

Getting started with R and RStudio



The engine



The dashboard



A tour of RStudio

~/Desktop/demo-project - RStudio

Console Terminal x Background Jobs x

R 4.3.1 · ~/Desktop/demo-project/ ↵

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: aarch64-apple-darwin20 (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.start()' for an HTML browser interface to help.
Type 'q()' to quit R.
```

> |

Environment History Connections Tutorial

Import Dataset 121 MiB List C

R Global Environment

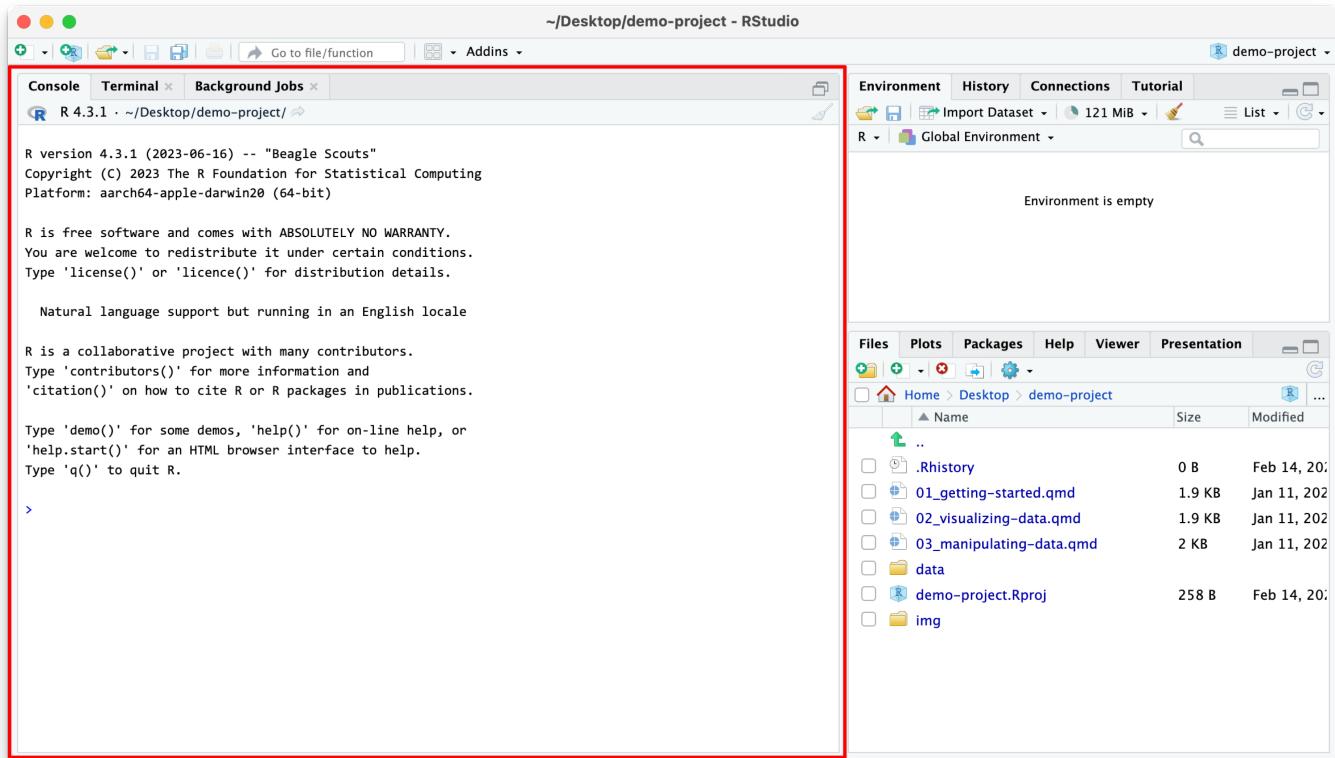
Environment is empty

Files Plots Packages Help Viewer Presentation

Home > Desktop > demo-project

	Name	Size	Modified
	..		
	.Rhistory	0 B	Feb 14, 2023
	01_getting-started.qmd	1.9 KB	Jan 11, 2023
