

Getting started with R and RStudio





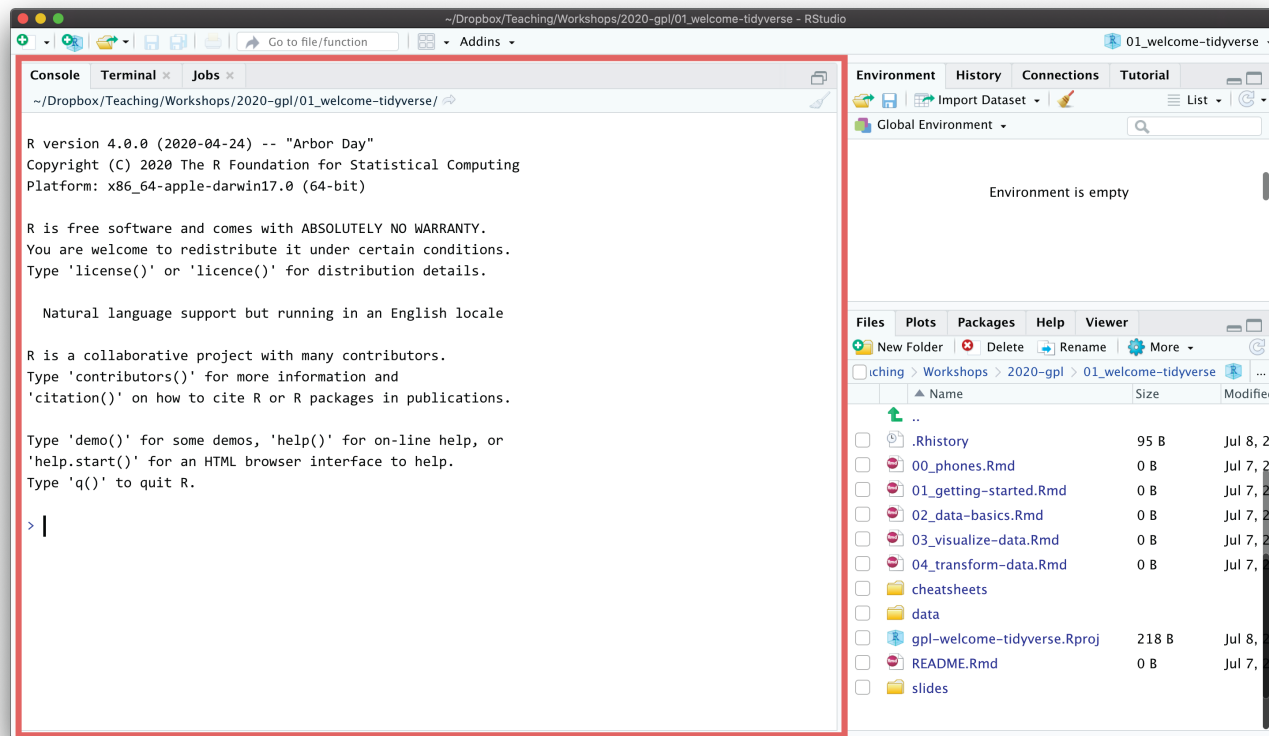
The engine



The dashboard

A tour of RStudio

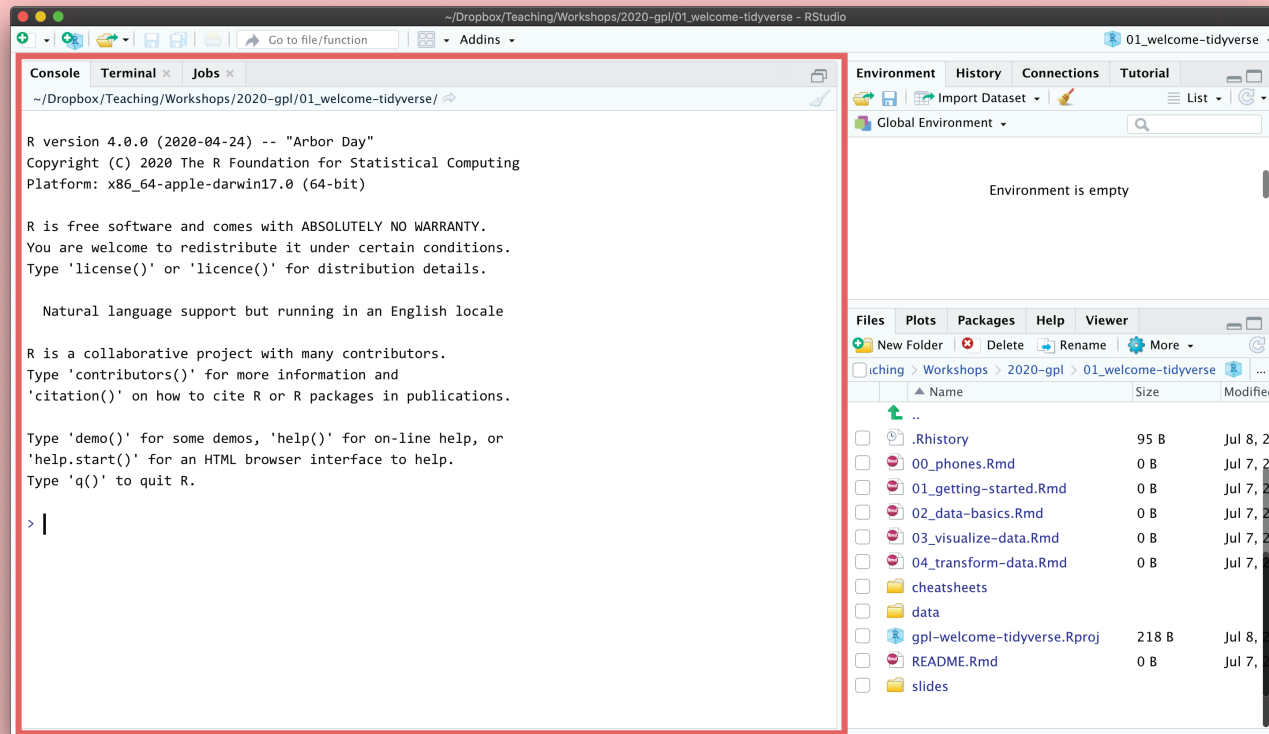
Console



R is awaiting your instructions

Type code here, press enter, and R will run it

Your turn



Type `2 + 2` in the console

Press enter

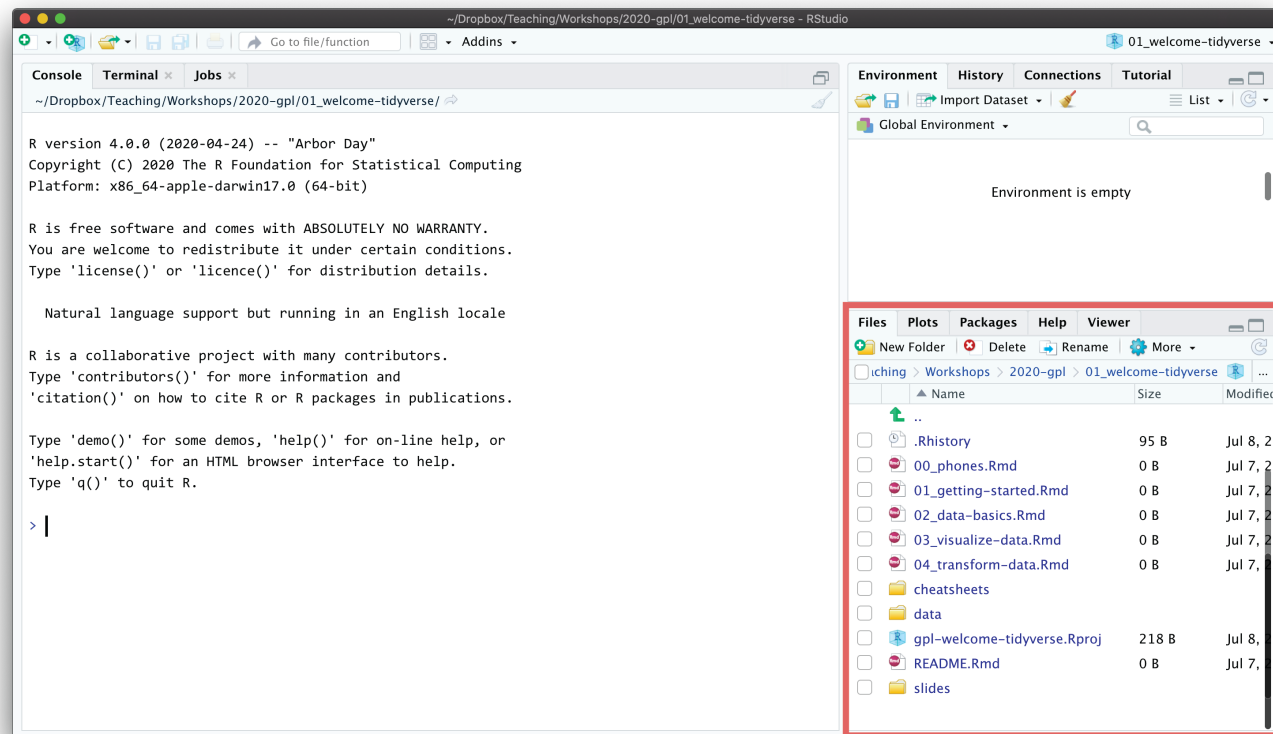
