Intro to R

RStudio

Help! Office hours

Office hours will always be held at the *same Zoom link*.

Working with R – RStudio

RStudio is an Integrated Development Environment (IDE) for R

- Helps you write code - makes suggestions
- Helps you view the output of your code
- Helps you find errors
- Is NOT a dropdown statistical tool (such as Stata)
    - See Rcmdr or Radiant

[source]

RStudio used to be the name of a company that is now called Posit.

RStudio

Easier working with R

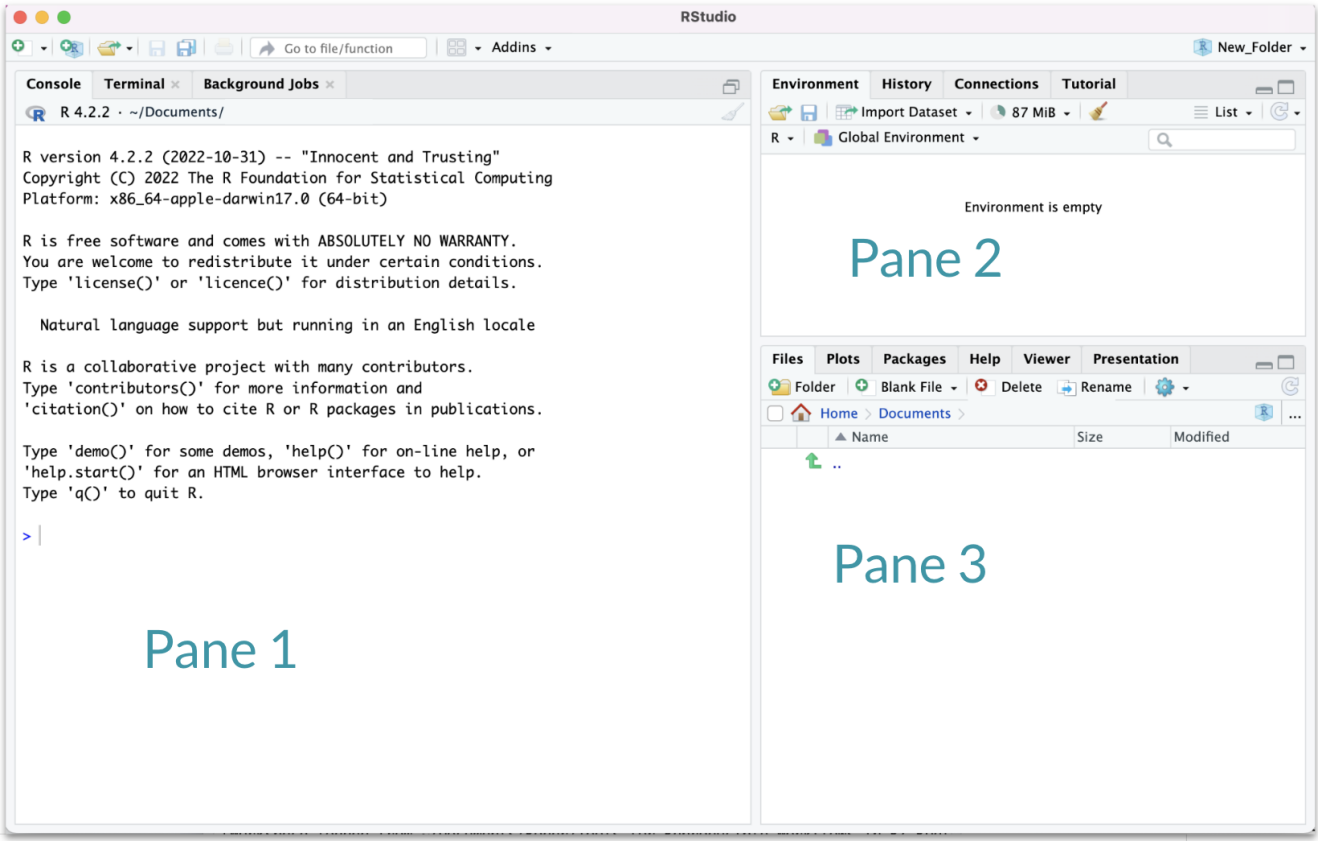
- Syntax highlighting, code completion, and smart indentation
- Easily manage multiple working directories and projects

More information

- Workspace browser and data viewer
- Plot history, zooming, and flexible image and file export
- Integrated R help and documentation

RStudio

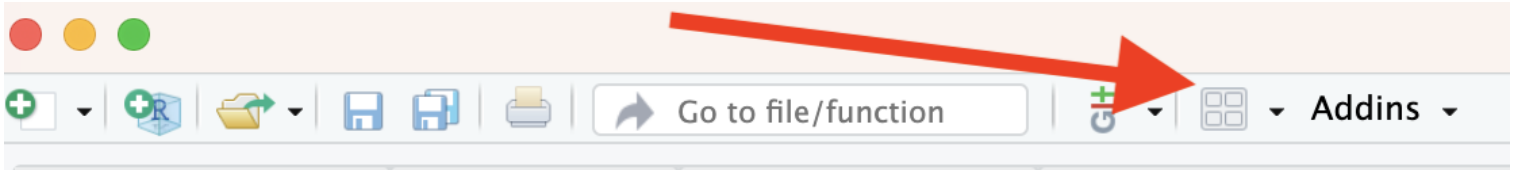
First it is important to be familiar with the layout. When you first open RStudio, you will see 3 panes.



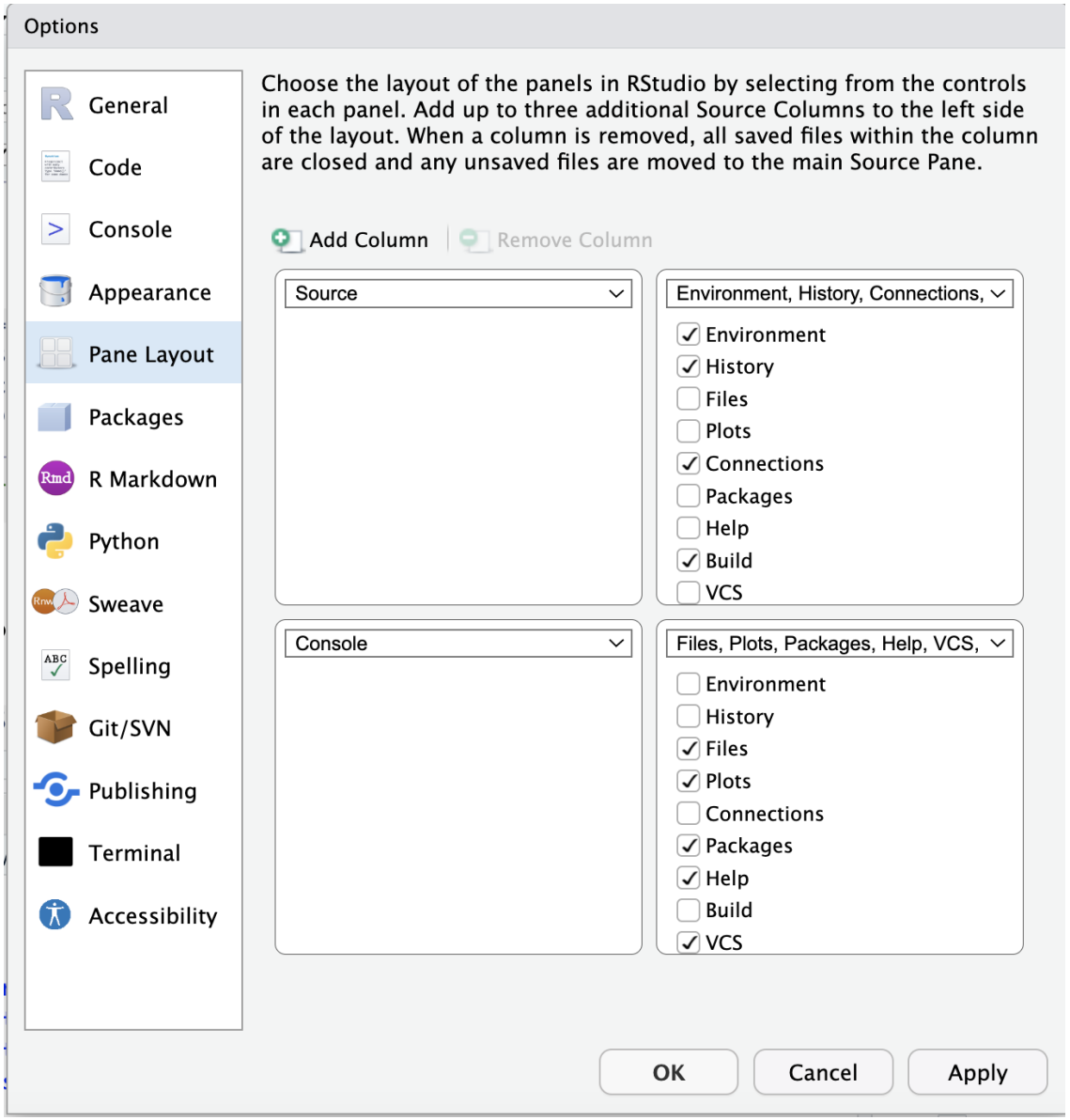
RStudio Layout

If RStudio doesn't look the way you want (or like our RStudio), then:

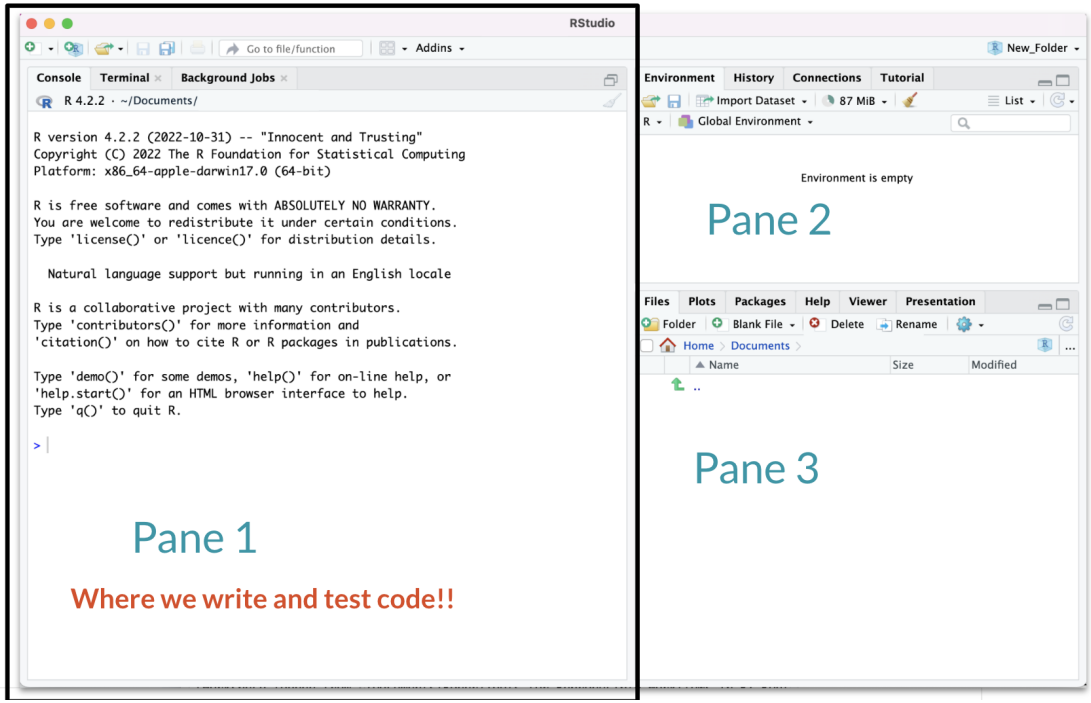
Click on the pane button, which looks like a waffle with 4 indentations. Scroll down to "Pane Layout".