	02_visualizing-data.qmd	1.9 KB	Jan 11, 2023
	03_manipulating-data.qmd	2 KB	Jan 11, 2023
	data		
	demo-project.Rproj	258 B	Feb 14, 2023
	img		

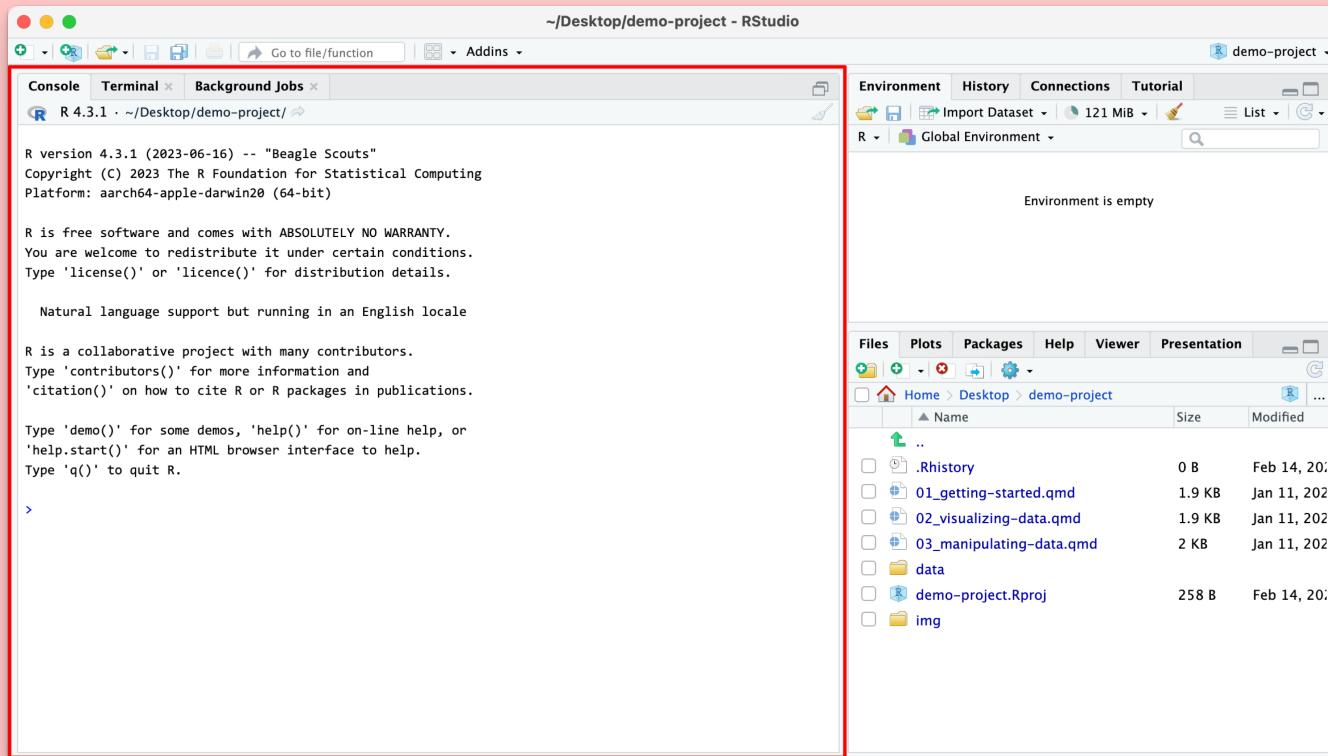
Console



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

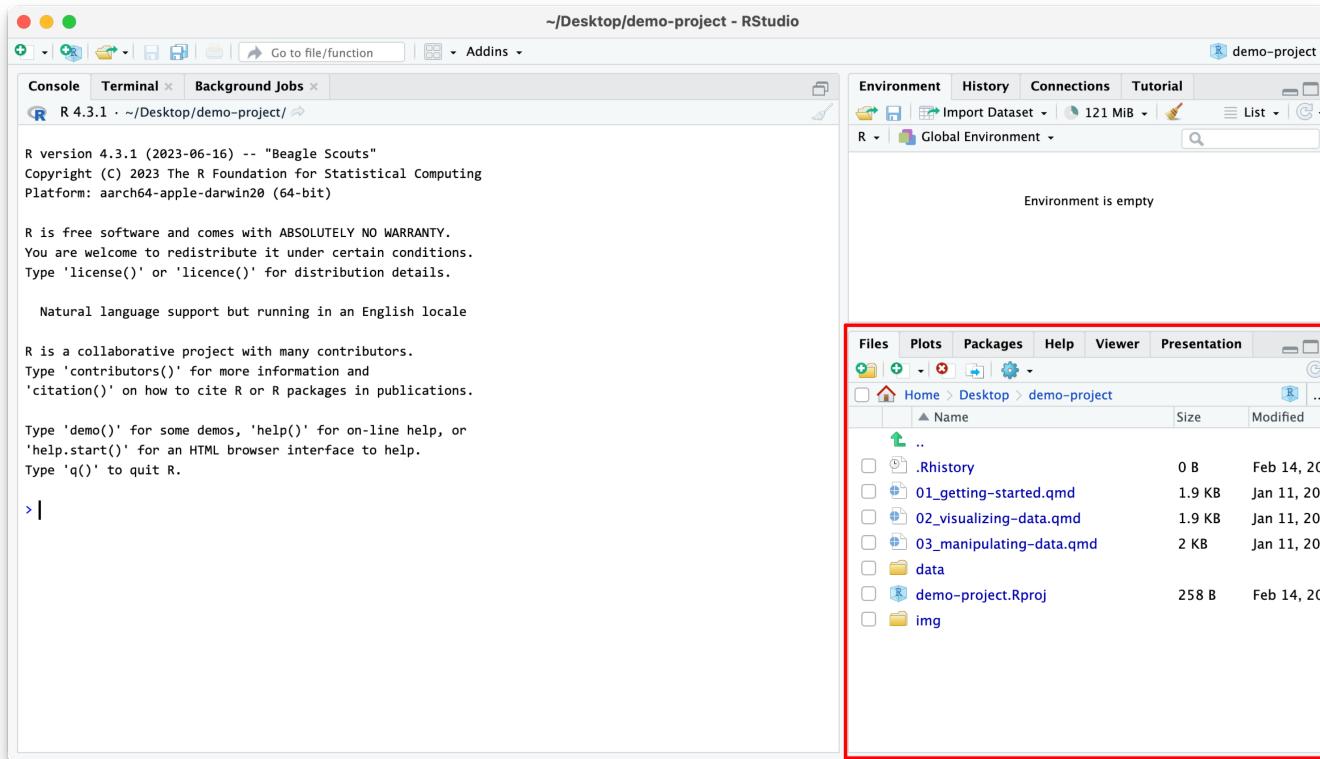
2 + 2

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