```
2 + 2
```

```
## [1] 4
```

**This is ephemeral though.
If you want to run this again, you'll have to type it again.**

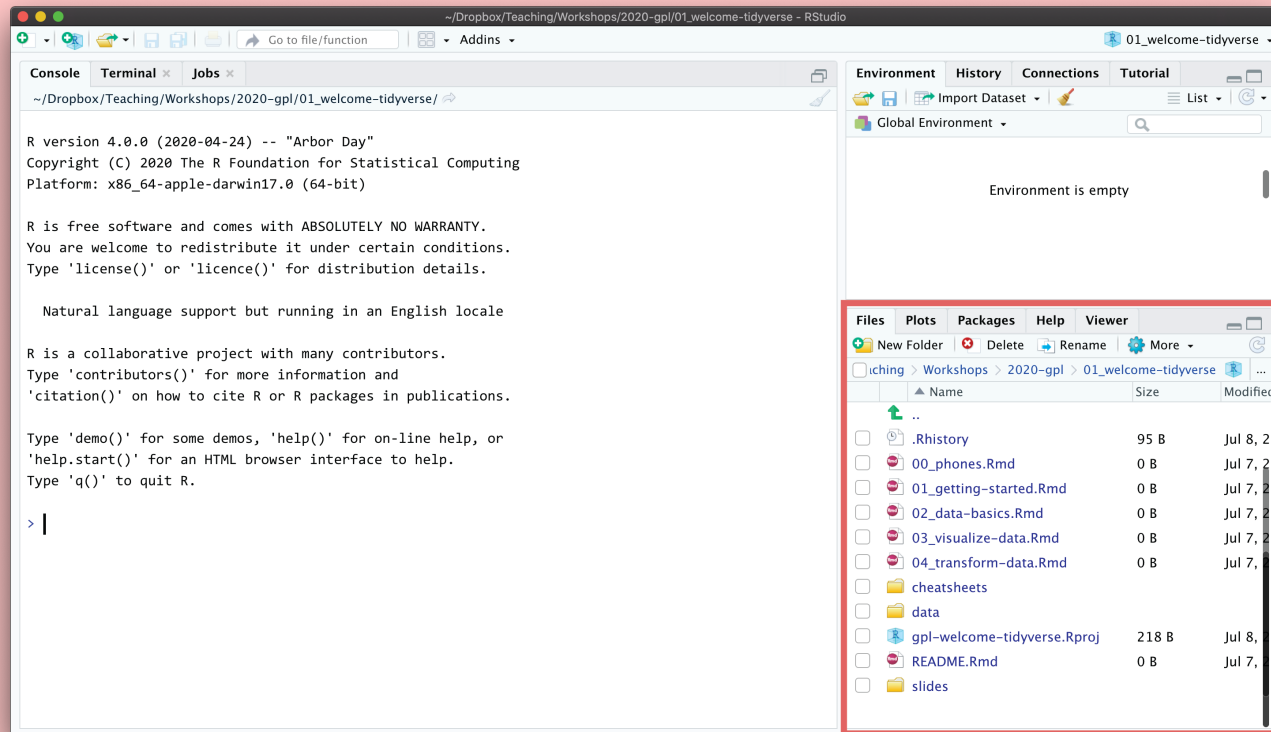
Store R code in a document instead

Files pane



All the files in your
current working
directory

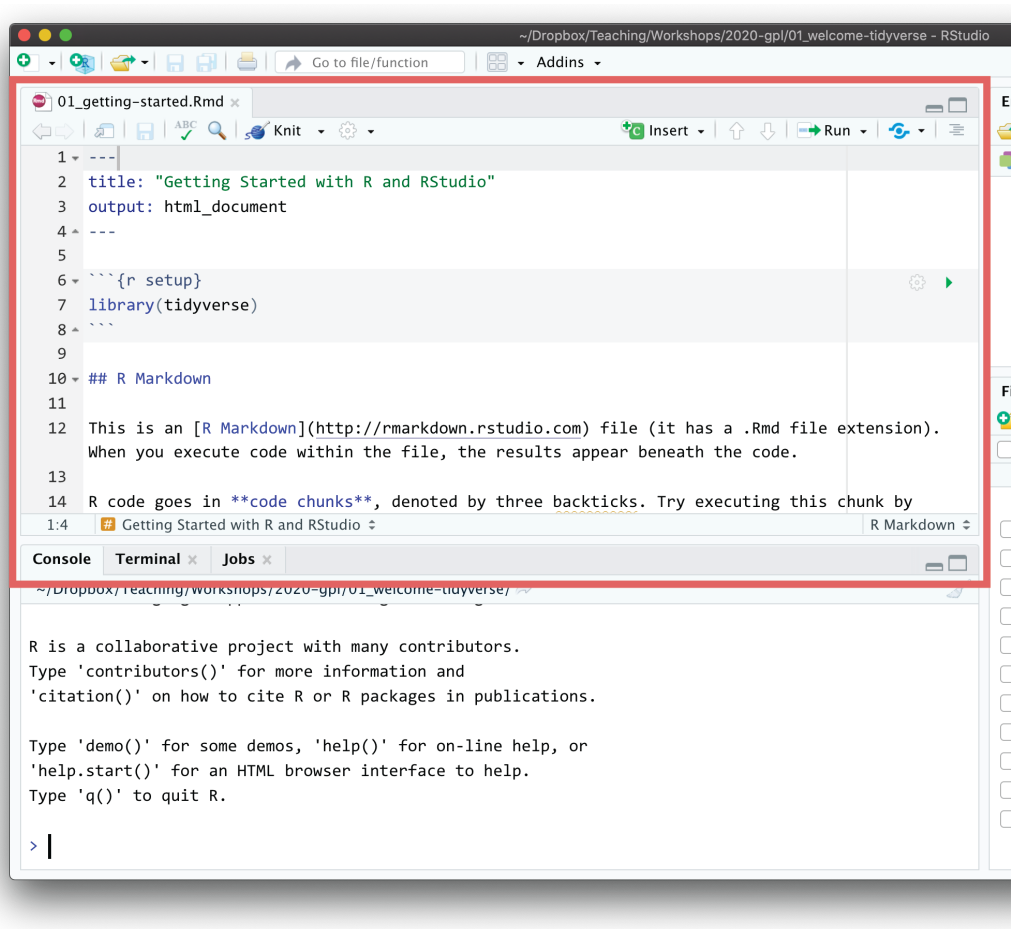
Your turn



Find 01_getting-started.Rmd

