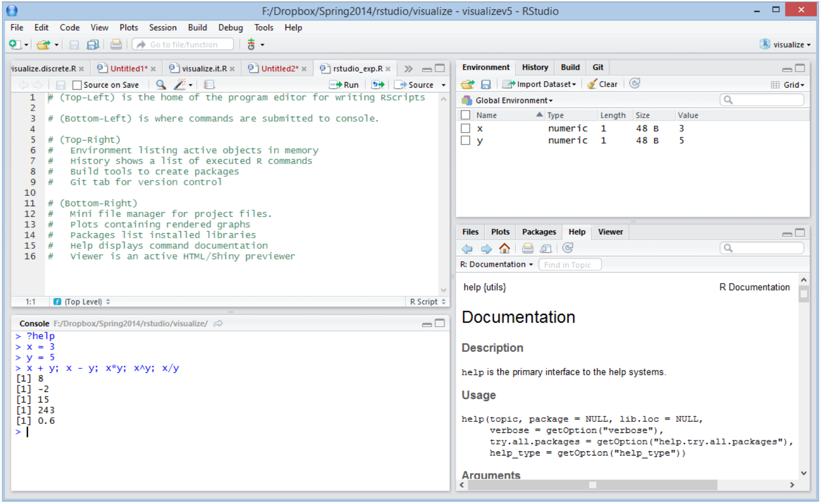
Learning is HARD!

Help?

The only way to learn `R` (or anything), is to fail. Then, get help.

- `?name_of_thing`
- Google!!!
- Stack Overflow
- `R` Resources
- Ask!

RStudio



```
# (Top-Left) is the home of the program editor for writing RScripts

# (Bottom-Left) is where commands are submitted to console.

# (Top-Right)
#   Environment listing active objects in memory
#   History shows a list of executed R commands
#   Build tools to create packages
#   Git tab for version control

# (Bottom-Right)
#   Mini file manager for project files.
#   Plots containing rendered graphs
#   Packages list installed libraries
#   Help displays command documentation
#   Viewer is an active HTML/Shiny previewer
```

```
> ?help
> x = 3
> y = 5
> x + y; x - y; x*y; x^y; x/y
[1] 8
[1] -2
[1] 15
[1] 243
[1] 0.6
>
```

	Name	Type	Length	Size	Value
□	x	numeric	1	48 B	3
□	y	numeric	1	48 B	5

help {utils} R Documentation

Documentation

Description

`help` is the primary interface to the help systems.

Usage

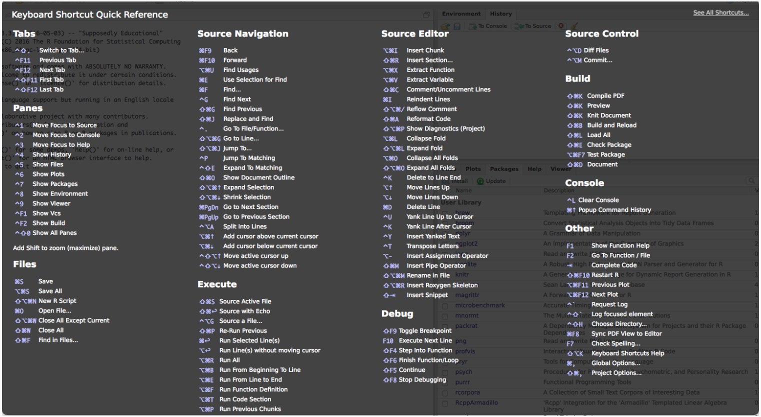
```
help(topic, package = NULL, lib.loc = NULL,
     verbose = getOption("verbose"),
     try.all.packages = getOption("help.try.all.packages"),
     help_type = getOption("help_type"))
```

Arguments

Know Your RStudio Environment

There are a *lot* of keyboard shortcuts in RStudio. To view all the options, you must engage the keyboard shortcut that rules them all:

- Windows: `Alt` + `Shift` + `K`
- macOS: `Option` + `Shift` + `K`



Keyboard Shortcut Quick Reference

See All Shortcuts...

Tabs

^⇧.	Switch to Tab...
^F11	Previous Tab
^F12	Next Tab
^⇧F11	First Tab
^⇧F12	Last Tab

Panes

^1	Move Focus to Source
^2	Move Focus to Console
^3	Move Focus to Help
^4	Show History
^5	Show Files
^6	Show Plots
^7	Show Packages
^8	Show Environment
^9	Show Viewer
^F1	Show Vcs
^F2	Show Build
^⇧0	Show All Panes

Add Shift to zoom (maximize) pane.

Files

⌘S	Save
⌥⌘S	Save All
⇧⌥⌘N	New R Script
⌘O	Open File...
⇧⌥⌘W	Close All Except Current
⇧⌘W	Close All
⇧⌘F	Find in Files...