Default Layout

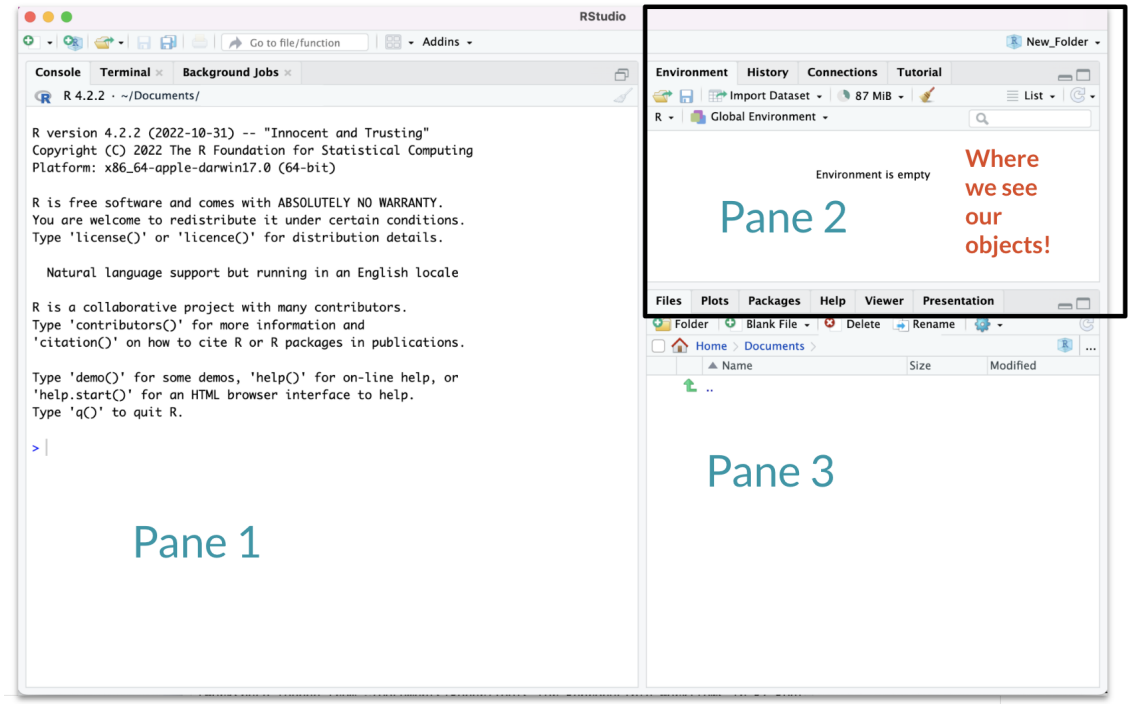


Pane 1 (Left side) for writing code

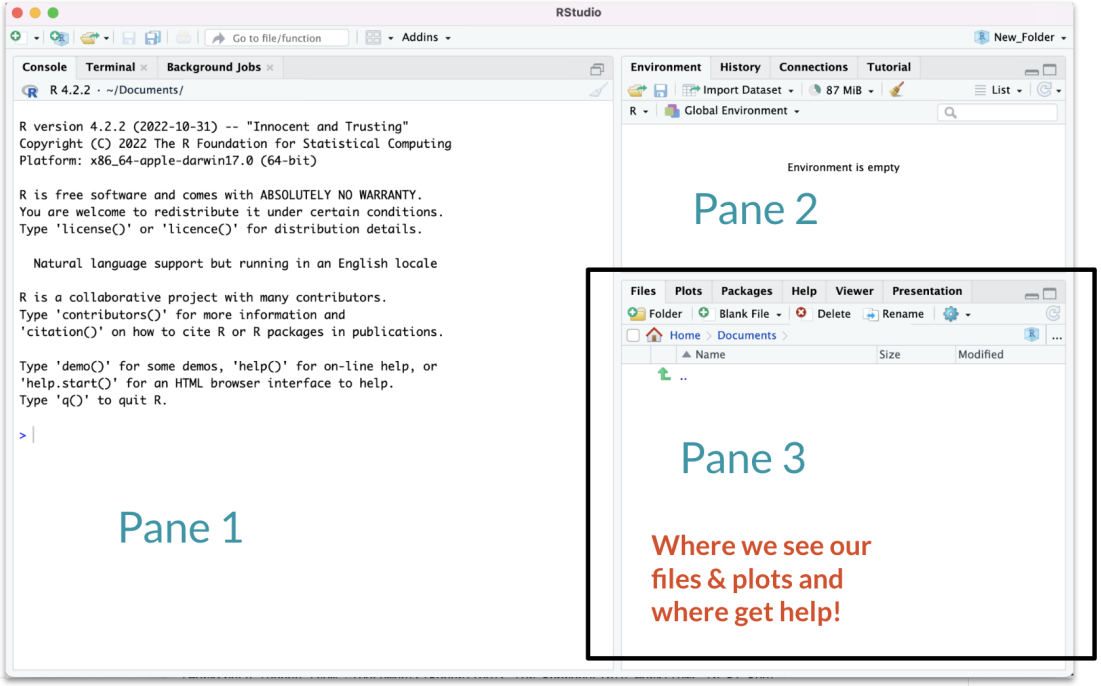


Pane 2 - where objects will be

We will start seeing this tomorrow!

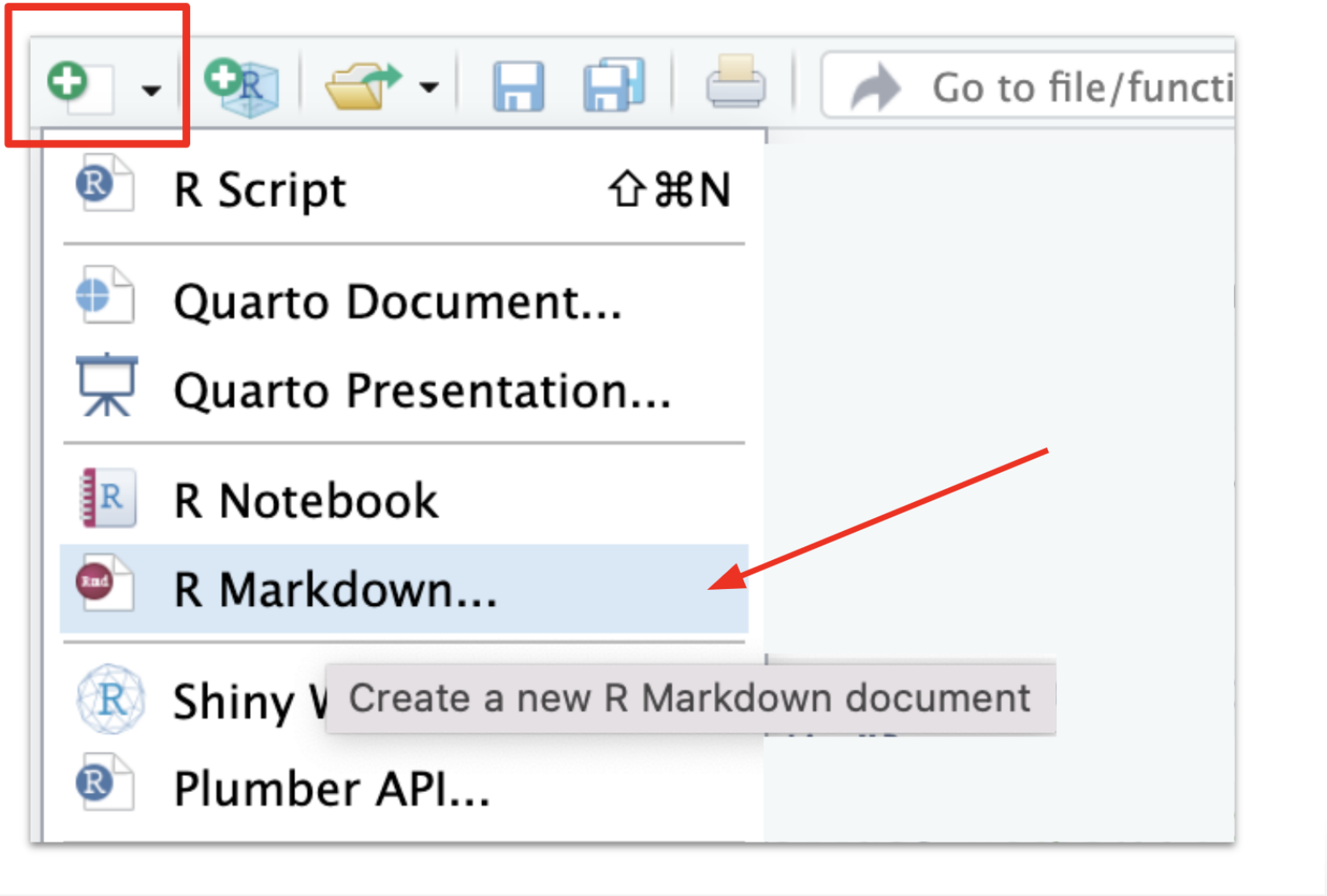


Pane 3 - where we get help and see plots



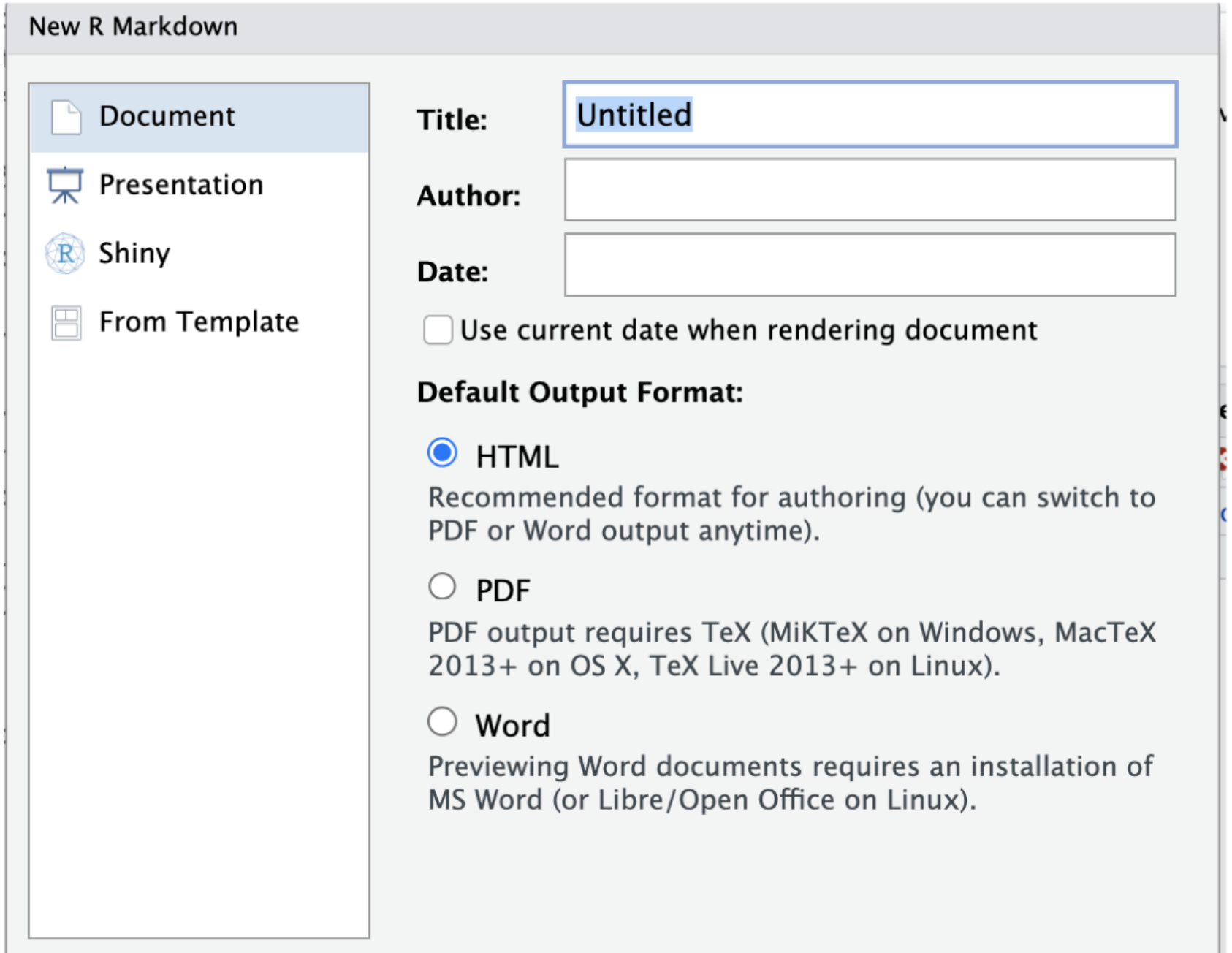
Hidden Pane

To save a copy of your code. You must open a file first - this will open a 4th pane. These files include Scripts or what are called R Markdown files.



