

# Getting started with R and RStudio



The engine



The dashboard



# A tour of RStudio

~/Desktop/demo-project - RStudio

demo-project

Console Terminal Background Jobs

```
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

Global Environment

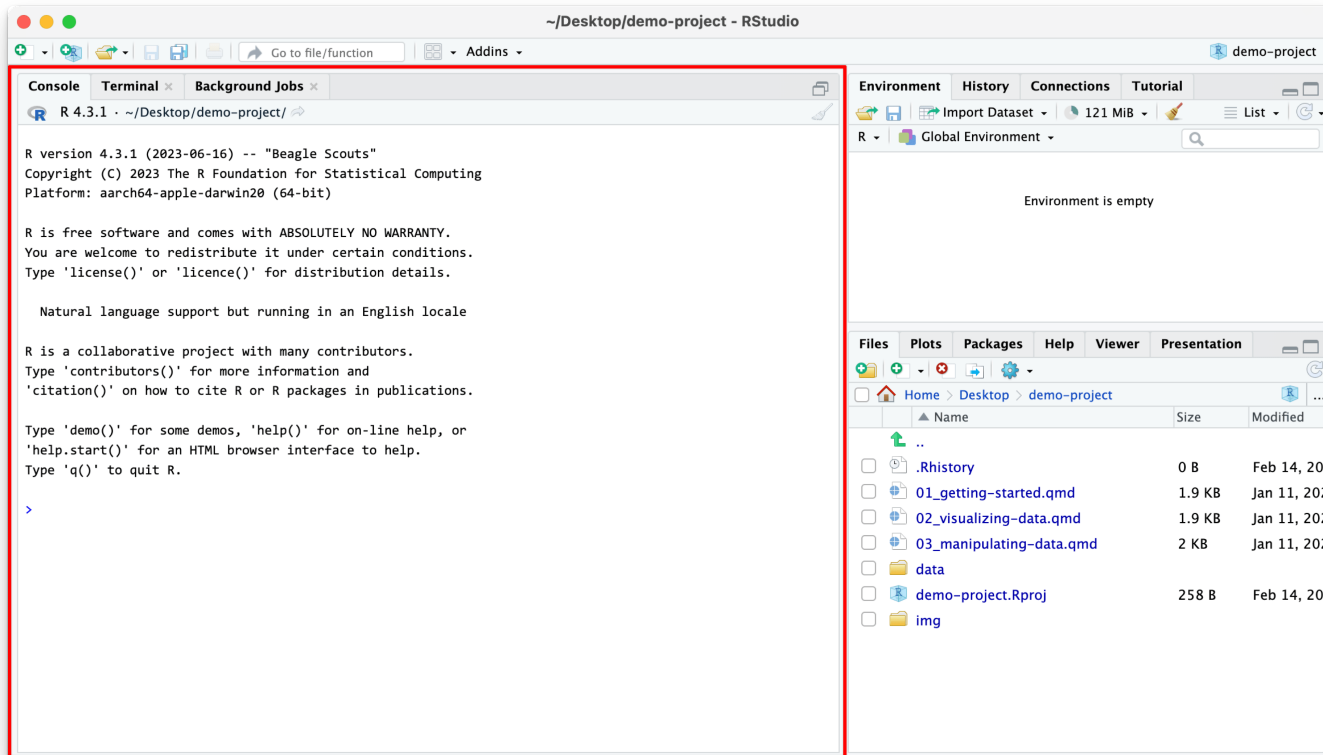
Environment is empty

Files Plots Packages Help Viewer Presentation

Home > Desktop > demo-project

	Name	Size	Modified
	..		
<input type="checkbox"/>	.Rhistory	0 B	Feb 14, 2023