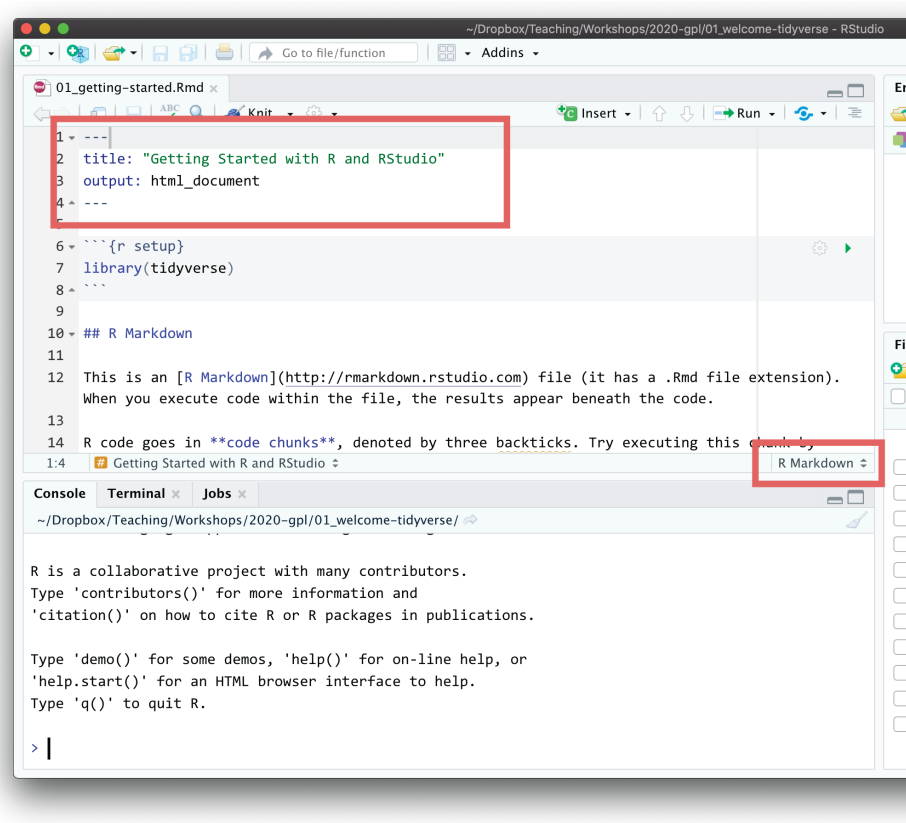
Click on its name to open the file

Source pane



Documents
open here

R Markdown



Document format that
combines text and code

Acts like a notebook
for your analysis

R Markdown



Text

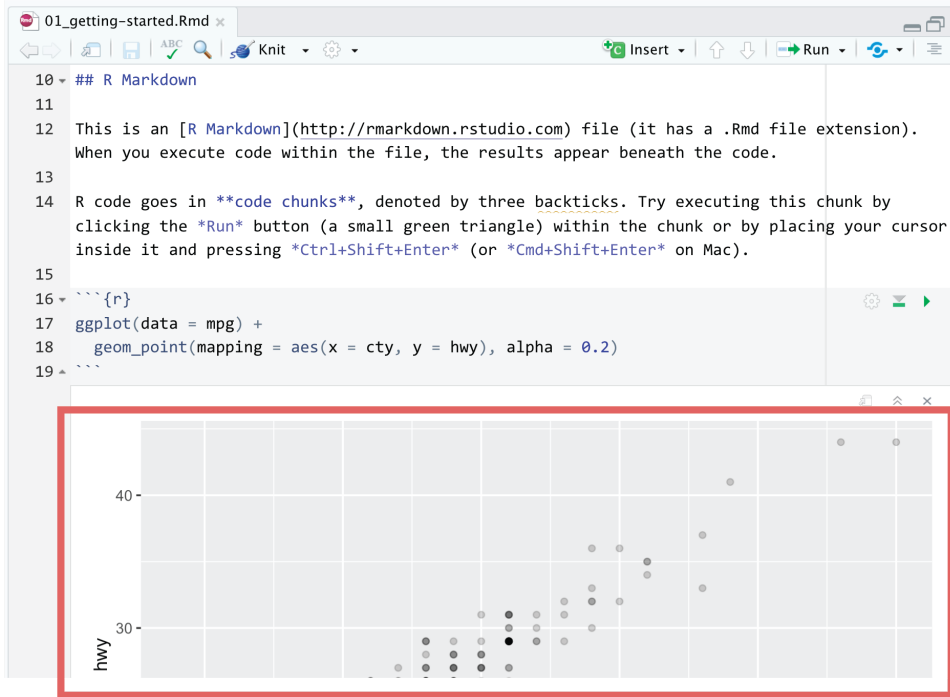
R Markdown



Text

Code

R Markdown



Text

Code

Output

Your turn