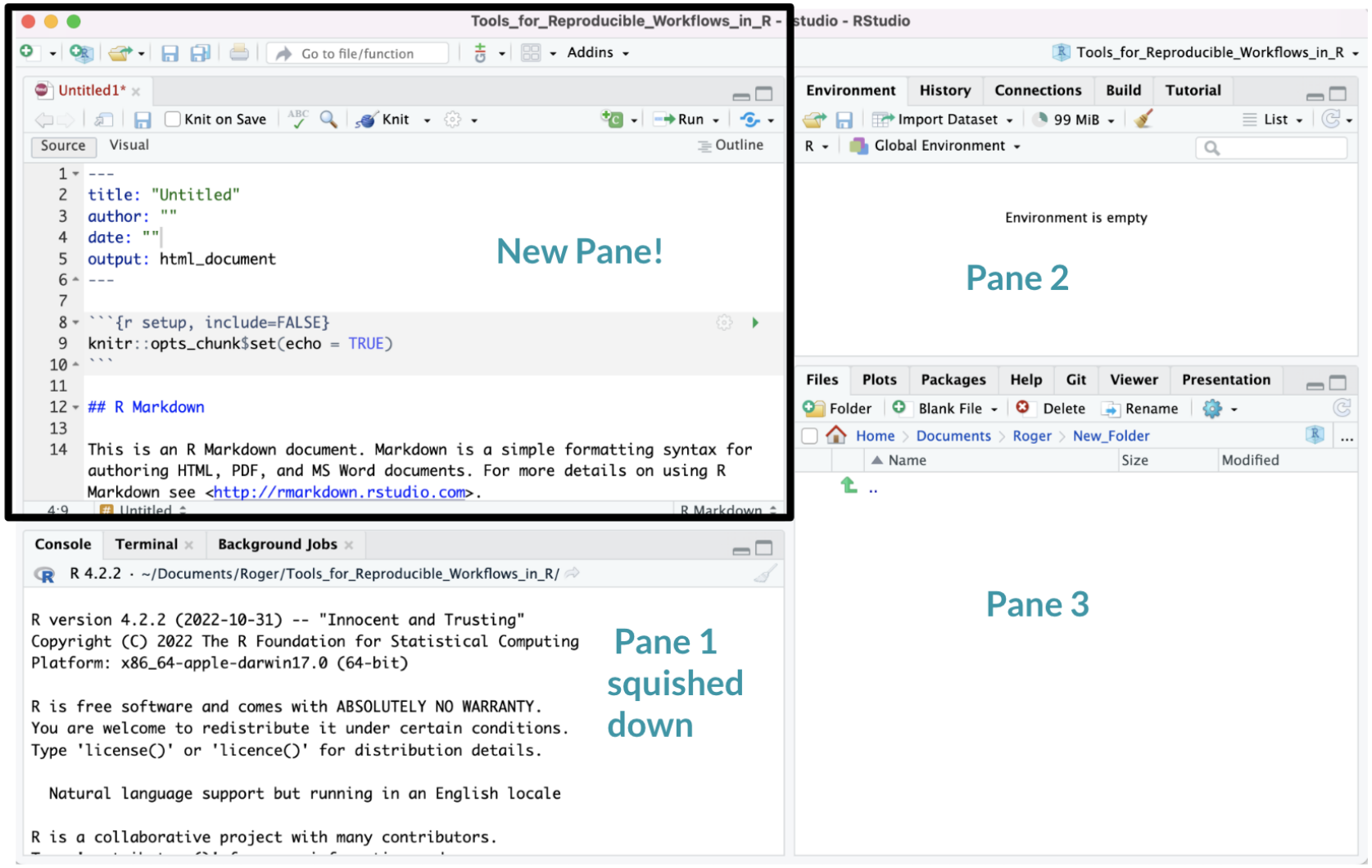
Hidden Pane

You will see a popup that you can just say “OK” to for now.



Hidden Pane

Nice! now we have a place to save code! This is where we will mostly be working.



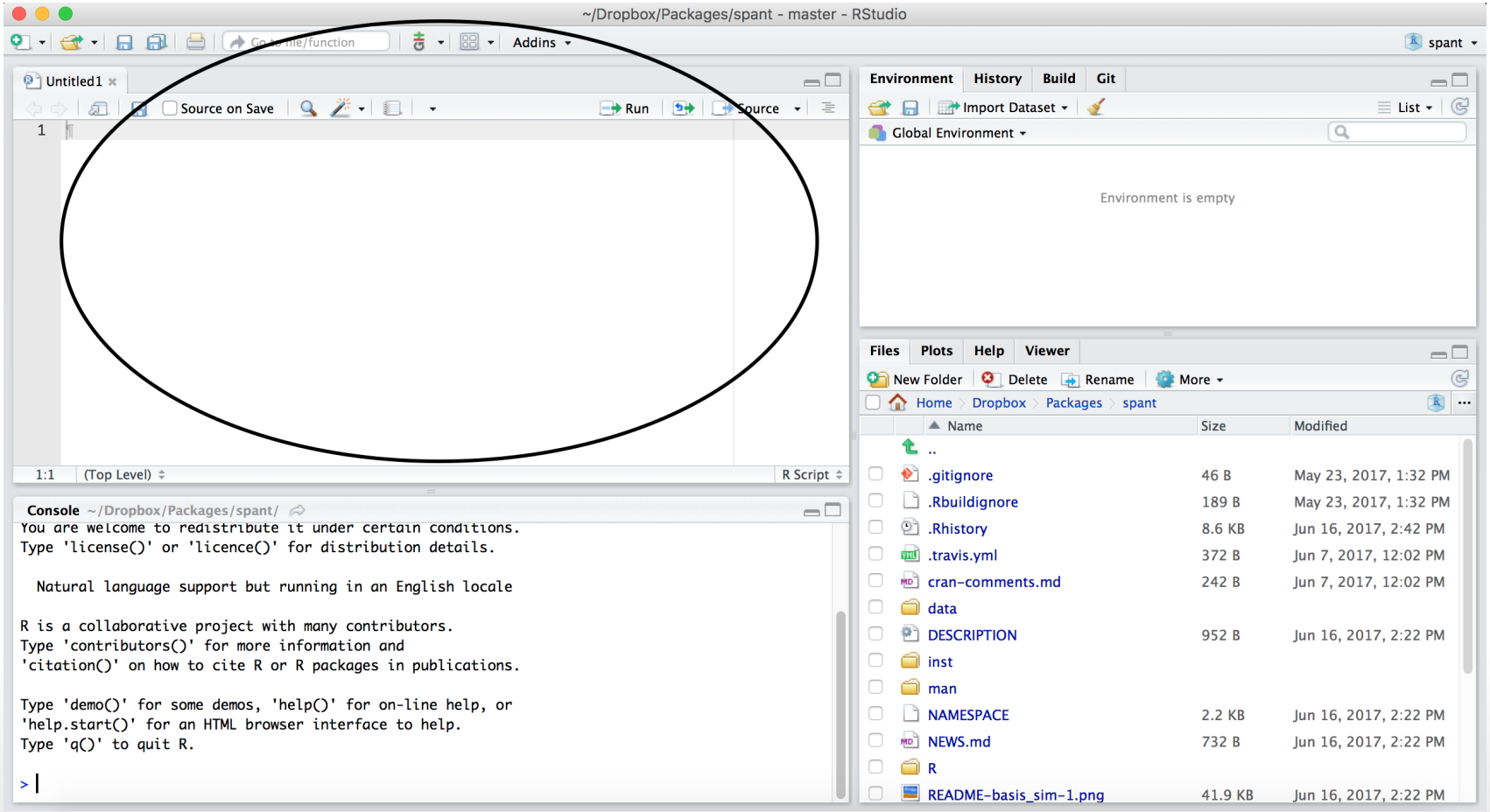
Working with R in R Studio - 2 major panes:

1. The **Source/Editor**: “Analysis” Script + Interactive Exploration
   - Static copy of what you did (reproducibility)
   - Top by default
2. The **R Console**: “interprets” whatever you type
   - Calculator
   - Try things out interactively, then add to your editor
   - Bottom by default

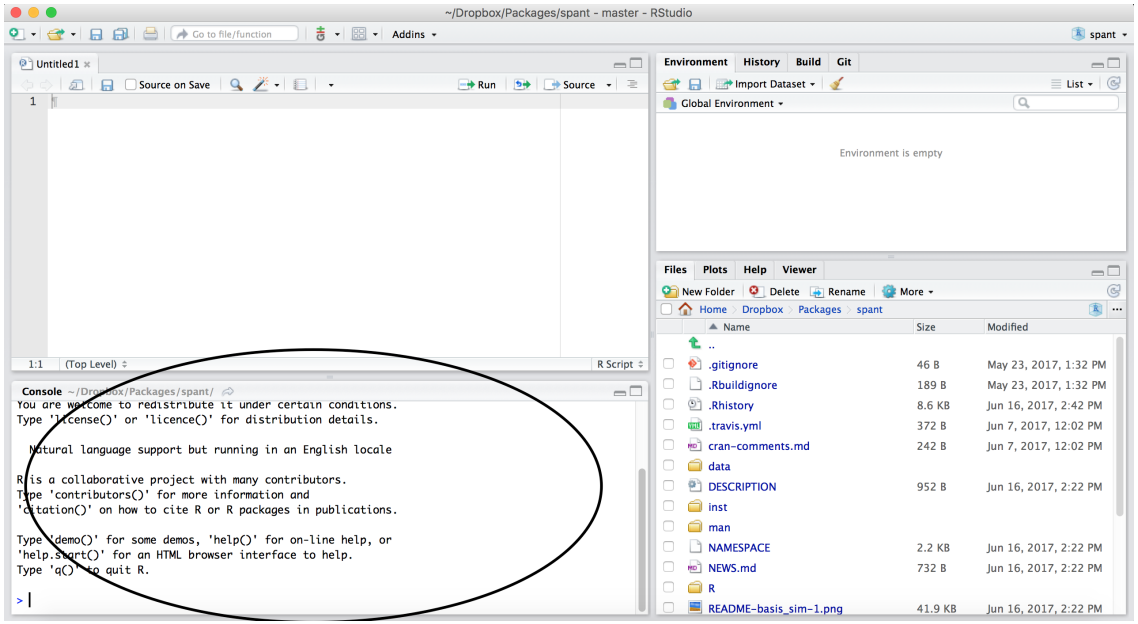
Source / Editor

- Where files open to
- Have R code and comments in them
- Can highlight and press (CMD+Enter (Mac) or Ctrl+Enter (Windows)) to run the code