<input type="checkbox"/>	01_getting-started.qmd	1.9 KB	Jan 11, 2023
<input type="checkbox"/>	02_visualizing-data.qmd	1.9 KB	Jan 11, 2023
<input type="checkbox"/>	03_manipulating-data.qmd	2 KB	Jan 11, 2023
<input type="checkbox"/>	data		
<input type="checkbox"/>	demo-project.Rproj	258 B	Feb 14, 2023
<input type="checkbox"/>	img		

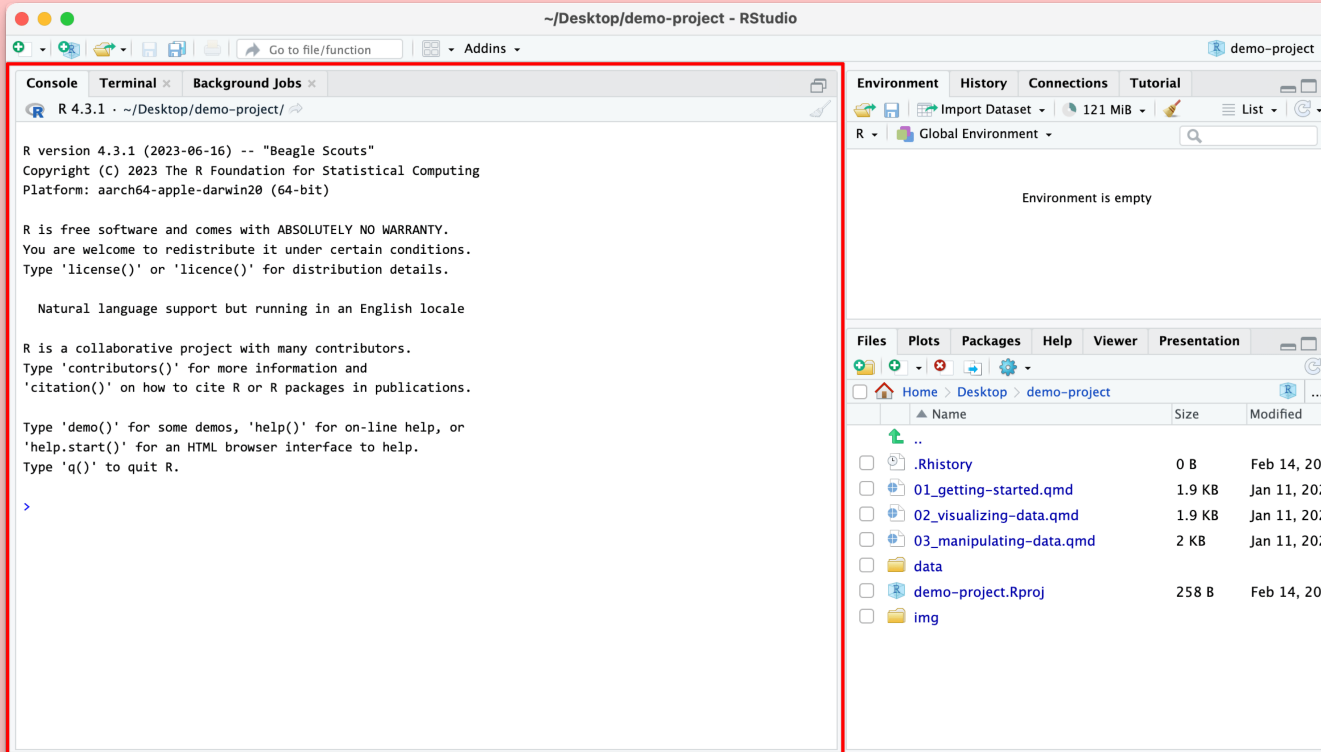
# Console



**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

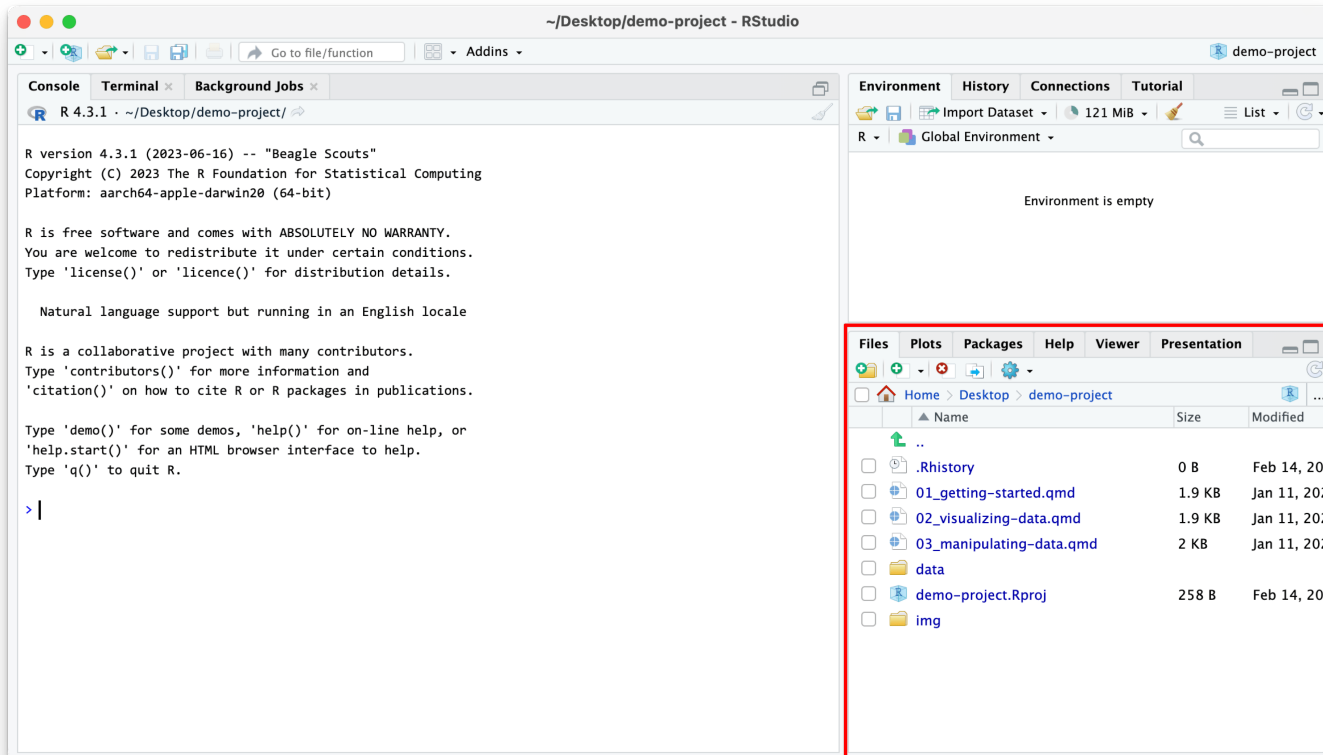
```
2 + 2
```