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

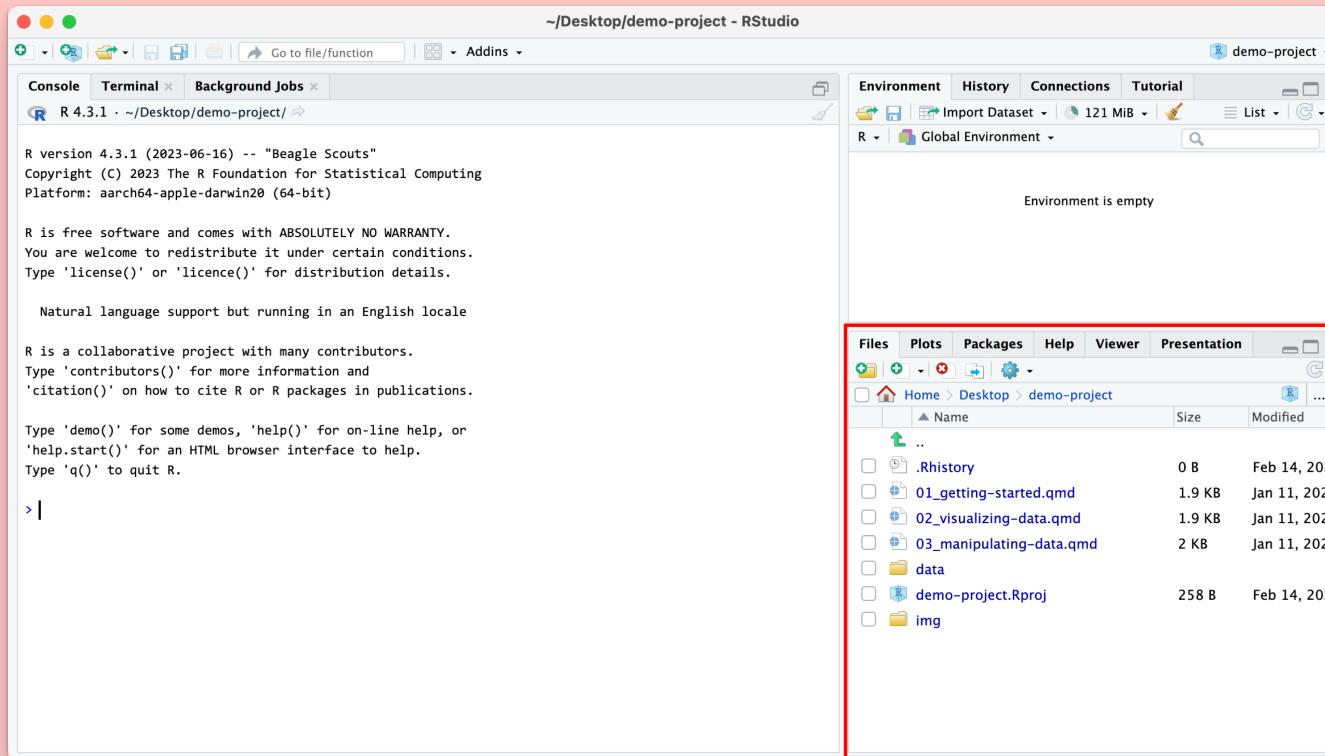
Store R code in a document instead

Files pane



All the files in your
current working
directory

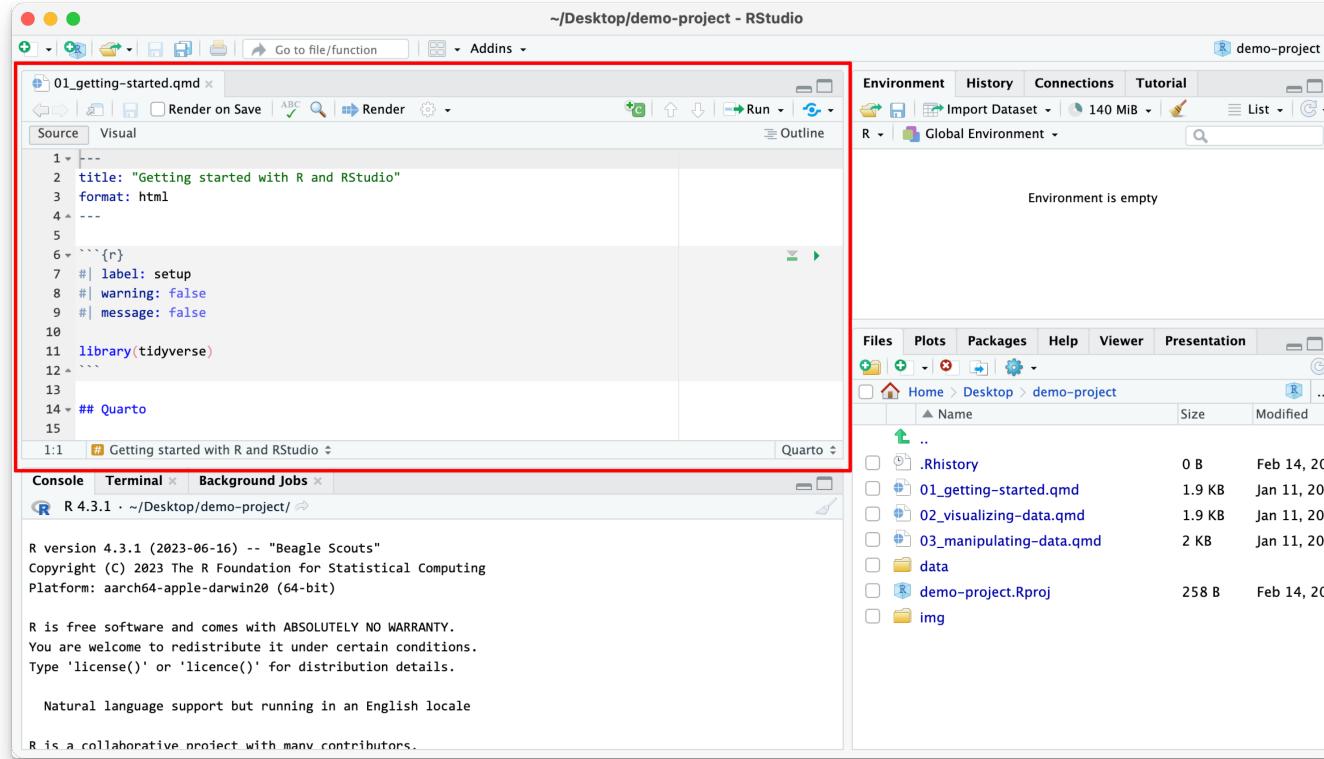
Your turn



Find `01_getting-started.qmd`

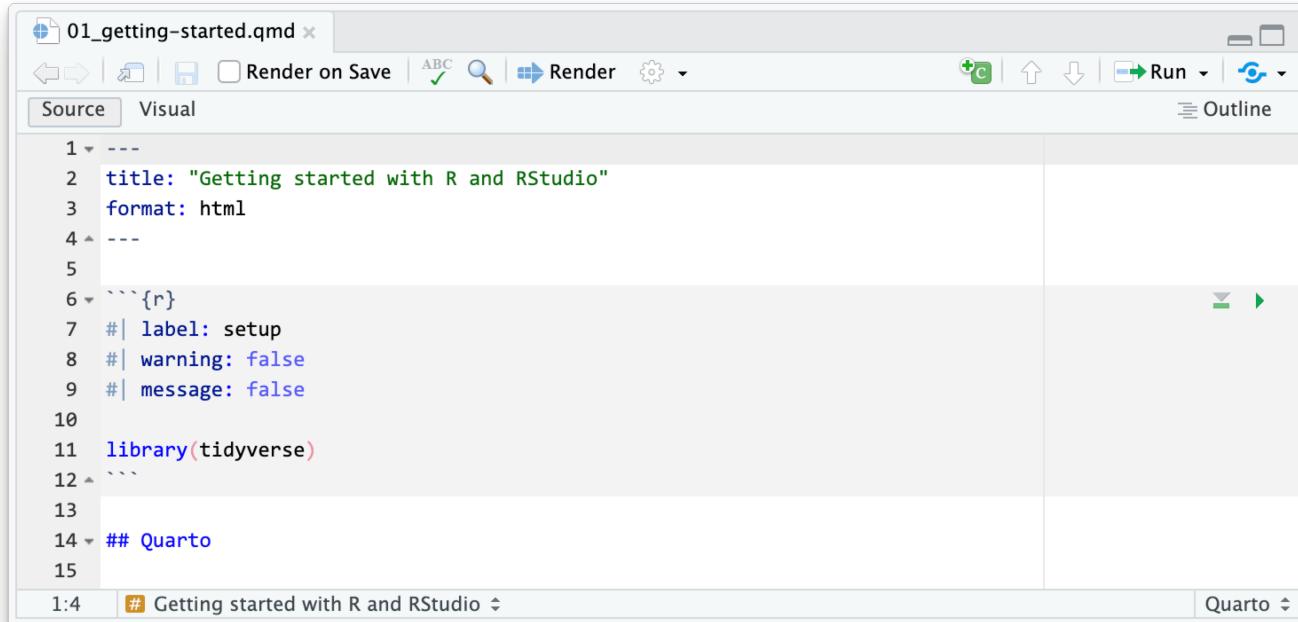
Click on its name to open the file

Source pane



Documents
open here

Quarto