In a .R file (we call a script), code is saved on your disk



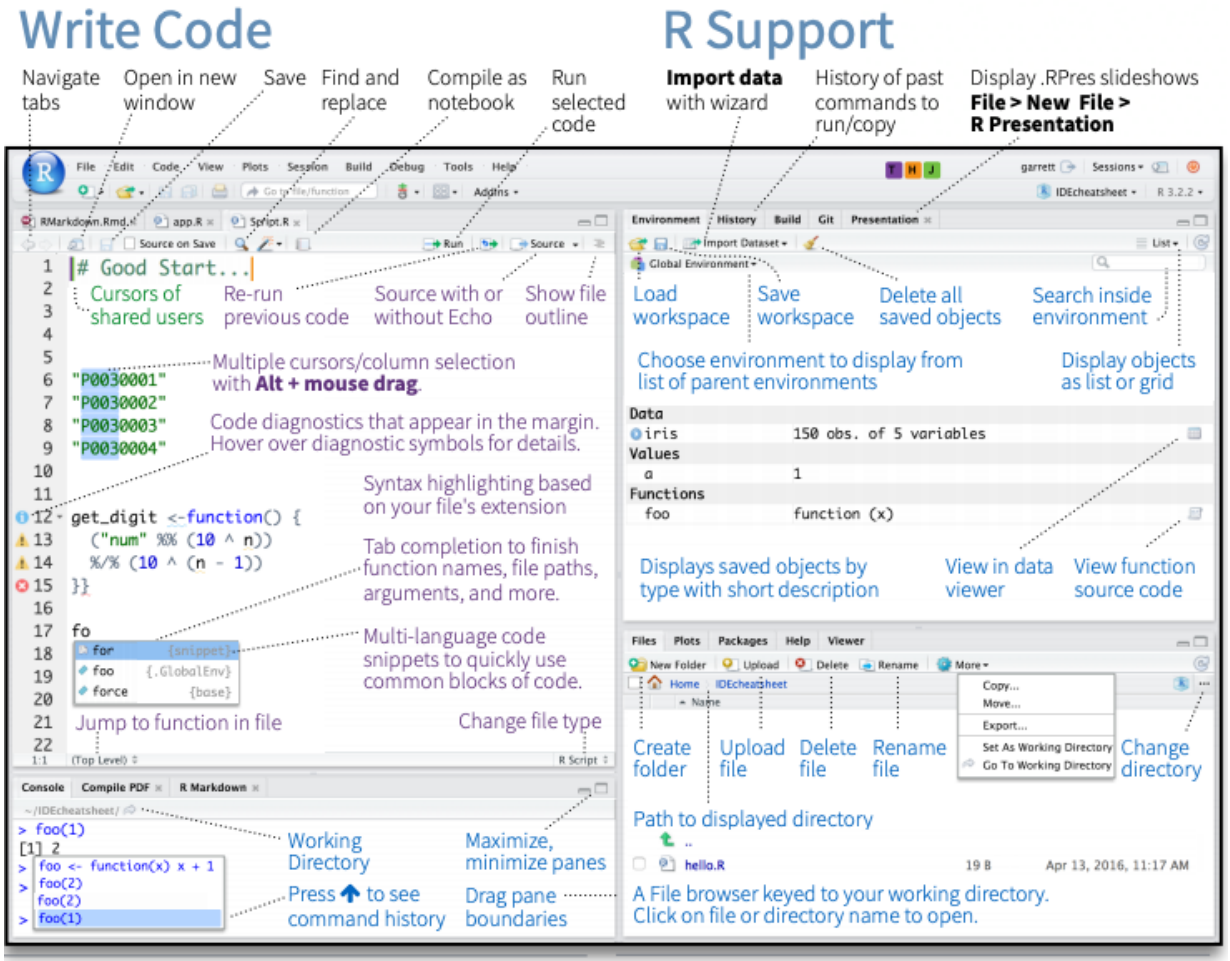
R Console



- Where code is executed (where things happen)
- You can type here for things interactively to test code
- Code is **not saved** on your disk

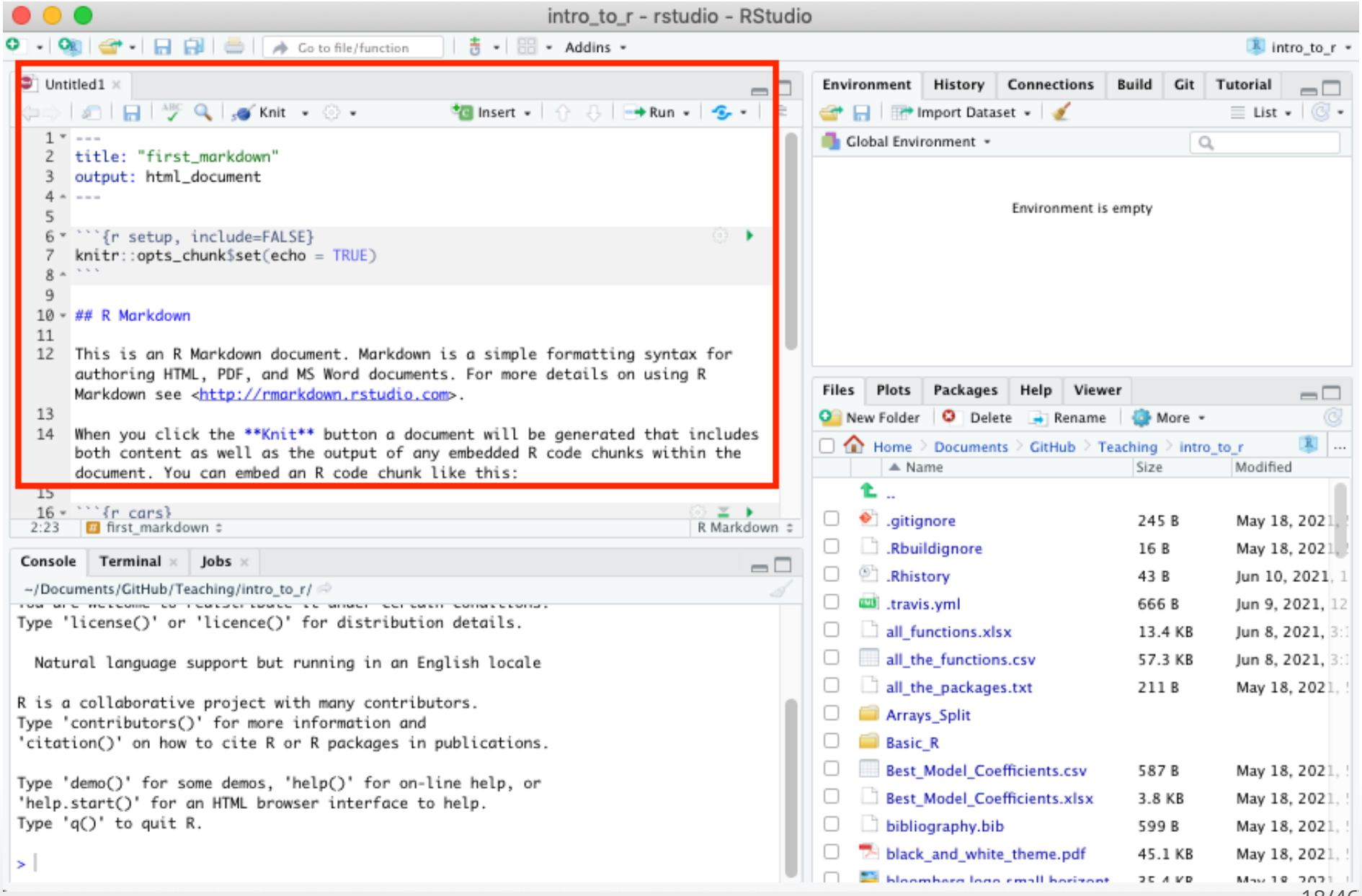
RStudio

Super useful “cheat sheet”:
https://github.com/rstudio/cheatsheets/raw/master/rstudio-ide.pdf

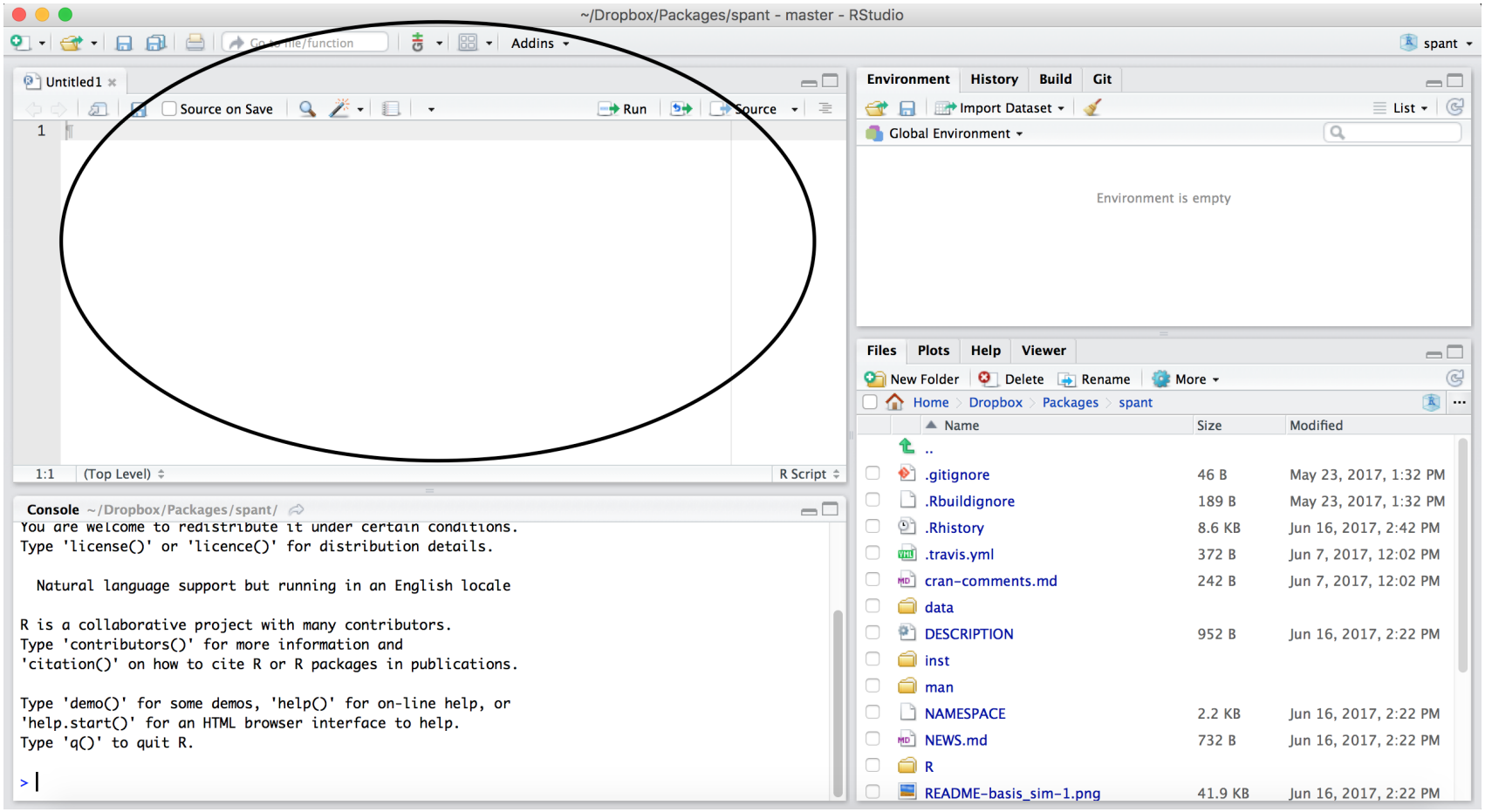


R Markdown files look different form scripts

It will look like this with text in it, unlike a script.