```
## [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

The screenshot shows the RStudio interface. The console on the left displays the R version 4.3.1 startup message. The file explorer on the right, highlighted with a red border, shows the contents of the `~/Desktop/demo-project` directory. The file `01_getting-started.qmd` is listed with a size of 1.9 KB and a modification date of Jan 11, 2022.

```
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)

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Natural language support but running in an English locale

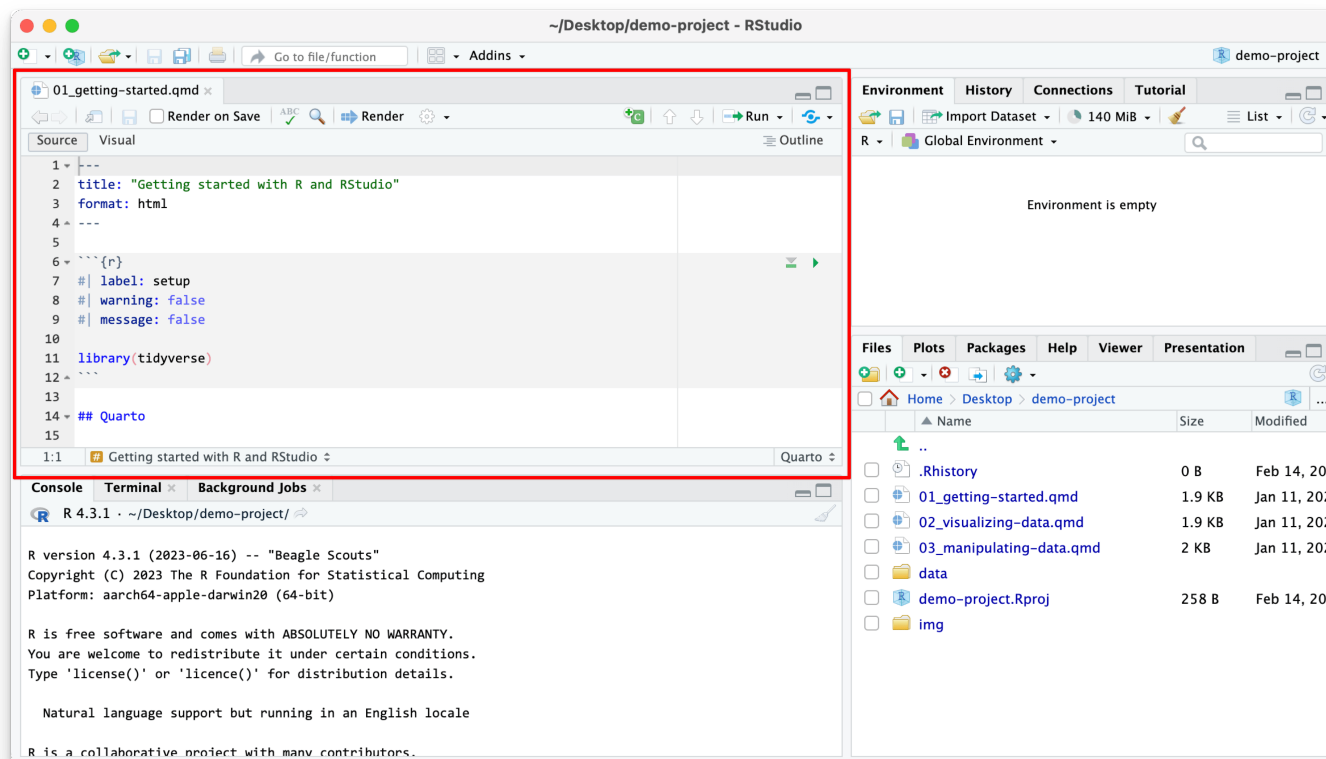
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

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.

> |
```