Source Navigation

⌘F9	Back
⌘F10	Forward
⌥⌘U	Find Usages
⌘E	Use Selection for Find
⌘F	Find...
^G	Find Next
⇧⌘G	Find Previous
⇧⌘J	Replace and Find
^.	Go To File/Function...
⇧⌥⌘G	Go to Line...
⇧⌥⌘J	Jump To...
^P	Jump To Matching
^⇧E	Expand To Matching
⇧⌘O	Show Document Outline
⇧⌥⌘↑	Expand Selection
⇧⌥⌘↓	Shrink Selection
⌘PgDn	Go to Next Section
⌘PgUp	Go to Previous Section
^⌥A	Split Into Lines
⌥⌘↑	Add cursor above current cursor
⌥⌘↓	Add cursor below current cursor
^⇧⌥↑	Move active cursor up
^⇧⌥↓	Move active cursor down

Execute

⇧⌘S	Source Active File
⇧⌘↩	Source with Echo
^⌥G	Source a File...
⇧⌘P	Re-Run Previous
⌘↩	Run Selected Line(s)
⌥↩	Run Line(s) without moving cursor
⌥⌘R	Run All
⌥⌘B	Run From Beginning To Line
⌥⌘E	Run From Line to End
⌥⌘F	Run Function Definition
⌥⌘T	Run Code Section
⌥⌘P	Run Previous Chunks

Source Editor

⌥⌘I	Insert Chunk
⇧⌘R	Insert Section...
⌥⌘X	Extract Function
⌥⌘V	Extract Variable
⇧⌘C	Comment/Uncomment Lines
⌘I	Reindent Lines
⇧⌥⌘/	Reflow Comment
⇧⌘A	Reformat Code
⇧⌥⌘P	Show Diagnostics (Project)
⌥⌘L	Collapse Fold
⇧⌥⌘L	Expand Fold
⌥⌘O	Collapse All Folds
⇧⌥⌘O	Expand All Folds
^K	Delete to Line End
⌥↑	Move Lines Up
⌥↓	Move Lines Down
⌘D	Delete Line
^U	Yank Line Up to Cursor
^K	Yank Line After Cursor
^Y	Insert Yanked Text
^T	Transpose Letters
⌥-	Insert Assignment Operator
⇧⌘M	Insert Pipe Operator
⇧⌥⌘M	Rename in File
⇧⌥⌘R	Insert Roxygen Skeleton
⇧⇥	Insert Snippet

Debug

⇧F9	Toggle Breakpoint
F10	Execute Next Line
⇧F4	Step Into Function
⇧F6	Finish Function/Loop
⇧F5	Continue
⇧F8	Stop Debugging

Source Control

^⌥D	Diff Files
^⌥M	Commit...

Build

⇧⌘K	Compile PDF
⇧⌘K	Preview
⇧⌘K	Knit Document
⇧⌘B	Build and Reload
⇧⌘L	Load All
⇧⌘E	Check Package
⌥⌘F7	Test Package
⇧⌘D	Document

Console

^L	Clear Console
⌘↑	Popup Command History

Other

F1	Show Function Help
F2	Go To Function / File
⇥	Complete Code
⇧⌘F10	Restart R
⌥⌘F11	Previous Plot
⌥⌘F12	Next Plot
^`	Request Log
^⇧`	Log focused element
^⇧H	Choose Directory...
⌘F8	Sync PDF View to Editor
F7	Check Spelling...
⇧⌥K	Keyboard Shortcuts Help
⌘,	Global Options...
⇧⌘,	Project Options...

Some Favorites

1. Autocomplete command.
   - Both: `Tab`
2. Run the current line or selection from the editor.
   - Windows: `Ctrl` + `Enter`
   - macOS: `Cmd` + `Enter`
3. Comment multiple lines.
   - Windows: `Ctrl` + `Shift` + `C`
   - macOS: `Command` + `Shift` + `C`
4. “Reformat”" Code:
   - Windows: `Ctrl` + `Shift` + `A`
   - macOS: `Command` + `Shift` + `A`

More to come when we introduce `rmarkdown`…

Objects and Functions

> *To understand computations in R, two slogans are helpful: Everything that exists is an object. Everything that happens is a function call. — John Chambers*

And when we say everything, we mean **everything**. Even a *function* is an *object*.

Assignment

<- or = ?

That is the question.

Attach

```
attach(dataset)
```

Do not ever do this.

You might curse me now, but you’ll thank me later.

Working Directory?

Do. Not. Set. A. Working. Directory.

More on this when we talk about generating documents using RMarkdown.

Vectors

- There is no scalar.
- Be aware of vectorization!

Packages

Use them!

They are what makes `R` great.

Style

Have one!

- Spaces around binary operators!
- Indent two spaces!
- Pick an assignment operator and stick to it.
- Get some inspiration from Hadley or Google.

Be consistent!

- With yourself!
- With your group!
- With your company!

Next Week

- Linear Model Refresher
- Importing Data?
    - Lists, Frames, and what the heck is a Tibble?
- `rmarkdown`!

Now

Lab!