```
1 ---  
2 title: "Getting started with R and RStudio"  
3 format: html  
4 ---  
5  
6 ```{r}  
7 #| label: setup  
8 #| warning: false  
9 #| message: false  
10  
11 library(tidyverse)  
12 ````  
13  
14 ## Quarto  
15
```

Document format
that combines
text and code

Acts like a
notebook for
your analysis

Quarto

The screenshot shows the RStudio interface with a Quarto file open. A red box highlights the first two code chunks in the Source tab:

```
14 ## Quarto
15
16 This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
within the file, the results appear beneath the code.
17
18 R code goes in **code chunks**, denoted by three backticks. Try executing this chunk by clicking the
*Run* button (a small green triangle) within the chunk or by placing your cursor inside it and
pressing *Ctrl+Shift+Enter* (or *Cmd+Shift+Enter* on Mac).
19
20 ``{r}
21 ggplot(data = mpg) +
22   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
23 ``
```

The resulting plot is a scatter plot of city vs highway fuel economy for different cars, with transparency applied to the points.

The Environment pane shows "Environment is empty".

The Files pane shows the project structure:

Name	Size	Modified
..		
.Rhistory	0 B	Feb 14, 2024
01_getting-started.qmd	1.9 KB	Feb 14, 2024
02_visualizing-data.qmd	1.9 KB	Jan 11, 2024,
03_manipulating-data.qmd	2 KB	Jan 11, 2024,
data		
demo-project.Rproj	258 B	Feb 14, 2024
img		

The Console tab shows the R session history:

```
R 4.3.1 · ~/Desktop/demo-project/
> library(tidyverse)
> ggplot(data = mpg) +
+   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
>
```

Text

Quarto

The screenshot shows the RStudio interface with a Quarto document open. The code chunk at line 20 is highlighted with a red box:

```
14 ## Quarto
15
16 This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
within the file, the results appear beneath the code.
17
18 R code goes in **code chunks**, denoted by three backticks. Try executing this chunk by clicking the
*Run* button (a small green triangle) within the chunk or by placing your cursor inside it and
pressing *Ctrl+Shift+Enter* (or *Cmd+Shift+Enter* on Mac).
19
20 ``{r}
21 ggplot(data = mpg) +
22   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
23 ``
```

The resulting ggplot2 visualization is displayed below the code chunk. The RStudio environment pane shows an empty global environment.

Console output:

```
R 4.3.1 · ~/Desktop/demo-project/
> library(tidyverse)
> ggplot(data = mpg) +
+   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
>
```

Text

Code

Quarto

The screenshot shows the RStudio interface with a Quarto document open. The code chunk at line 22 contains an R command to create a scatter plot of city vs highway fuel economy. The resulting plot is highlighted with a red box in the preview area. The R console at the bottom shows the executed R code and its output.

```
14 ## Quarto
15
16 This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
within the file, the results appear beneath the code.
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18 R code goes in code chunks, denoted by three backticks. Try executing this chunk by clicking the
*Run* button (a small green triangle) within the chunk or by placing your cursor inside it and
pressing *Ctrl+Shift+Enter* (or *Cmd+Shift+Enter* on Mac).
19
20 ``{r}
21 ggplot(data = mpg) +
22   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
23 ````{r}
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```

Your turn

The screenshot shows the RStudio interface with a Quarto document titled "01_getting-started.qmd". The code chunk at line 20, which generates a scatter plot, is highlighted with a red box. Below the code, the resulting ggplot2 scatter plot is displayed, showing the relationship between city fuel consumption (cty) and highway fuel consumption (hwy). The plot has a light gray background with a grid. The x-axis ranges from approximately 10 to 50, and the y-axis ranges from approximately 10 to 50. Data points are semi-transparent circles. The RStudio environment pane shows an empty global environment. The file browser pane shows the project structure:

Name	Size	Modified
.Rhistory	0 B	Feb 14, 2024
01_getting-started.qmd	1.9 KB	Feb 14, 2024
02_visualizing-data.qmd	1.9 KB	Jan 11, 2024,
03_manipulating-data.qmd	2 KB	Jan 11, 2024,
data		
demo-project.Rproj	258 B	Feb 14, 2024
img		

Read the instructions

Run the code chunk by clicking the play button

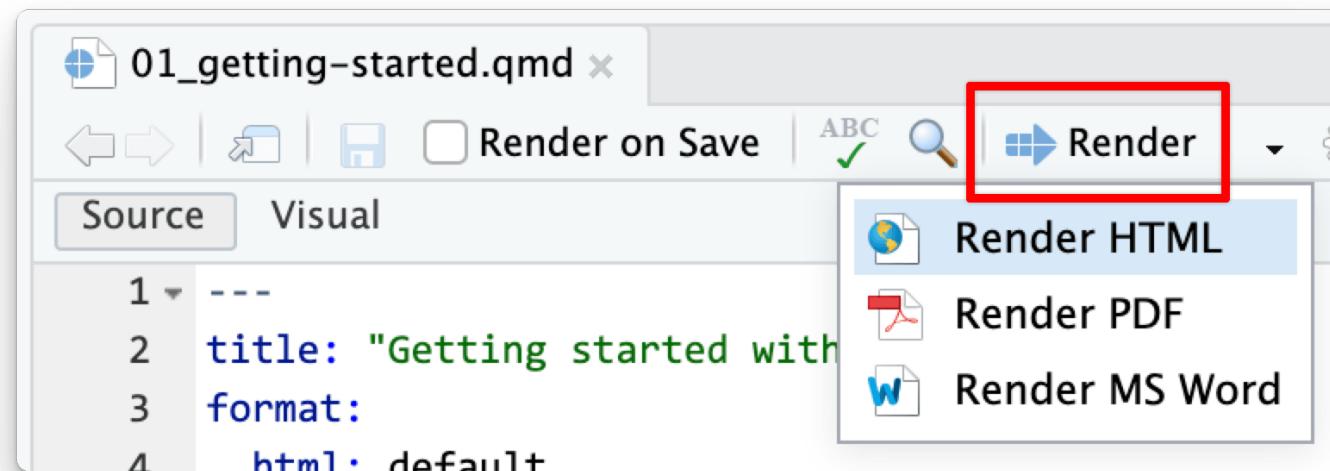
Your turn

Add a new chunk

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

Render

Render a Quarto document into a standalone shareable file



Quarto

The best way to combine R code and narrative

We'll use it throughout the workshop

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)
```

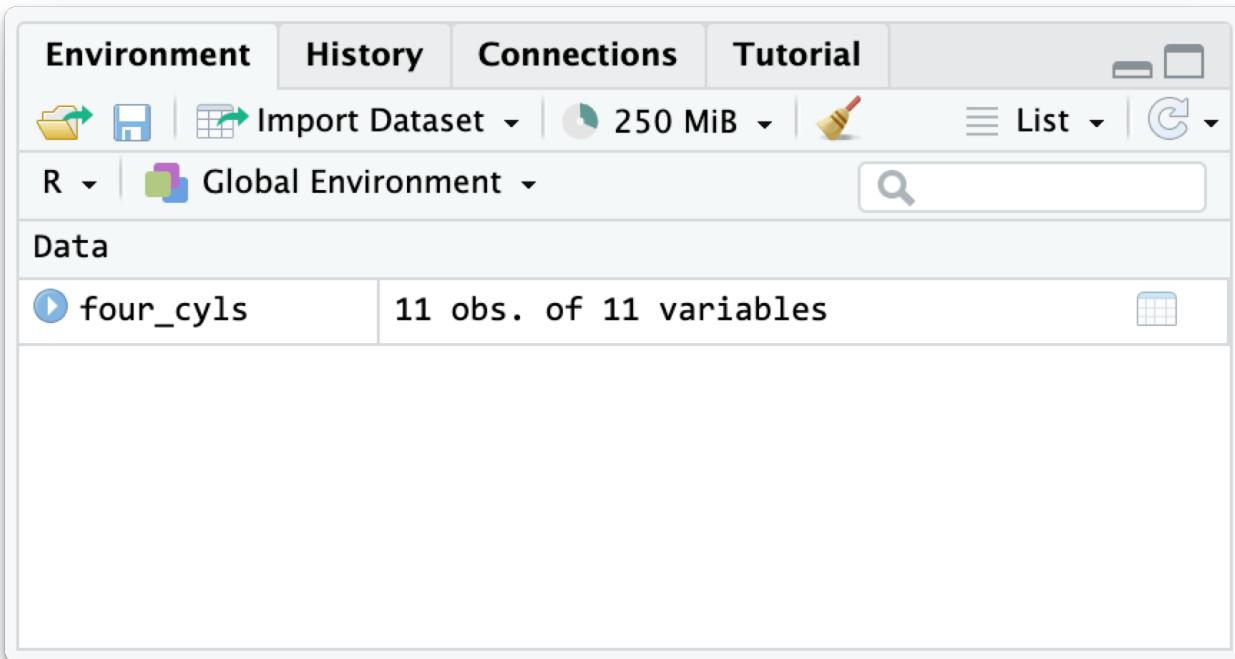
Find these chunks in the notebook and run them.
What's different about what happens?

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



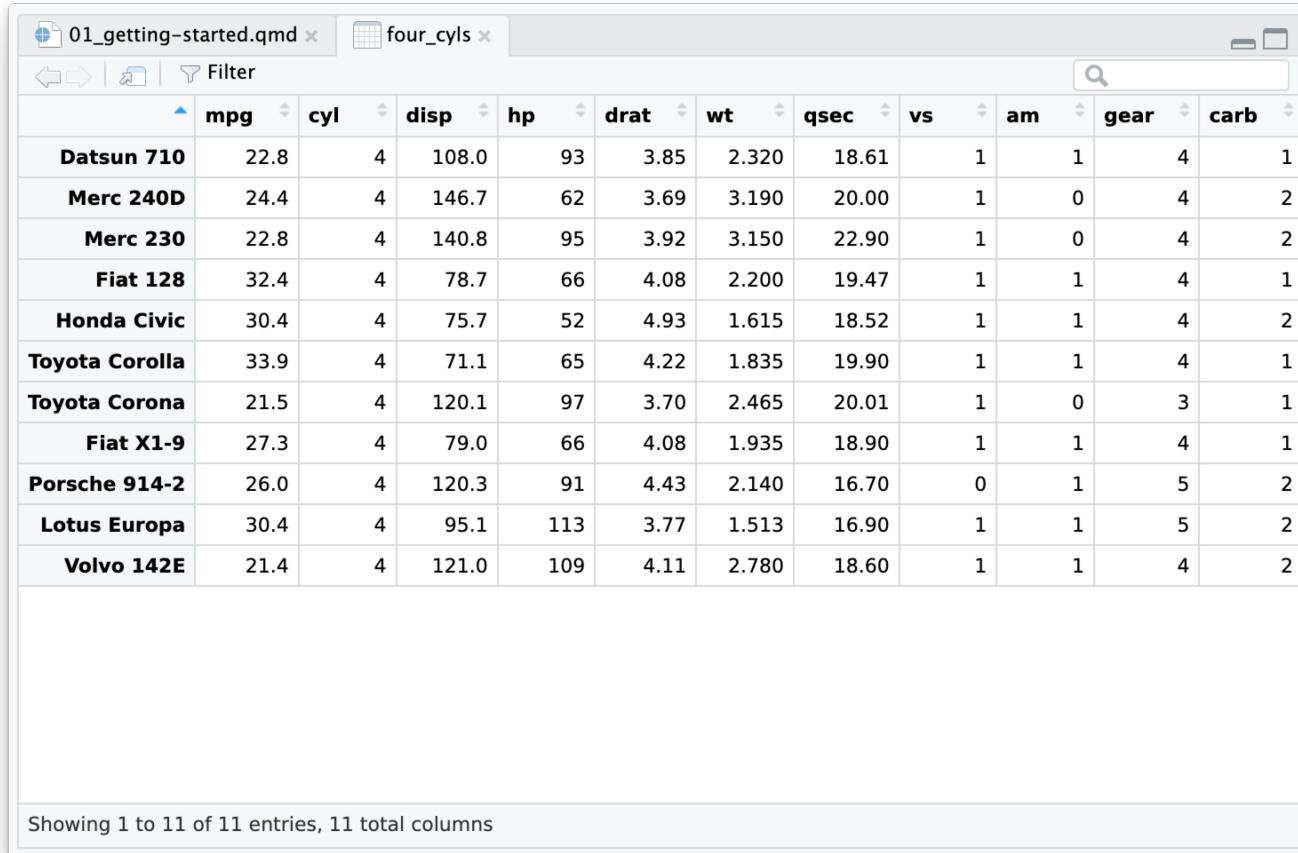
List of all the
variables you've
created

Your turn

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

What happens?

Viewer