Read the instructions

Run the code chunk by clicking the play button



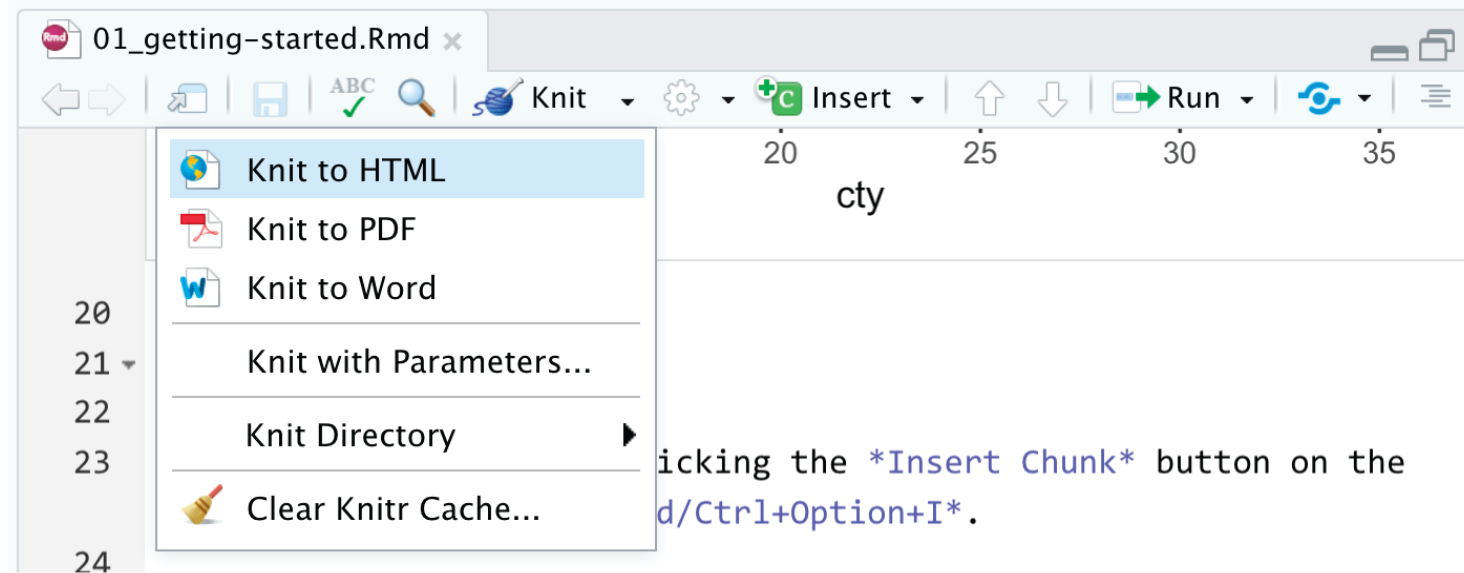
Your turn

Add a new chunk

Put $2 + 2$ in the chunk and run it

Knitting

"Knit" an R Markdown document into a standalone sharable file



R Markdown

The best way to combine R code and narrative

We'll use it throughout the class:

I'll provide starter code