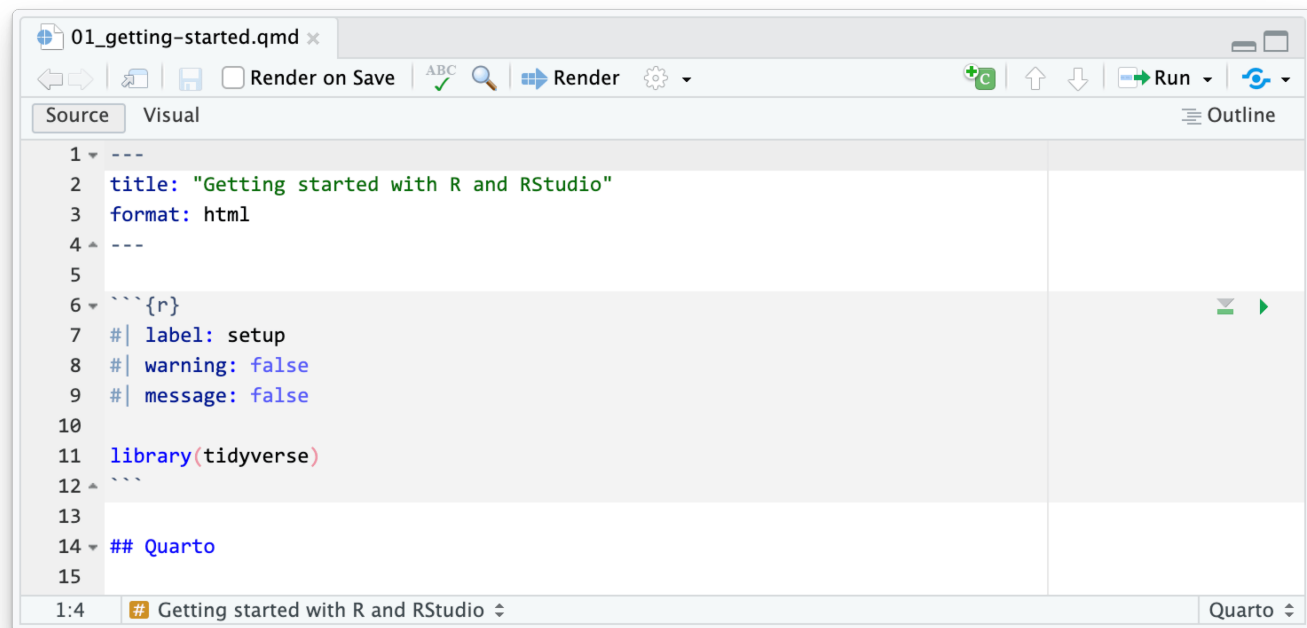
Name	Size	Modified
..		
.Rhistory	0 B	Feb 14, 2022
01_getting-started.qmd	1.9 KB	Jan 11, 2022
02_visualizing-data.qmd	1.9 KB	Jan 11, 2022
03_manipulating-data.qmd	2 KB	Jan 11, 2022
data		
demo-project.Rproj	258 B	Feb 14, 2022
img		

# Source pane



Documents  
open here

# Quarto



The screenshot shows the Quarto editor interface. The top bar includes a file name '01\_getting-started.qmd', navigation icons, and a 'Render' button. The main editor area is split into 'Source' and 'Visual' views. The 'Source' view shows the following code:

```
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
```

The status bar at the bottom indicates the current position '1:4' and the document title '# Getting started with R and RStudio'.