Recall that a script was just empty

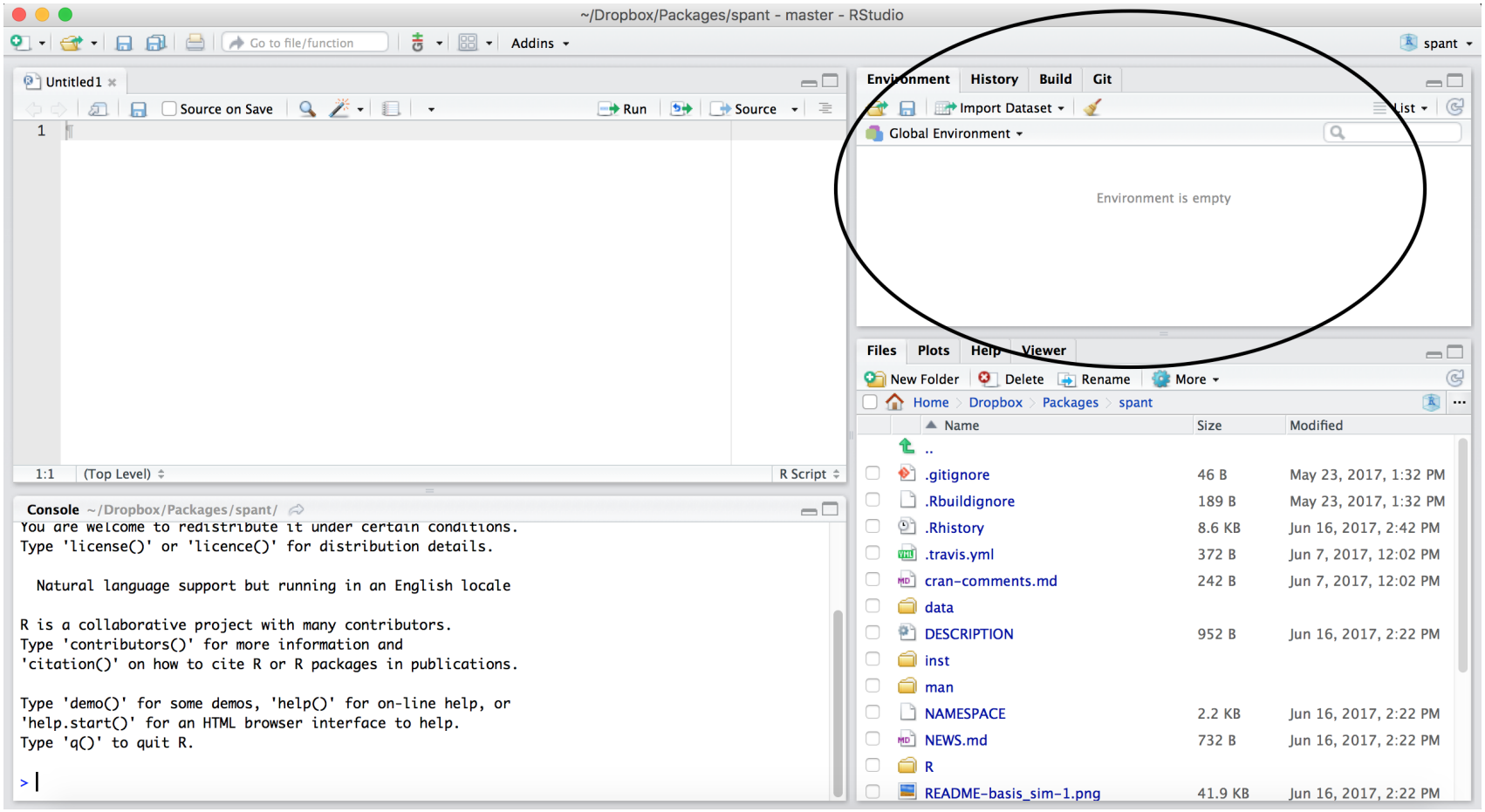


Scripts and R Markdown

Although people will use scripts often, and they are good for more programmatic purposes, we generally don't recommend them for Public Health Researchers.

For data analyses, R Markdown files are generally superior because they allow you to check your code and write more info about your code.

Workspace/Environment



Workspace/Environment

- Tells you what **objects** are in R
- What exists in memory/what is loaded?/what did I read in?

History

- Shows previous commands. Good to look at for debugging, but **don't rely** on it.
  Instead use RMarkdown!
- Also type the "up" key in the Console to scroll through previous commands

Other Panes

- **Files** - shows the files on your computer of the directory you are working in
- **Viewer** - can view data or R objects
- **Help** - shows help of R commands
- **Plots** - pictures and figures
- **Packages** - list of R packages that are loaded in memory

Let’s take a look at R Studio ourselves!

Lab: Starting with R and RMarkdown

RStudio Lab

To do this lab we need to:

- Download the file at the link above by clicking on it or go to the website schedule page
- Find the downloaded file on your computer
- Open the file in RStudio (double clicking the file name typically works)

These videos can help if you aren't sure where your downloads are:

If you have a PC: https://youtu.be/we6vwB7DsNU

If you have a Mac: https://www.youtube.com/watch?v=Ao9e0cDzMrE

You can find these on the resource page of the class website.

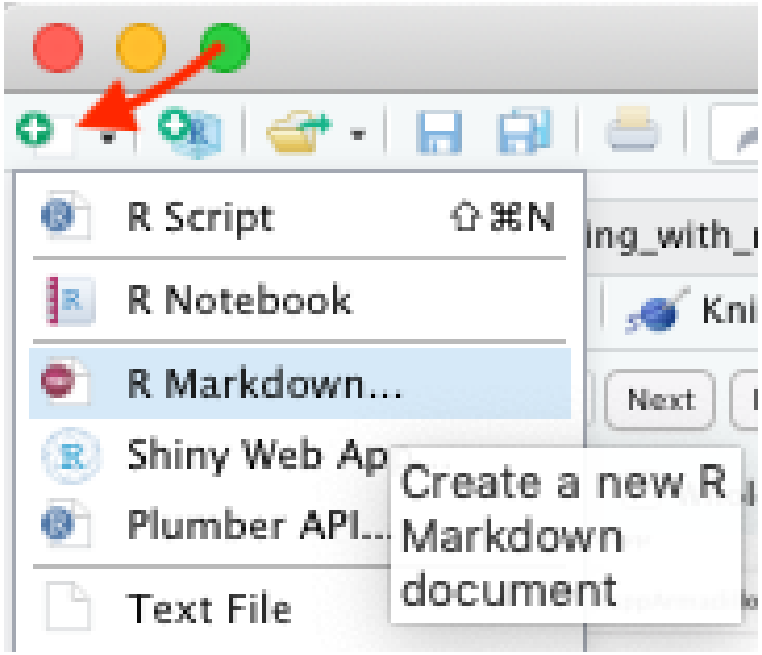
R Markdown file

R Markdown files (.Rmd) help generate reports that include your code and output. Think of them as fancier scripts.

1. Helps you describe your code
2. Allows you to check the output
3. Can create many different file types

Create an R Markdown file

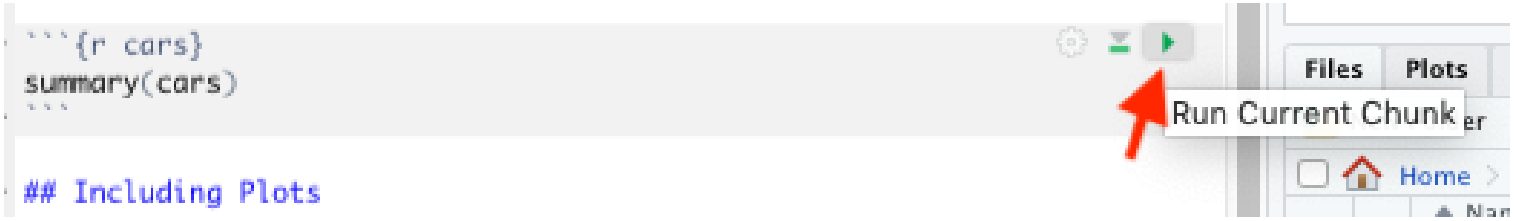
Go to File → New File → R Markdown or click the green add file button.



Code chunks

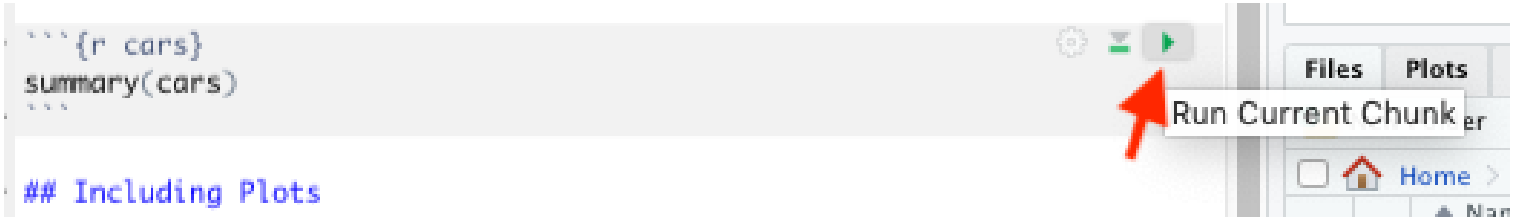
Within R Markdown files are code “chunks”.

This is where you can type R code and run it!



Run code in a chunk

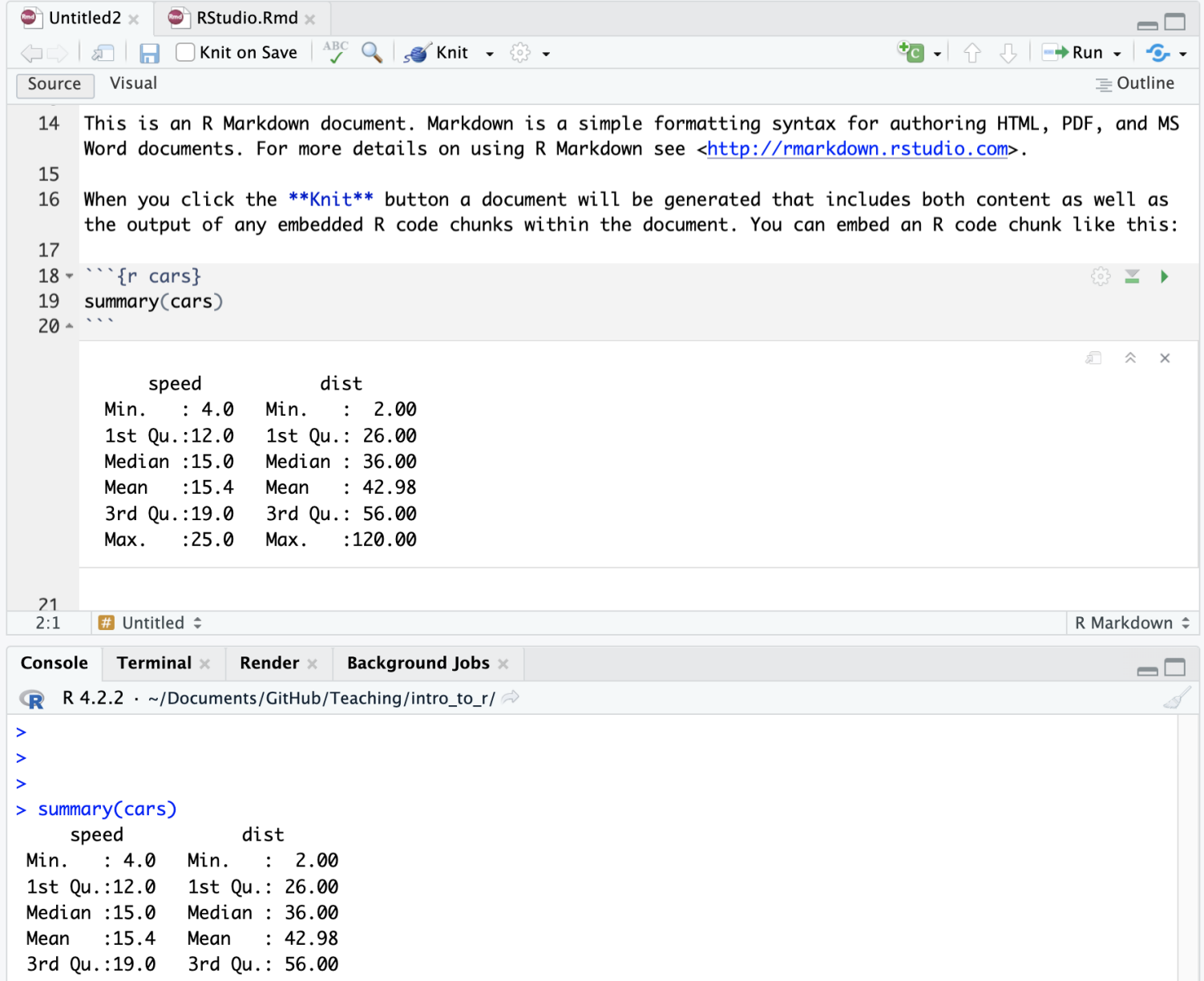
Clicking the run (play) button runs the code in the chunk.