The screenshot shows the RStudio interface with a viewer panel open. The viewer panel title is "four_cyls". The data frame contains 11 rows of car information, including columns for mpg, cyl, disp, hp, drat, wt, qsec, vs, am, gear, and carb. The first few rows are:

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Datsun 710	22.8	4	108.0	93	3.85	2.320	18.61	1	1	4	1
Merc 240D	24.4	4	146.7	62	3.69	3.190	20.00	1	0	4	2
Merc 230	22.8	4	140.8	95	3.92	3.150	22.90	1	0	4	2
Fiat 128	32.4	4	78.7	66	4.08	2.200	19.47	1	1	4	1
Honda Civic	30.4	4	75.7	52	4.93	1.615	18.52	1	1	4	2
Toyota Corolla	33.9	4	71.1	65	4.22	1.835	19.90	1	1	4	1
Toyota Corona	21.5	4	120.1	97	3.70	2.465	20.01	1	0	3	1
Fiat X1-9	27.3	4	79.0	66	4.08	1.935	18.90	1	1	4	1
Porsche 914-2	26.0	4	120.3	91	4.43	2.140	16.70	0	1	5	2
Lotus Europa	30.4	4	95.1	113	3.77	1.513	16.90	1	1	5	2
Volvo 142E	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

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

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

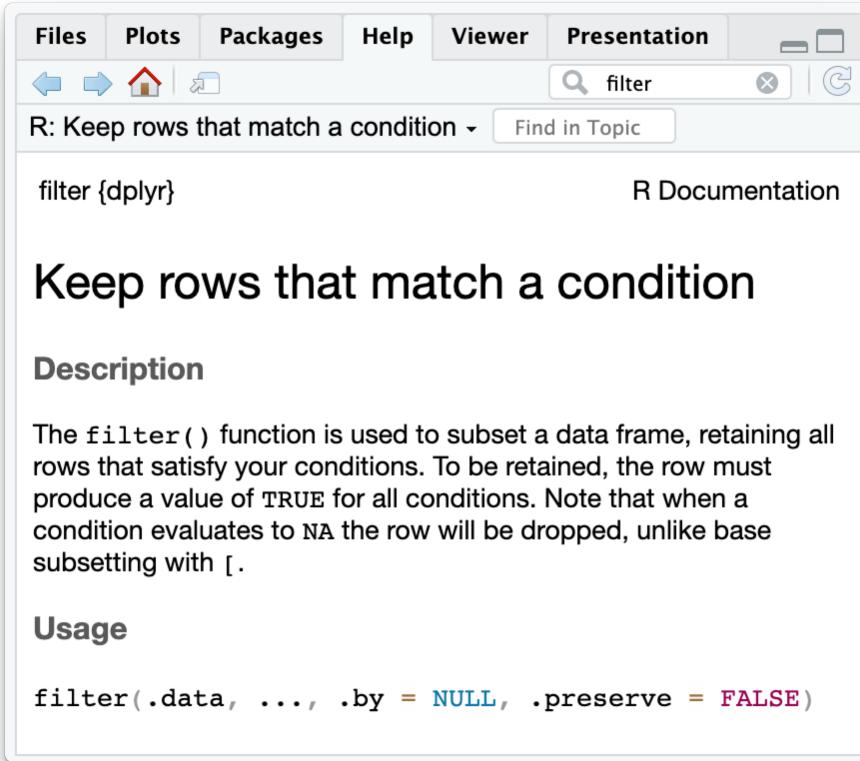
Help

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 prove 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
```