**Document format  
that combines  
text and code**

**Acts like a  
notebook for  
your analysis**

# Quarto

Text

The screenshot displays the RStudio interface for a Quarto project. The main editor shows a file named `01_getting-started.qmd` with the following content:

```
14 - ## Quarto
15 -
16 - This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
17 - within the file, the results appear beneath the code.
18 - R code goes in code chunks, denoted by three backticks. Try executing this chunk by clicking the
19 - *Run* button (a small green triangle) within the chunk or by placing your cursor inside it and
20 - pressing *Ctrl+Shift+Enter* (or *Cmd+Shift+Enter* on Mac).
21 -
22 - ```{r}
23 - ggplot(data = mpg) +
24 -   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
25 - ```
```

The code chunk is highlighted with a red box. Below the code, a scatter plot is rendered, showing the relationship between city (cty) and highway mileage (hwy) for the mpg dataset. The plot has a grid and a y-axis labeled '40'. The console at the bottom shows the execution of the R code:

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

The right-hand side of the interface shows the Environment pane (empty), the Files pane (listing project files like `.Rhistory`, `01_getting-started.qmd`, `02_visualizing-data.qmd`, `03_manipulating-data.qmd`, `data`, `demo-project.Rproj`, and `img`), and the Plots pane.

# Quarto

The screenshot displays the RStudio interface for a Quarto project. The main editor shows a code chunk with the following content:

```
14 ## Quarto
15
16 This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
17 within the file, the results appear beneath the code.
18 R code goes in code chunks, denoted by three backticks. Try executing this chunk by clicking the
19 Run button (a small green triangle) within the chunk or by placing your cursor inside it and
20 pressing Ctrl+Shift+Enter (or Cmd+Shift+Enter on Mac).
21
22 ```{r}
23 ggplot(data = mpg) +
24   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
25 ```
```

The code chunk is highlighted with a red box. Below the code, a scatter plot is rendered, showing the relationship between city (cty) and highway (hwy) mileage for different car models. The plot has a grid and a y-axis labeled '40'.

The console at the bottom shows the execution of the code:

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

The right-hand side of the interface shows the Environment pane (empty), the Files pane (listing project files), and the Plots pane (empty).

Text

Code

# Quarto

The screenshot shows the RStudio interface with a Quarto file open. The source editor contains the following code:

```
14 ## Quarto
15
16 This is a [Quarto](https://quarto.org/) file (it has a .qmd file extension). When you execute code
17 within the file, the results appear beneath the code.
18 R code goes in code chunks, denoted by three backticks. Try executing this chunk by clicking the
19 Run button (a small green triangle) within the chunk or by placing your cursor inside it and
20 pressing Ctrl+Shift+Enter (or Cmd+Shift+Enter on Mac).
21
22 ```{r}
23 ggplot(data = mpg) +
24   geom_point(mapping = aes(x = cty, y = hwy), alpha = 0.2)
25 ```
```

The console shows the execution of the code:

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

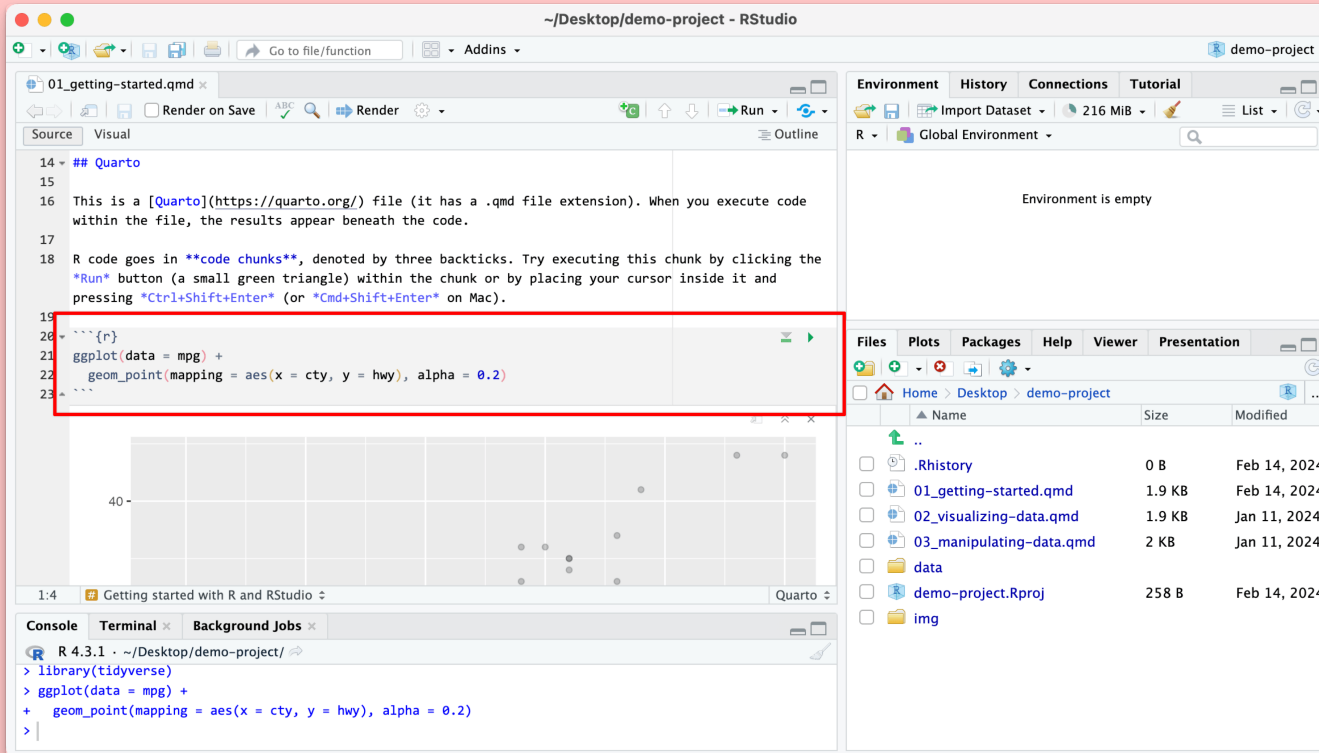
The viewer pane displays a scatter plot of highway mileage (hwy) versus city miles per gallon (cty) for the mpg dataset. The plot is semi-transparent (alpha = 0.2) and shows a positive correlation. A red box highlights the plot area.

Text

Code

Output

# Your turn



The screenshot shows the RStudio interface with a Quarto file open. The code chunk is highlighted with a red box, and the plot below it shows a scatter plot of highway mileage (hwy) versus city miles per gallon (cty) for the mpg dataset. The console shows the execution of the code.

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

Environment: Global Environment (empty)