`Ctrl + Enter` on Windows or `Command + Enter` on Mac in your script evaluates that line of code

Running a chunk executes the code

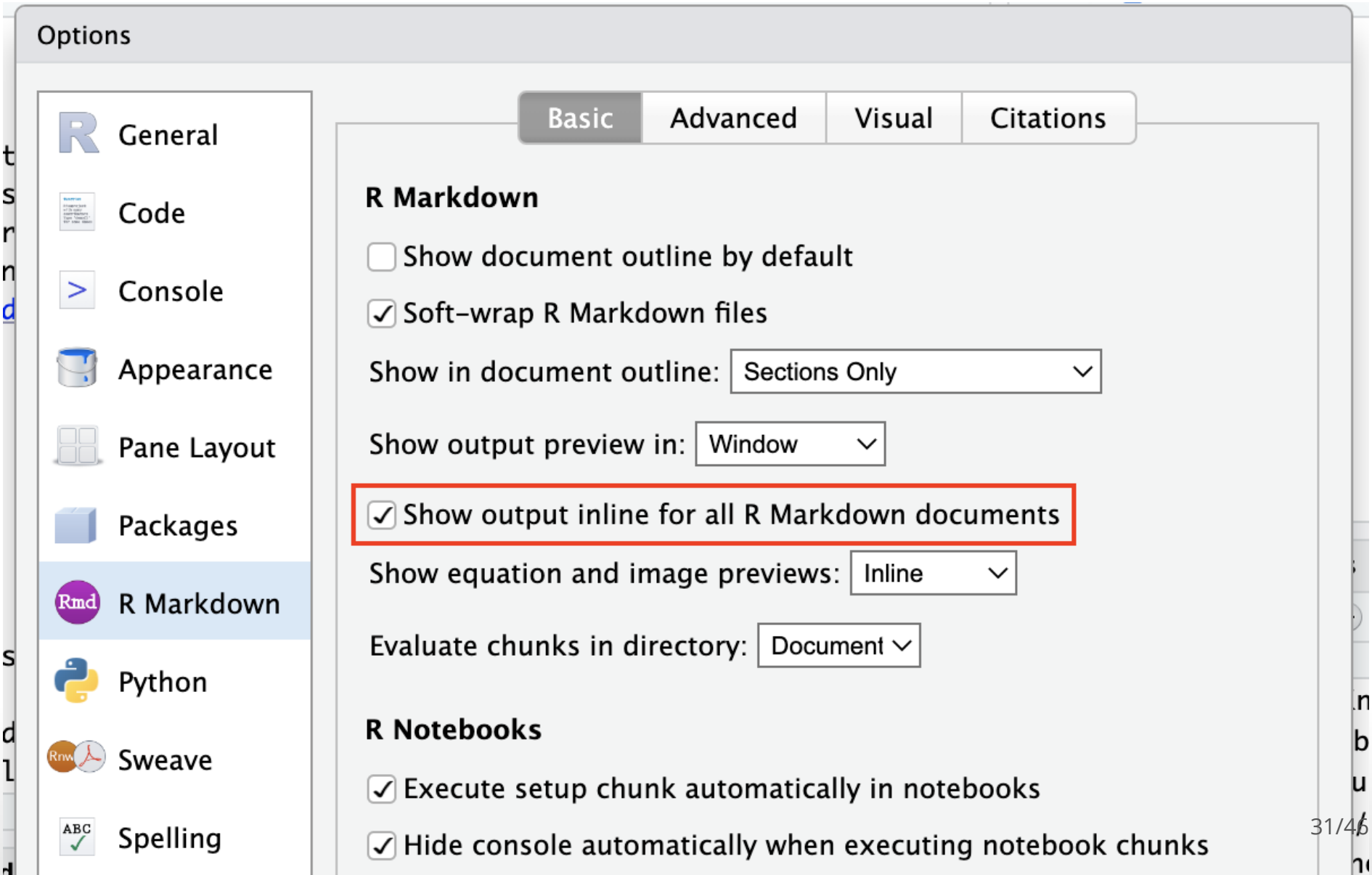
- generally see a preview of the output of the code just below the chunk
- see the code in the console



If you get annoyed by code previews in Markdown files:

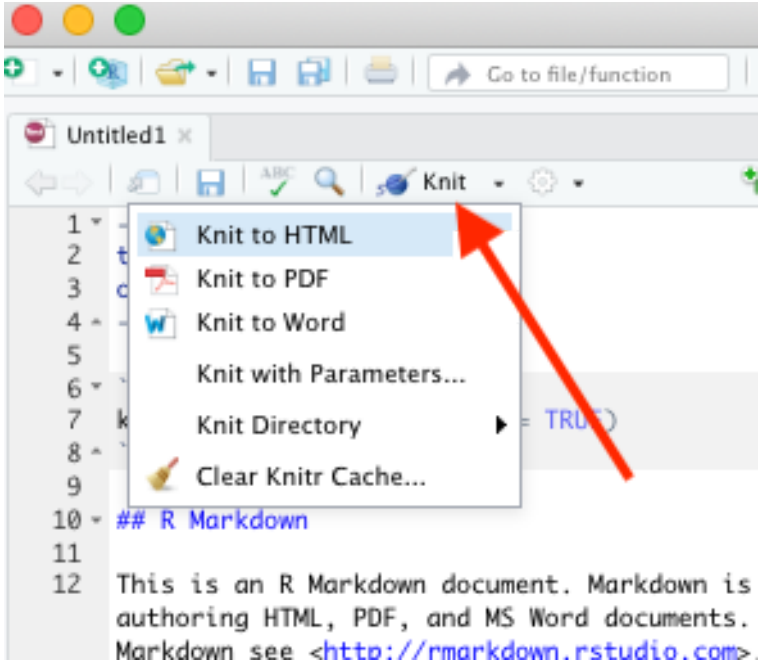
In RStudio Click the Edit tab –> scroll down to Preferences… –> R Markdown

Uncheck the following:



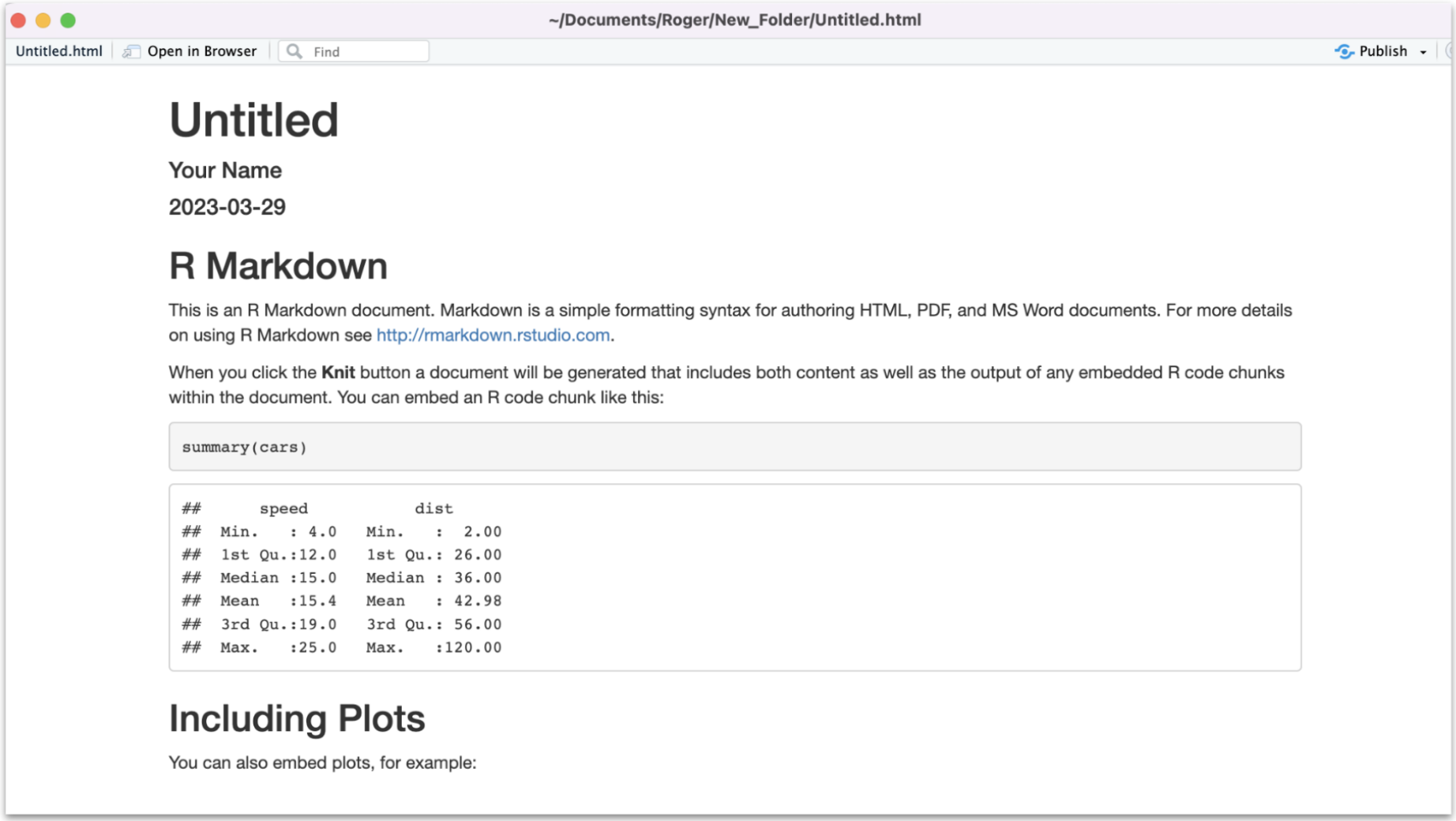
Knit file to html

Running all chunks - this will create a report from the R Markdown document!



Nice report!

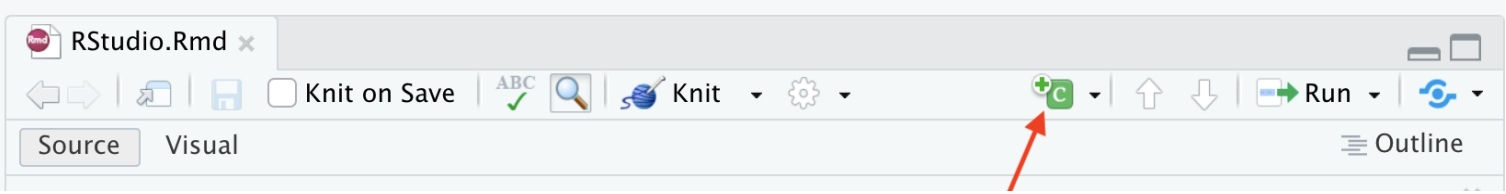
This generates a nice report that you can share with others who can open in any browser.



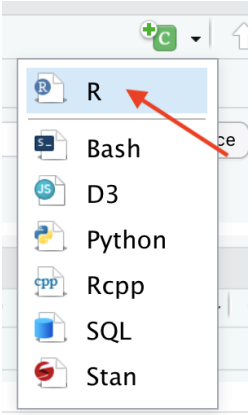
Create Chunks

To create a new R code chunk:

- Use the insert code chunk button at the top of RStudio.