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
```

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

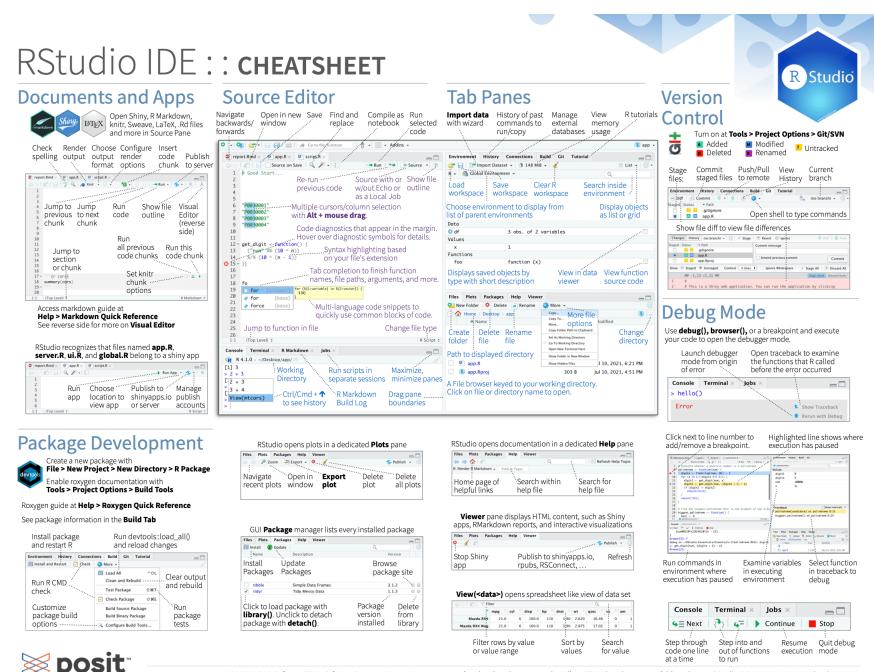
Your turn

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



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Next up

Data basics