Files: Home > Desktop > demo-project

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		

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

Read the  
instructions

Run the code chunk  
by clicking the play  
button

# Your turn

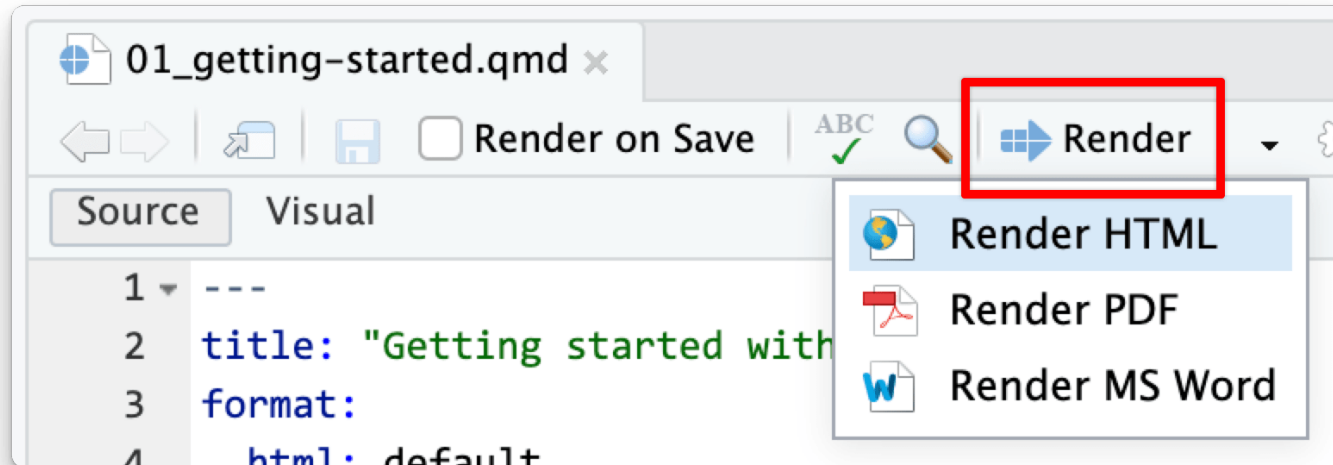
**Add a new chunk**

**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)
```

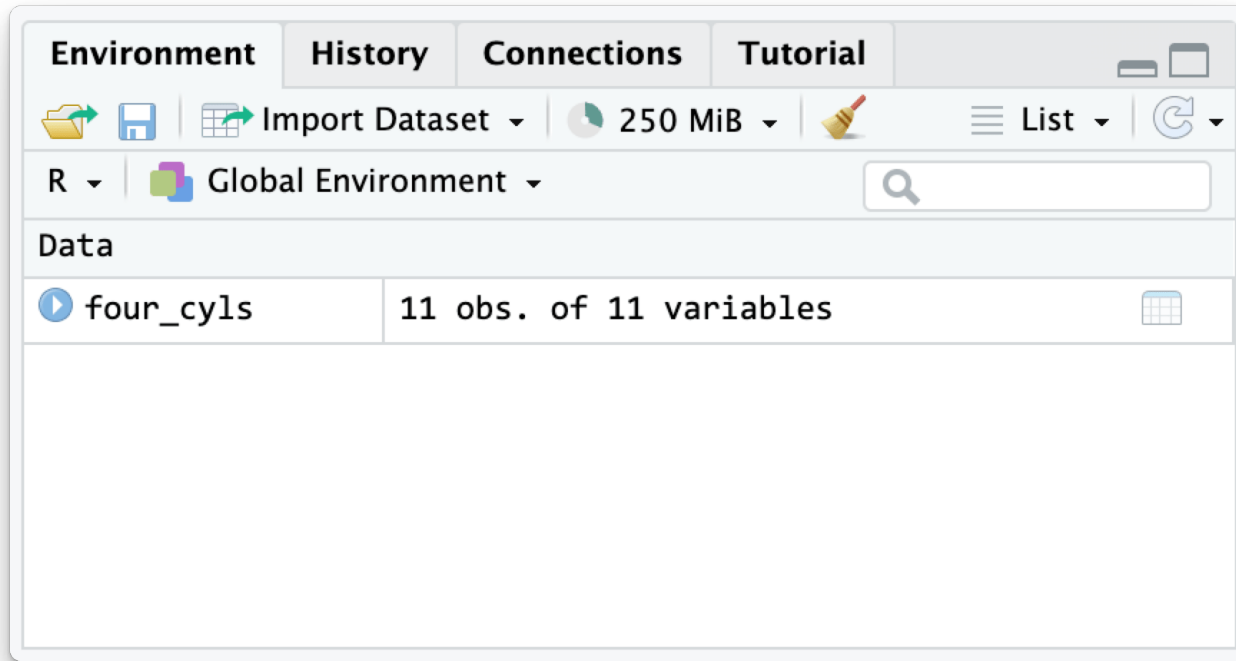
**Find these chunks in the notebook and run them.  
What's different about what happens?**

