

Using R for Data Processing

Getting Started in R

Glenn Williams

University of Sunderland

2021-10-25 (updated: 2021-10-25)

How Do I Install R?

Local Installation

- To get started, at the very least you'll have to **download R from CRAN**.
- Choose a mirror from which to download R. Any will do.
- Select the distribution for your operating system. On Windows, click **install R for the first time**. On Mac/Linux click the most recent install version.
- You'll see a new page; For Windows, click on "**Download R [version number] for Windows**".



[\[Home\]](#)

[Download](#)

[CRAN](#)

[R Project](#)

The R Project for Statistical Computing

Getting Started

R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To [download R](#), please choose your preferred [CRAN mirror](#).

CRAN Mirrors

The Comprehensive R Archive Network is available at the following URLs, please choose a location close to you. Some statistics on the status of the mirrors can be found here: [main page](#), [windows release](#), [windows old release](#).

If you want to host a new mirror at your institution, please have a look at the [CRAN Mirror HOWTO](#).

0-Cloud

<https://cloud.r-project.org/>

Automatic redirection to servers worldwide, currently sponsored by Rstudio

The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#)
- [Download R for \(Mac\) OS X](#)
- [Download R for Windows](#)

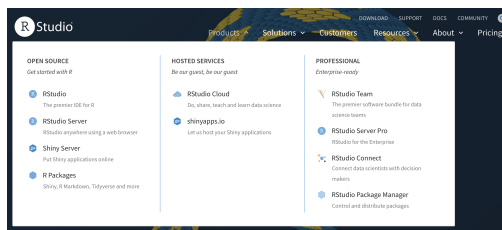
R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

What is RStudio? How Do I Install It?

Local Installation

Integrated Development Environment for R: makes working with R and extensions to it easier.

- Download from the **RStudio website**.
- Select products and choose **RStudio**. Scroll down until you see **Download RStudio Desktop**.



	Open Source Edition	RStudio Desktop Pro
Overview	<ul style="list-style-type: none">• Access RStudio locally• Syntax highlighting, code completion, and smart indentation• Execute R code directly from the source editor• Quickly jump to function definitions• Easily manage multiple working directories using projects• Integrated R help and documentation• Interactive debugger to diagnose and fix errors quickly• Extensive package development tools	<p>All of the features of open source; plus:</p> <ul style="list-style-type: none">• A commercial license for organizations not able to use AGPL software• Access to priority support• RStudio Professional Drivers• Connect directly to your RStudio Server Pro instance remotely
Support	Community forums only	<ul style="list-style-type: none">• Priority Email Support• 8 hour response during business hours (ET)
License	AGPL v3	RStudio License Agreement
Pricing	Free	\$995/year

DOWNLOAD RSTUDIO DESKTOP

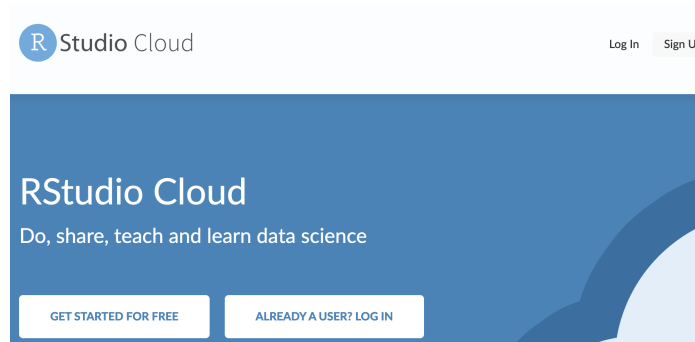
DOWNLOAD FREE RSTUDIO DESKTOP PRO TRIAL

- Click the **Download** button in the free tier and select the correct installer for your operating system.

Getting Started in the Cloud

Alternatively, we can use **RStudio Cloud** to do everything online.