You'll complete "Your turns"

In the end, you'll have an annotated record for yourself

Your turn

Spot the difference:

```
filter(mtcars, cyl == 4)
```

```
four_cyls <- filter(mtcars, cyl == 4)
```

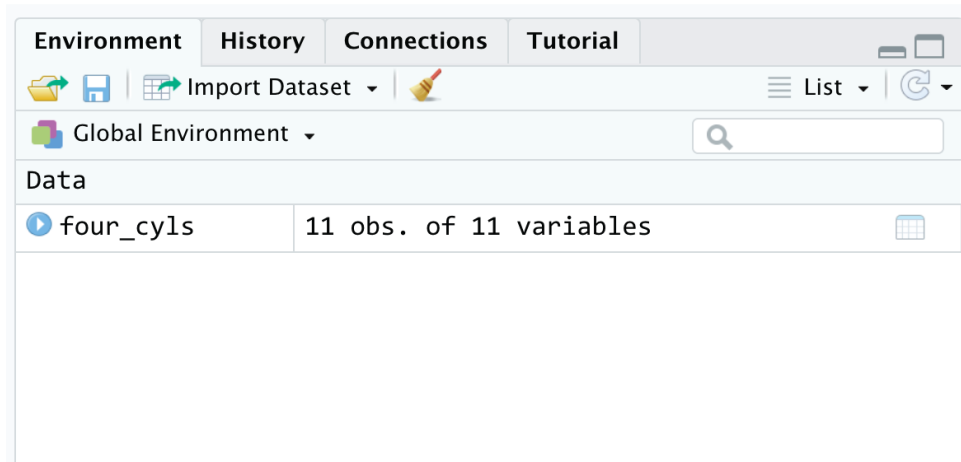
**Find these chunks in the notebook and run them.
What's different about what happens?**

Assignment