- Select R (default) as the language:



Create Chunks

If you like keyboard shortcuts:

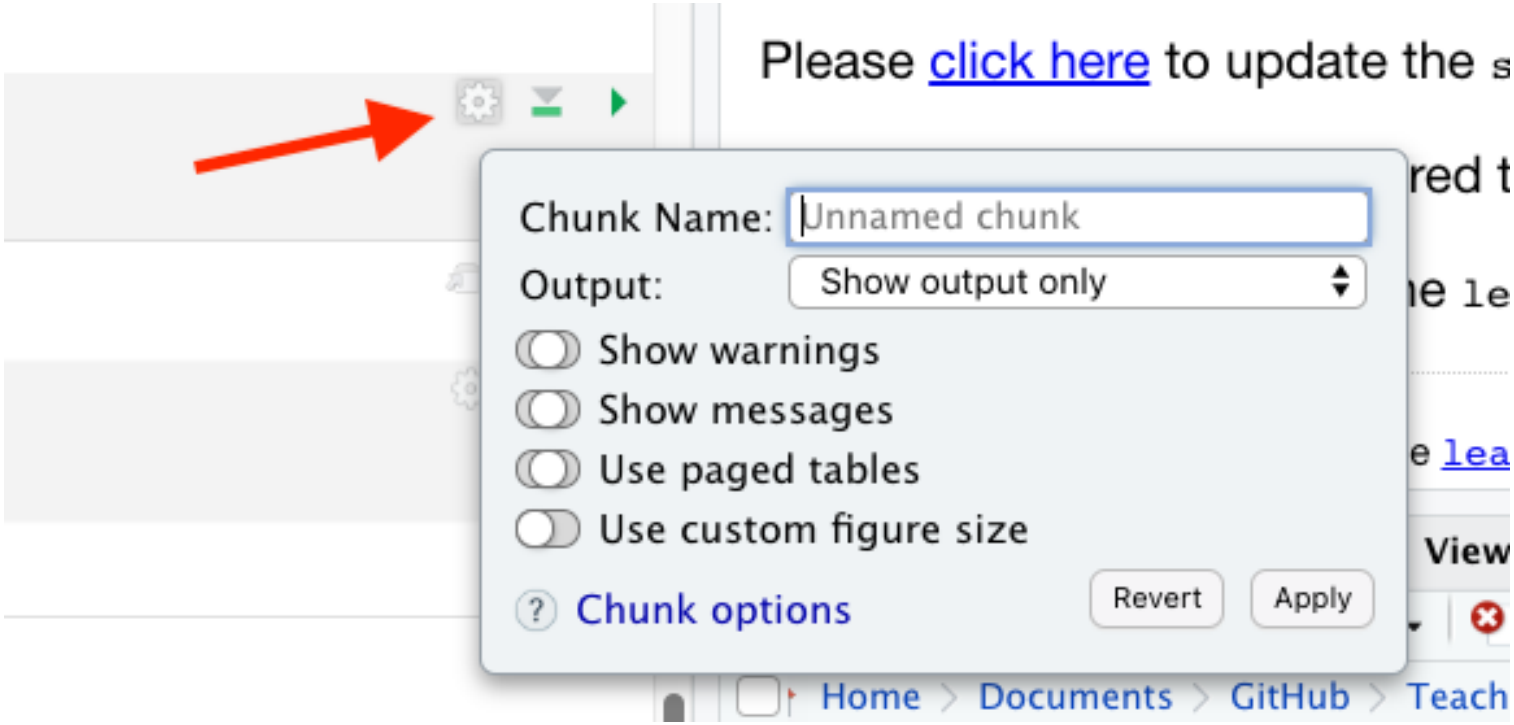
- Windows & Linux use Ctrl+Alt+I
- Mac use Command+Option+I

I is for insert.

Run previous chunks button

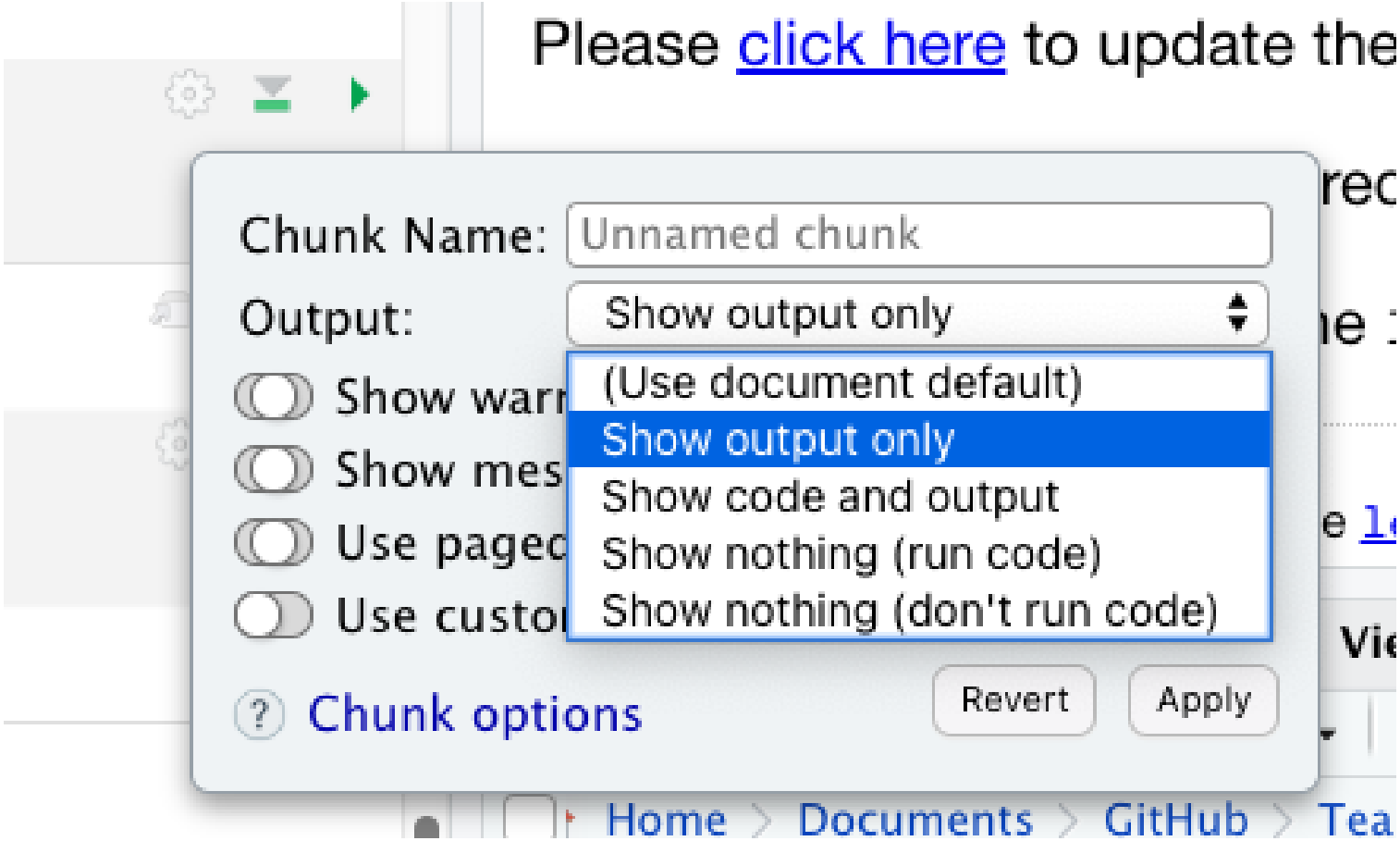
You can run all chunks above a specific chunk using this button:

Chunk settings



Chunk settings

You can specify if a chunk will be seen in the report or not.



Errors

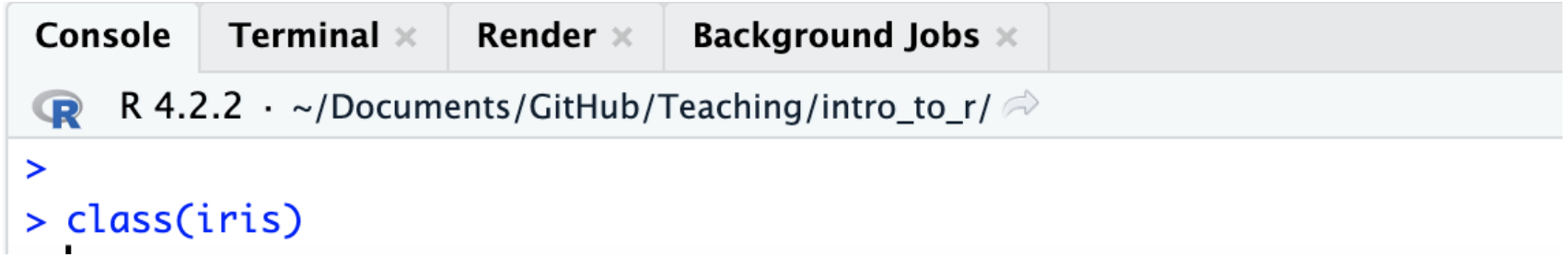
R studio can help you find issues in your code. Note that sometimes the error occurs earlier than RStudio thinks.

Useful R Studio Shortcuts

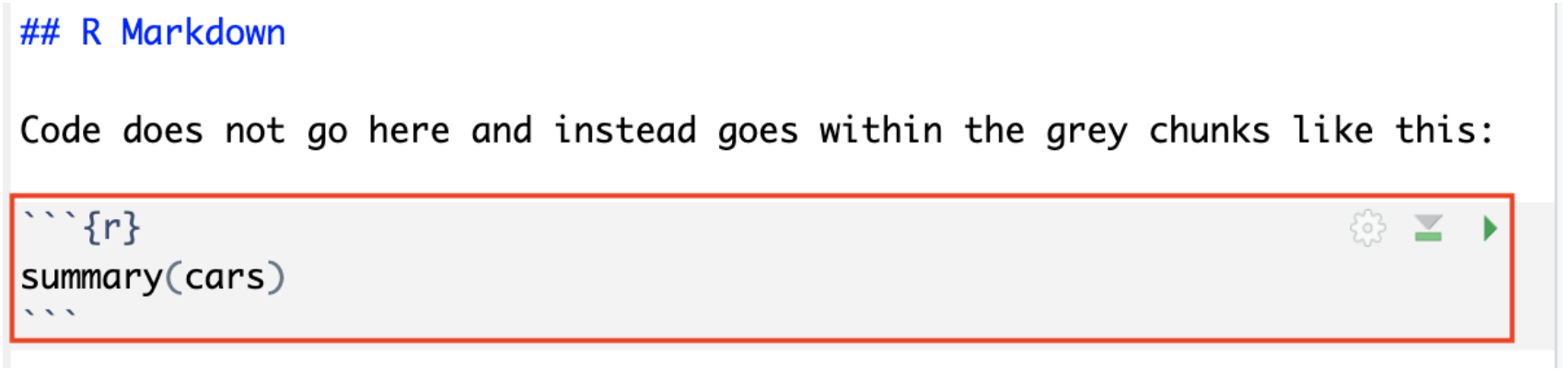
- `Ctrl + Enter` on Windows or `Command + Enter` on Mac in your script evaluates that line of code
  - It's like copying and pasting the code into the console for it to run.
- `Ctrl+1` on Windows or `Command + 1` on Mac takes you to the script page
- `Ctrl+2` on Windows or `Command + 2` on Mac takes you to the console
- http://www.rstudio.com/ide/docs/using/keyboard_shortcuts

Recap of where code goes

- you can test code in the console

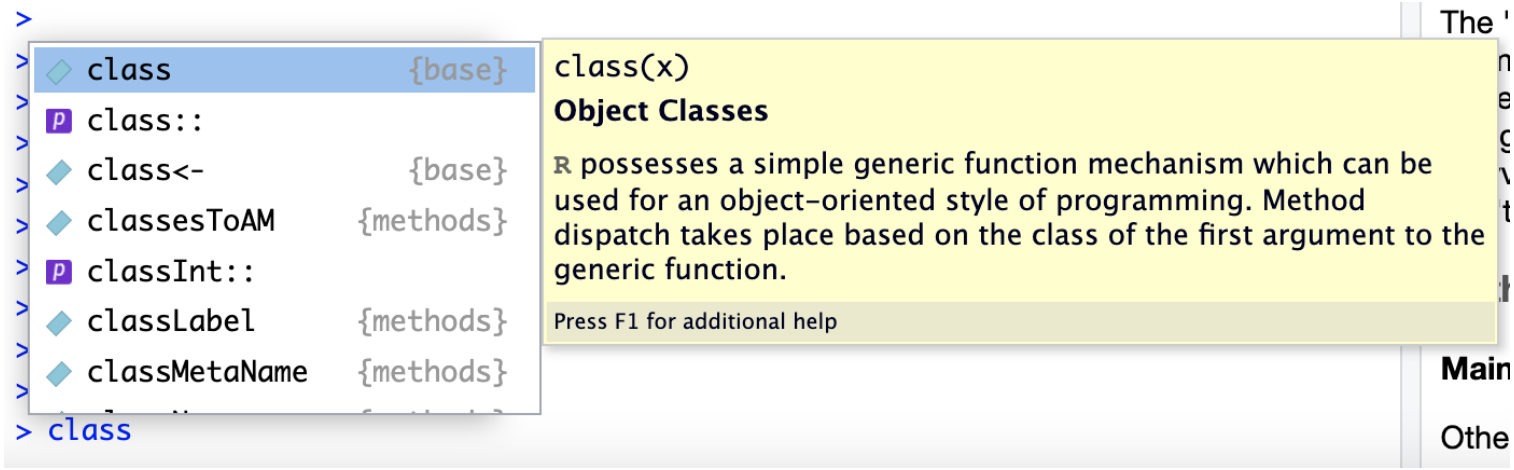


- you can save code in a chunk in the editor (Markdown file)