- This may be the **easiest** route, especially if your system is locked down (e.g. on University controlled computers).
- This may be a little more limited than using R on your machine, but **most things you need will be available without effort on your behalf.**



rstudio.cloud signup page

- **Works with Chromebooks** etc. that do not allow local installs of R.
- Please note that **rstudio.cloud** has **usage limits**. You can only work for 15 hours per month in it at the free tier. If you can, get a local install.

Sign up for an account by clicking sign up on the **homepage**.

Starting Your First Project

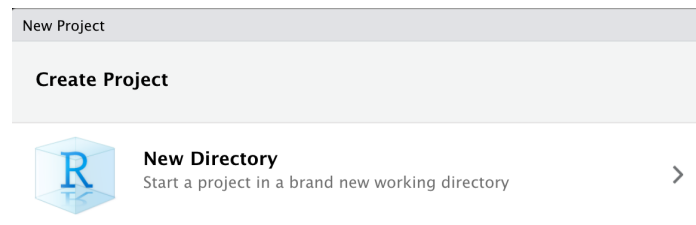
Assuming you're using a local installation of R/RStudio:

- Make a folder somewhere on your computer.
- Open RStudio.
- **Click File → New Project → New Directory → New Project.**
- Give this a name and save it somewhere you can access on your computer (e.g. Desktop)

Assuming you're using rstudio.cloud:

- Make a new Space and give it a name, then **click New Project.**

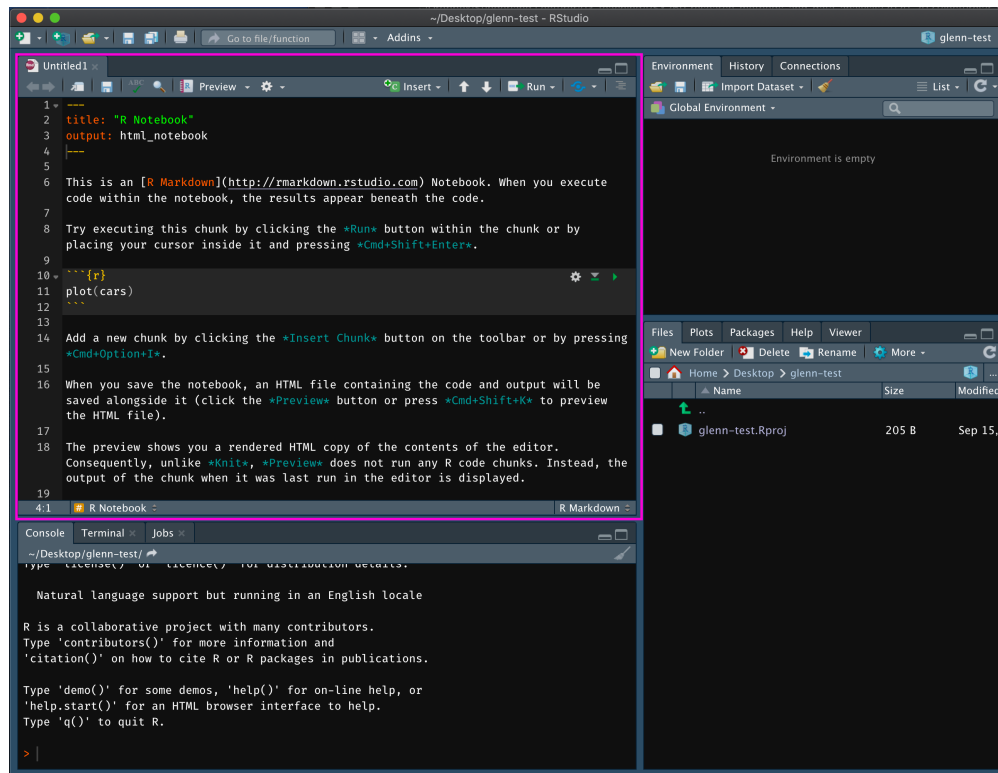
You now have a **folder and an rstudio project** for your work. You can put data and code in here, and all outputs will be saved in this place.