# 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



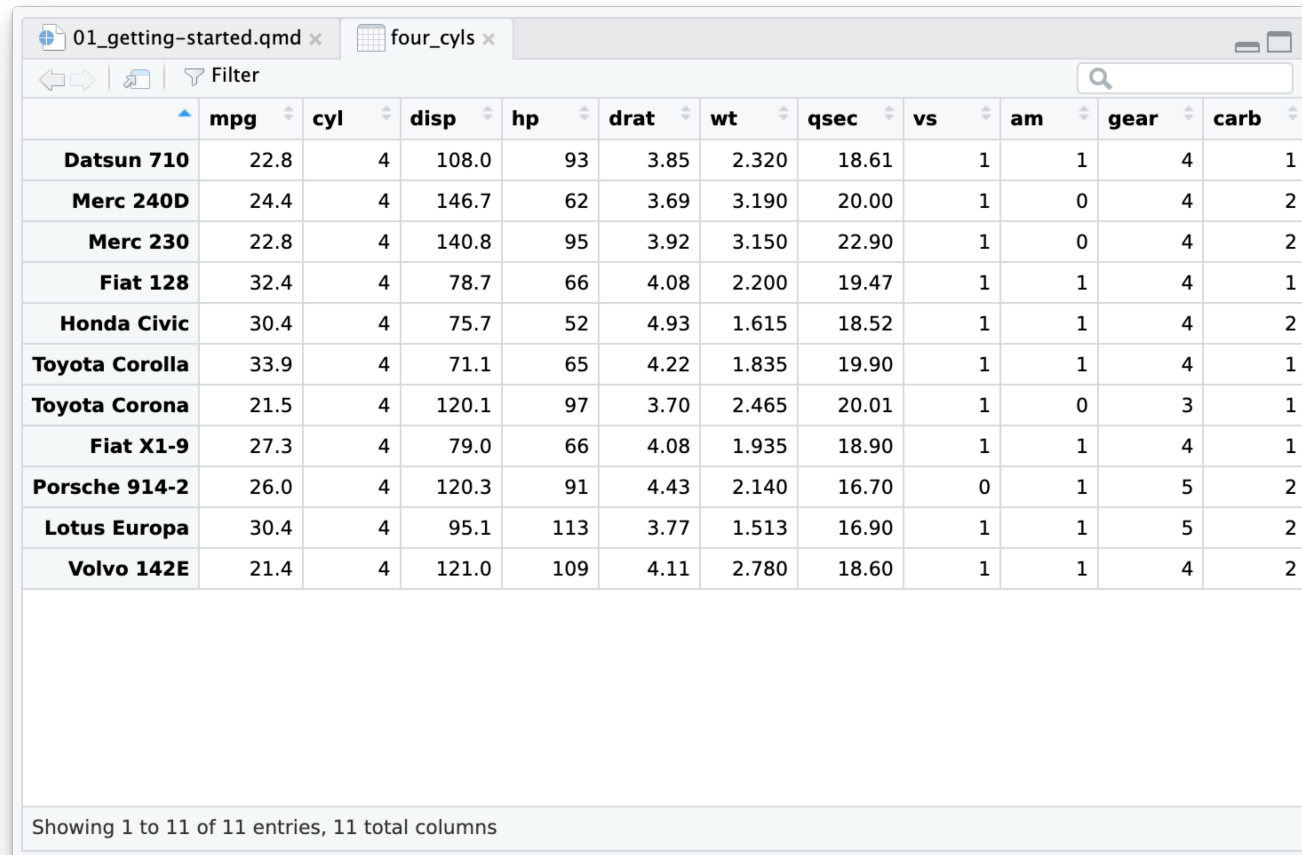
List of all the  
variables you've  
created

# Your turn

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

What happens?

# Viewer



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



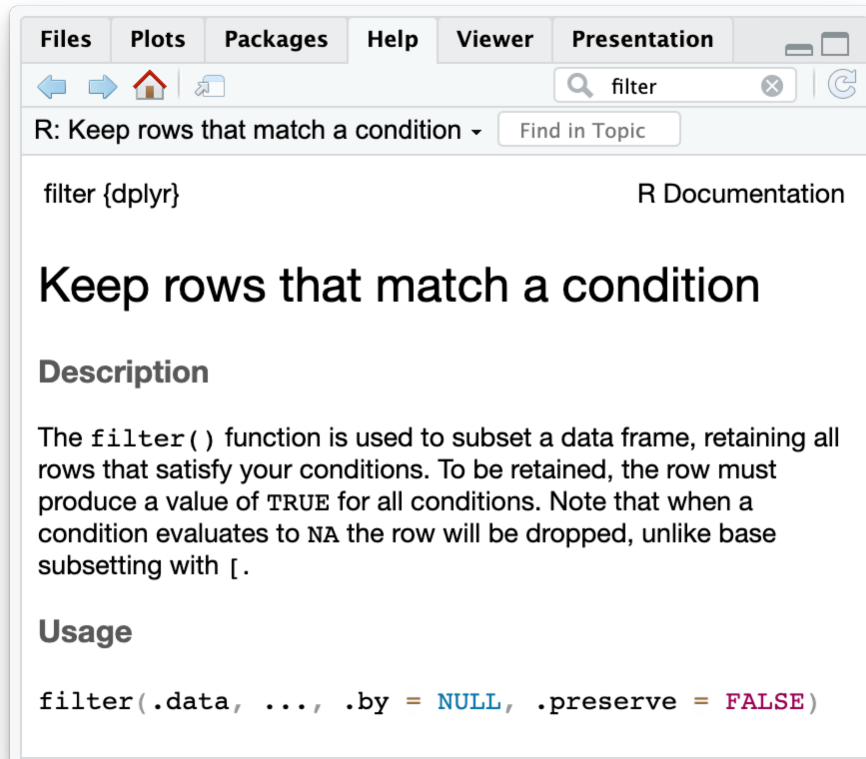
# Help

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**





# Next up

**Data basics**