<- assigns the output from the righthand side to a variable with the name on the lefthand side

```
four_cyls <- filter(mtcars, cyl == 4)
```

Environment pane



**List of all the
variables you've created**

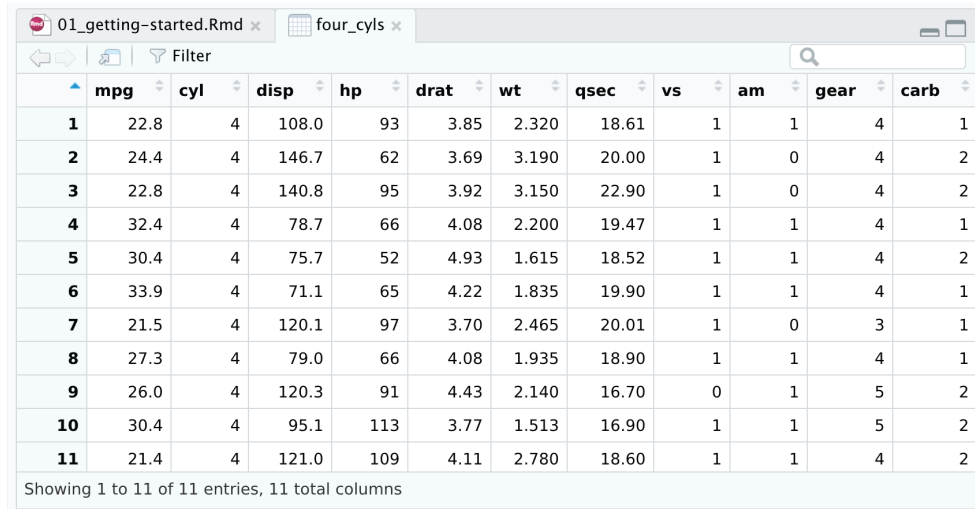
Your turn

Find `four_cyls` in the environment pane.
Click on the name `four_cyls`

What happens?