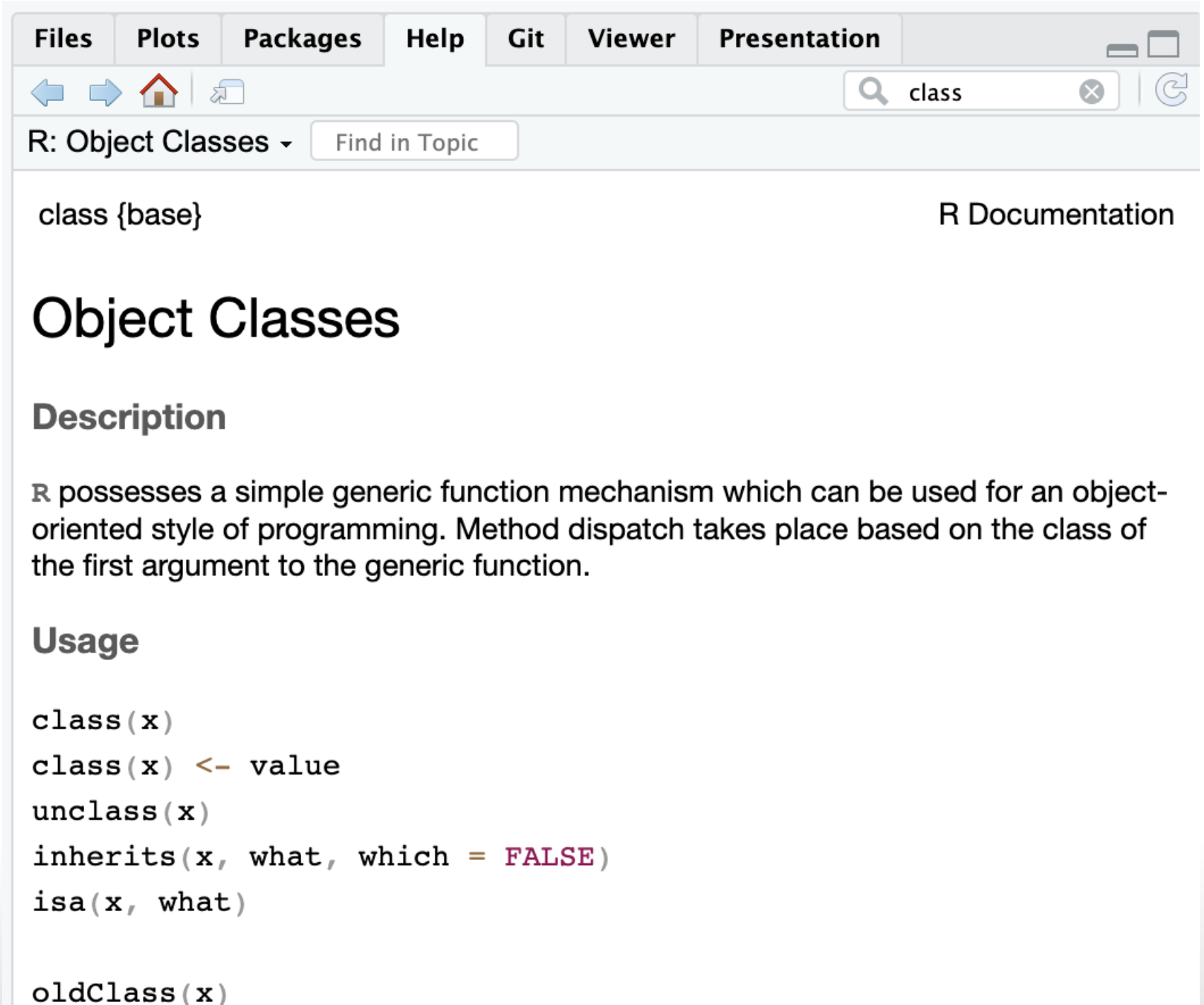


Getting help from the preview

When you type in a function name, a pop up will preview documentation to help you. It also helps you remember the name of the function if you don't remember all of it!



Get help with the help pane

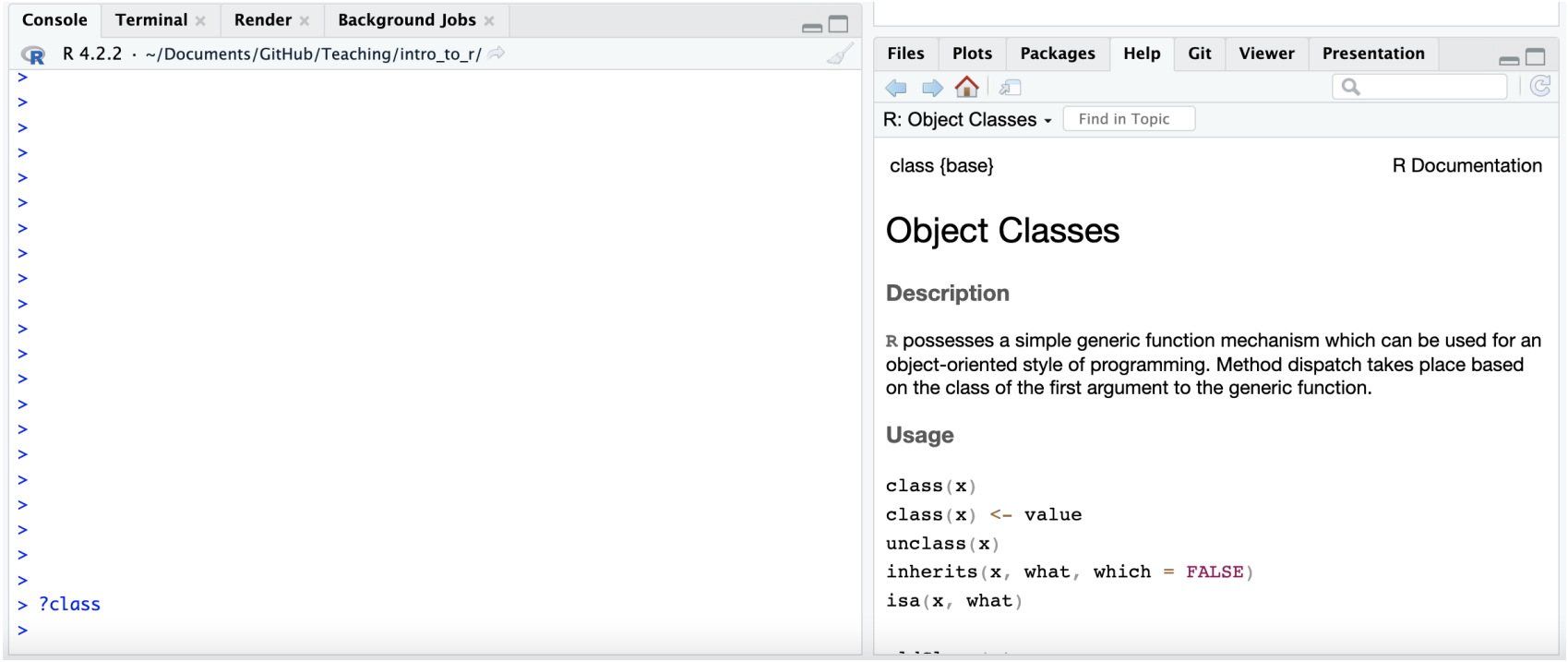


Getting Help with ?

If you know the name of a package or function:

Type `?package_name` or `?function_name` in the console to get information about packages and functions.

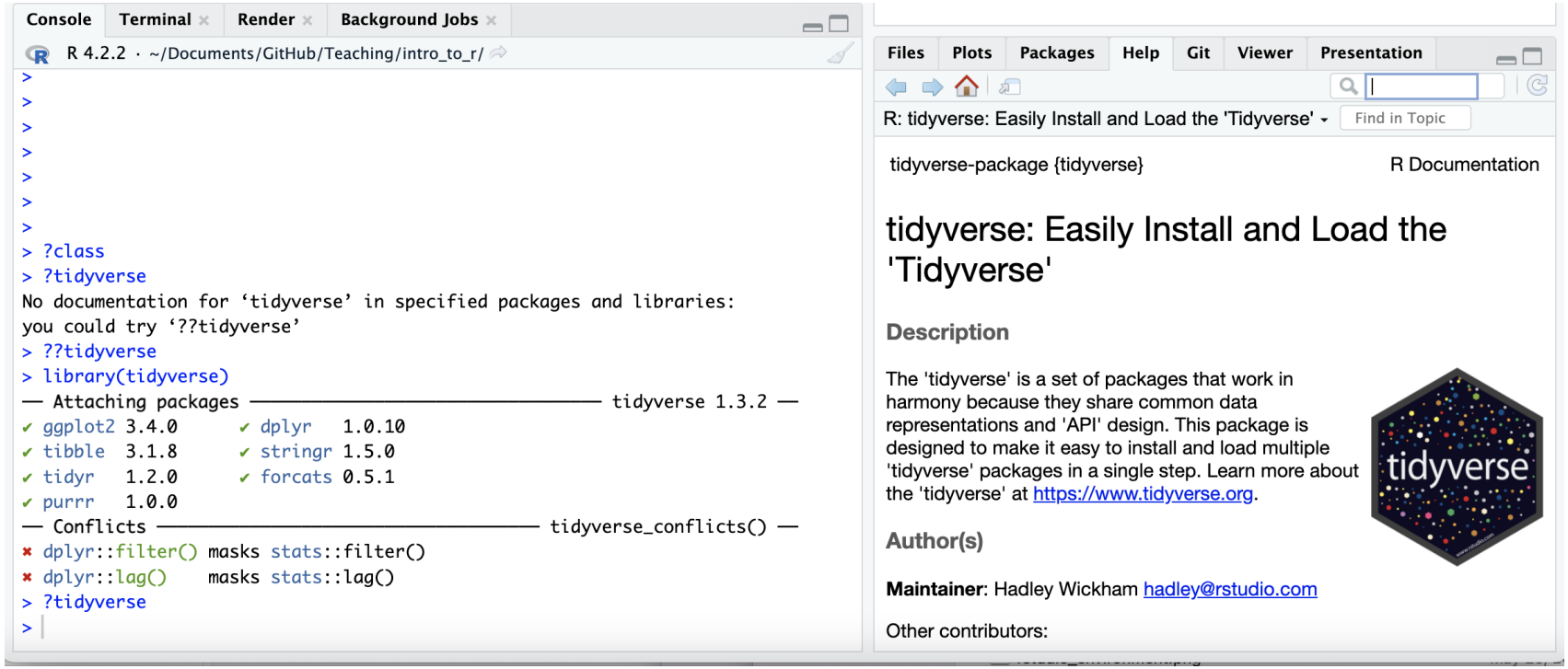
For example: `?readr` or `?read_csv`.



Double Question Mark

If you haven't loaded a package yet into R than you may get a response that there is no documentation.

Typing in `??package_name` can show you packages that you haven't loaded yet.



Summary

- RStudio makes working in R easier
- the Editor (top) is for static code like scripts or R Markdown documents
- The console is for testing code (bottom) - best to save your code though!
- R markdown documents are really helpful for lots of reasons!
- R code goes within what is called a chunk (the gray box with a green play button)
- Code chunks can be modified so that they show differently in reports

Class Website

Lab

Image by Gerd Altmann from Pixabay