creating a new project

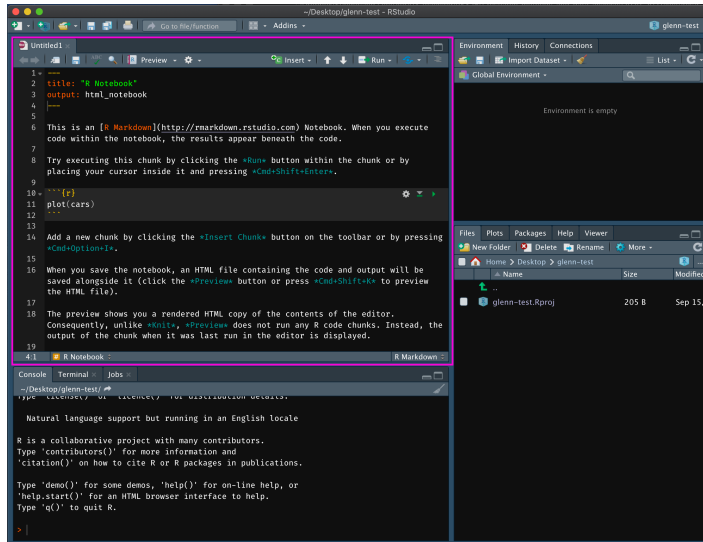
Now What?

Click File → New File → R Notebook. This will open an R notebook in the Editor.



RStudio Interface

Understanding the Editor



Editor (top-left): Where you **write your code**. Anything you write here can be saved to the file.

Console (bottom-left): Where we run your code. Once code is entered here you cannot edit it. **Don't work in the console!!!**

Environment (top-right): Lists any **variables available in your global environment**. More on this later.

The RStudio Interface

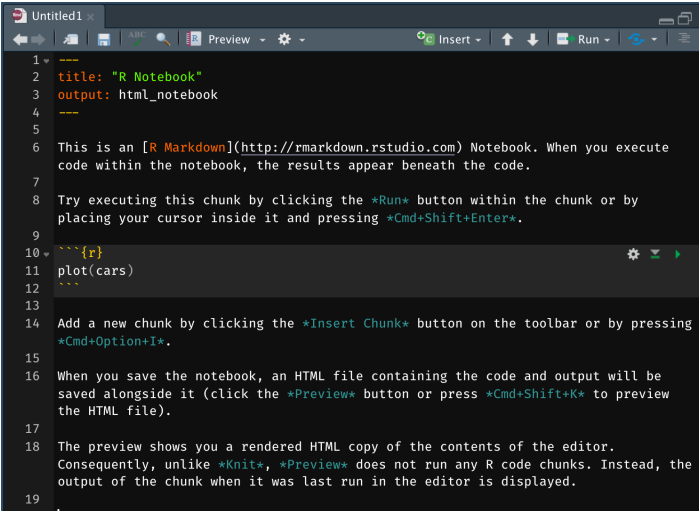
Files/Plots/Help/Viewer (bottom-right): See any plots in your **working directory (i.e. in your project)**, view any recently created plots or help on how to use R functions.

Working with Notebooks

After making a notebook (by clicking **File** → **New File** → **R Notebook**). Give your notebook a title by changing the text following `title:` at the top.

Notebooks are made up of:

- **Markdown text:** which allows you to **write in plain English** (or other languages). You **add decoration** to text (e.g. italics, bold, links) using markdown commands. They have some examples in the text for you.
- **R code chunks:** These only accept R code. Press the play button to run the code.