Viewer

Clicking on an object in the environment panel opens it an interactive viewer tab



The screenshot shows the RStudio Viewer tab for the object 'four_cyls'. The table displays 11 rows of data with 11 columns: mpg, cyl, disp, hp, drat, wt, qsec, vs, am, gear, and carb. The first column contains row numbers from 1 to 11. The status bar at the bottom indicates 'Showing 1 to 11 of 11 entries, 11 total columns'.

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
1	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
2	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
3	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
4	32.4	4	78.7	66	4.08	2.200	19.47	1	1	4	1
5	30.4	4	75.7	52	4.93	1.615	18.52	1	1	4	2
6	33.9	4	71.1	65	4.22	1.835	19.90	1	1	4	1
7	21.5	4	120.1	97	3.70	2.465	20.01	1	0	3	1
8	27.3	4	79.0	66	4.08	1.935	18.90	1	1	4	1
9	26.0	4	120.3	91	4.43	2.140	16.70	0	1	5	2
10	30.4	4	95.1	113	3.77	1.513	16.90	1	1	5	2
11	21.4	4	121.0	109	4.11	2.780	18.60	1	1	4	2

Showing 1 to 11 of 11 entries, 11 total columns

Functions

```
four_cyls <- filter(mtcars, cyl == 4)
```

Functions do things

Functions take arguments, output results

If you want to keep the output, assign it to a variable

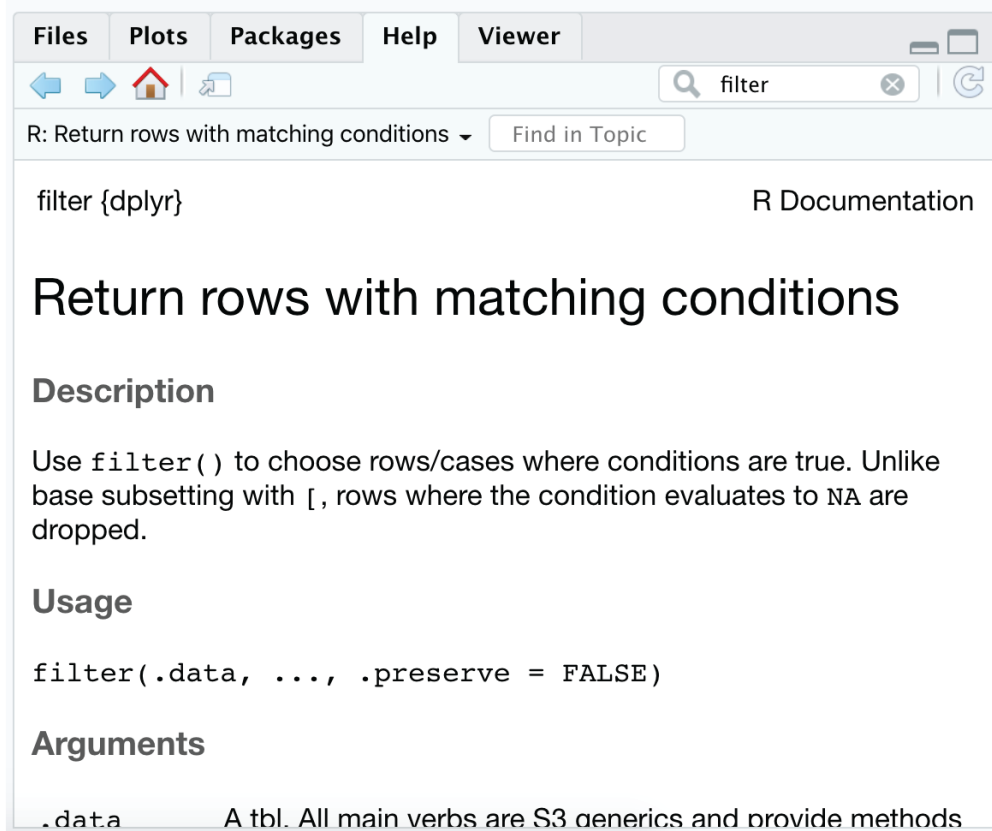
Help

To look up the help page for an R function,
type this in the console:

```
?function_name
```

(Or google it!)

Help pane



These help pages provide details about the arguments you can supply a function

Often full of examples at the bottom

Your turn

Look at the help page for `seq`

Add a chunk that uses `seq()` to create a list of numbers from 5 to 100, spaced by 5 (so 5, 10, 15, 20, ...)

02:00

```
seq(from = 5, to = 100, by = 5)
```

```
## [1] 5 10 15 20 25 30 35 40 45 50 55 60 65 70  
## [20] 100
```

Common syntax problem #1

Missing closing parentheses or quotes

```
mean(mtcars
```

```
"Oops this is wrong
```

Common syntax problem #2

Surrounding something in quotes when it should be (or vice versa)

```
mean("mtcars")
```

```
## Warning in mean.default("mtcars"): argument is not numeric or
```

```
## NA
```

```
## [1] NA
```

Your turn

There are three chunks under "Syntax gone wrong"

Run each, read the error message, and try to fix the syntax

Cheatsheets

Go to Help > Cheatsheets to find quick reference guides to different packages

RStudio IDE : : CHEAT SHEET

Documents and Apps

Open Shiny, R Markdown, knitr, Sweave, LaTeX, RUI files and more in Source Pane

Check spelling, output format, chunk

Render chunk, Choose output location, Insert chunk

Jump to previous chunk, Run chunk, Publish chunk, Show file outline, Run this chunk, Run all previous code chunks, Run this chunk, Run all previous code chunks, Run this chunk, Run all previous code chunks

Access markdown guide at **Help > Markdown Quick Reference**

Jump to Set knitr chunk, Run this chunk, Run all previous code chunks, Run this chunk, Run all previous code chunks, Run this chunk, Run all previous code chunks

RStudio recognizes that files named **app.R**, **server.R**, **ui.R**, and **global.R** belong to a shiny app

Run app, Choose location to shinyapps.io account, Publish app, Manage app, Publish app, Manage app

Write Code

Open in new window, Save, Find and replace, Compile and run, Run selected code

Source with or without Echo, Show file outline, Multiple cursors/column selection with **Alt + mouse drag**, Code diagnostics that appear in the margin, Hover over diagnostic symbols for details, Syntax highlighting based on your file's extension, Tab completion to finish function names, file paths, arguments, and more, Multi-language code snippets to quickly use common blocks of code, Change file type

Launch debugger mode from origin of error, Open traceback to examine the functions that R called before the error occurred

R Support

Import data, History of past commands to re-run, Display R/Reps slideshows, **File > New File > R Presentation**

Load workspace, Delete all saved objects, Choose environment to display from list of parent environments, Display objects as list or grid, Data, Lists, 130 obj. of 5 variables, Values, Functions, File

Displays saved objects by type with short description, View in data viewer, View function source code

Path to displayed directory, Click on file or directory name to open

Pro Features

Share Project with Collaborators, Active shared collaborators

Start new R Session in current project, Close R Session in project, Select R Version

PROJECT SYSTEM

File > New Project

RStudio saves the call history, workspace, and working directory associated with a project. It reloads each when you re-open a project.

Name of current project

RStudio opens plots in a dedicated Plots pane

Navigate, Open in recent plots, Export, Delete, recent plots, window, plot, all plots

GUI Package manager lists every installed package

Install, Update, Create reproducible package, Packages, Packages library for your project

Click to load package with library(), Uninstall to detach package with detach()

RStudio opens documentation in a dedicated Help pane

Home page of RStudio, Search within RStudio, Search for help file, Viewer Pane displays HTML content, such as Shiny apps, R Markdown reports, and interactive visualizations

Stop Shiny app, Publish to shinyapps.io, Refresh app, View<data> opens spreadsheet like view of data set

Filter rows by value, Sort by values, Search for value

Debug Mode

Open with **debug()**, **browser()**, or a breakpoint. RStudio will open the debugger mode when it encounters a breakpoint while executing code.

Click next to line number to add/remove a breakpoint.

Highlighted line shows where execution has paused

Run commands in environment where execution has paused

Examine variables in executing environment

Select function in traceback to debug

Step through code one line at a time

Step into and out of functions to run

Resume execution mode

Quit debug mode

Version Control

Turn on **Tools > Project Options > Git/SVN**

Stage files, Show file diff, Commit staged files to remote, Push/Pull, View History

Added, Deleted, Modified, Renamed, Untracked

Open shell to execute commands

Package Writing

File > New Project > New Directory > R Package

Turn project into package, Enable roxygen documentation with **Tools > Project Options > Build Tools**

Roxygen guide at **Help > Roxygen Quick Reference**

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Next up

Data basics