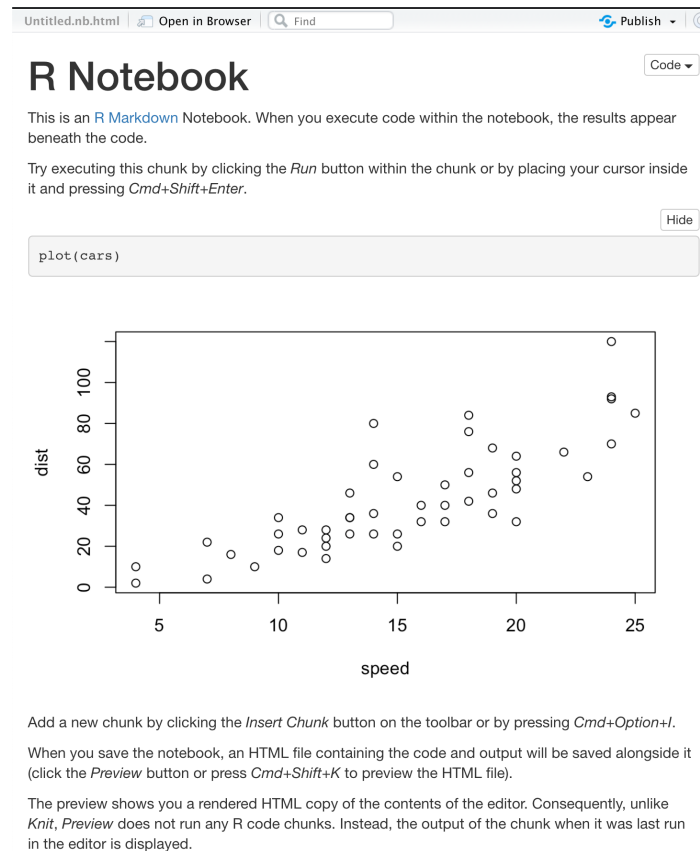
```
1 ---
2 title: "R Notebook"
3 output: html_notebook
4 ---
5
6 This is an [R Markdown](http://rmarkdown.rstudio.com) Notebook. When you execute
7 code within the notebook, the results appear beneath the code.
8
9 Try executing this chunk by clicking the *Run* button within the chunk or by
10 placing your cursor inside it and pressing *Cmd+Shift+Enter*.
11
12 ```{r}
13 plot(cars)
14 ```
15
16 Add a new chunk by clicking the *Insert Chunk* button on the toolbar or by pressing
17 *Cmd+Option+I*.
18
19 When you save the notebook, an HTML file containing the code and output will be
20 saved alongside it (click the *Preview* button or press *Cmd+Shift+K* to preview
21 the HTML file).
22
23 The preview shows you a rendered HTML copy of the contents of the editor.
24 Consequently, unlike *Knit*, *Preview* does not run any R code chunks. Instead, the
25 output of the chunk when it was last run in the editor is displayed.
```

An R Notebook

When you save your notebook, you can **preview it**. It will create an HTML file that contains your markdown text and r code with output made pretty.

Preview Your Notebook

Make sure you press play on your code chunks. This will run your code and show you the output. When done, save your work (Command/Ctrl + S) and **click Preview**. You should see this:



Avoiding Repetition

In **R code chunks**, we can code things up by hand, or make **functions** that allow us to repeat a sequence of commands easily. For example, let's say we want to add 1 to several numbers.

We could do it by hand:

```
1 + 1
```

```
## [1] 2
```

```
2 + 1
```

```
## [1] 3
```

```
3 + 1
```

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

Or we could write a function, and apply this to our numbers:

```
add_one <- function(x) {x + 1}  
add_one(1)
```

```
## [1] 2
```

```
add_one(2)
```

```
## [1] 3
```

```
add_one(3)
```

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

Making Life Easy with Pre-built Functions

Some developers make functions available to others as a **package**.

- The two packages (or package of packages) we'll use are tidyverse and here.
 - **Tidyverse**: has several functions for making working with data and creating plots easier.
 - **Here**: makes your R-scripts read and write files relative to where the project is. This means you can write scripts that work on any PC (not just your own).

This will be made clear once we start using these packages.

You only need to **install a package once per computer** (or cloud project):

```
install.packages("tidyverse")  
install.packages("here")
```

But, you **must load the packages (or libraries) every time you start R**:

```
library("tidyverse")  
library("here")
```

What Next?

Now we know the basics of R and RStudio, we'll learn how to code in R.

