Introduction to R/RStudio

Outline

What is R and why do we use it?

Downloading R and RStudio

Basics of using R

Objects, assigning, and functions

Summary

Outline

What is R and why do we use it?

Downloading R and RStudio

- EX: download and start using

Basics of using R

- EX: Trying out commands

Objects, assigning, and functions

- EX: Using objects and functions in R

Summary

What is R and why do we use it?

What is R and why do we use it?

Who has heard of R before?

Mentimeter

What is R and why do we use it?

Open-source (FREE)

Statistical programming language

Widely used (popular) and cross platform

Flexible

Interpreted language (no need to compile)

What is R and why do we use it?

Open-source (FREE)

Statistical programming language

Widely used (popular) and cross platform

Flexible

Interpreted language (no need to compile)

Object orientated

What is R and why do we use it?

Language – so we have some new words:

Script

Comment

Object

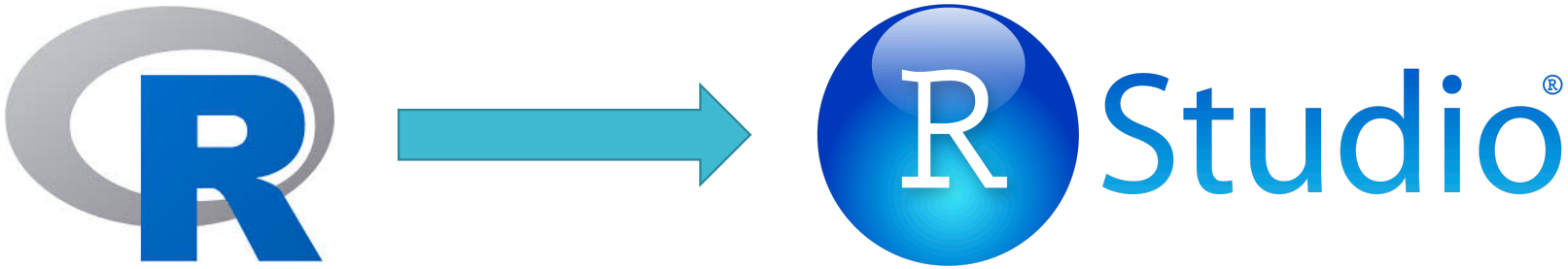
Assign

Function

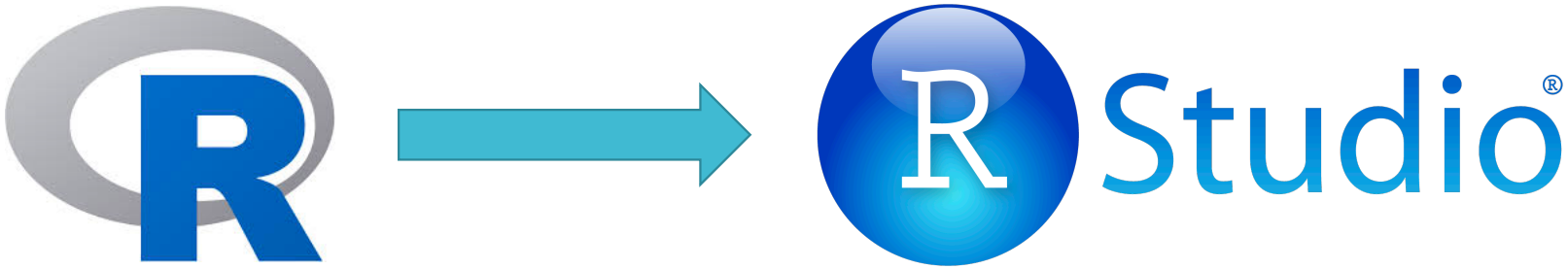
Argument

How to use R

How to use R



How to use R



RStudio is an integrated development environment
(makes R pretty and has everything in one place)

It runs R

Also free and cross platform

Downloading R and RStudio

Exercise 1: Downloading R and Rstudio and getting started

Go to:
https://www.math.ntnu.no/emner/ST2304/2021v/Week01/R-tutorial.html

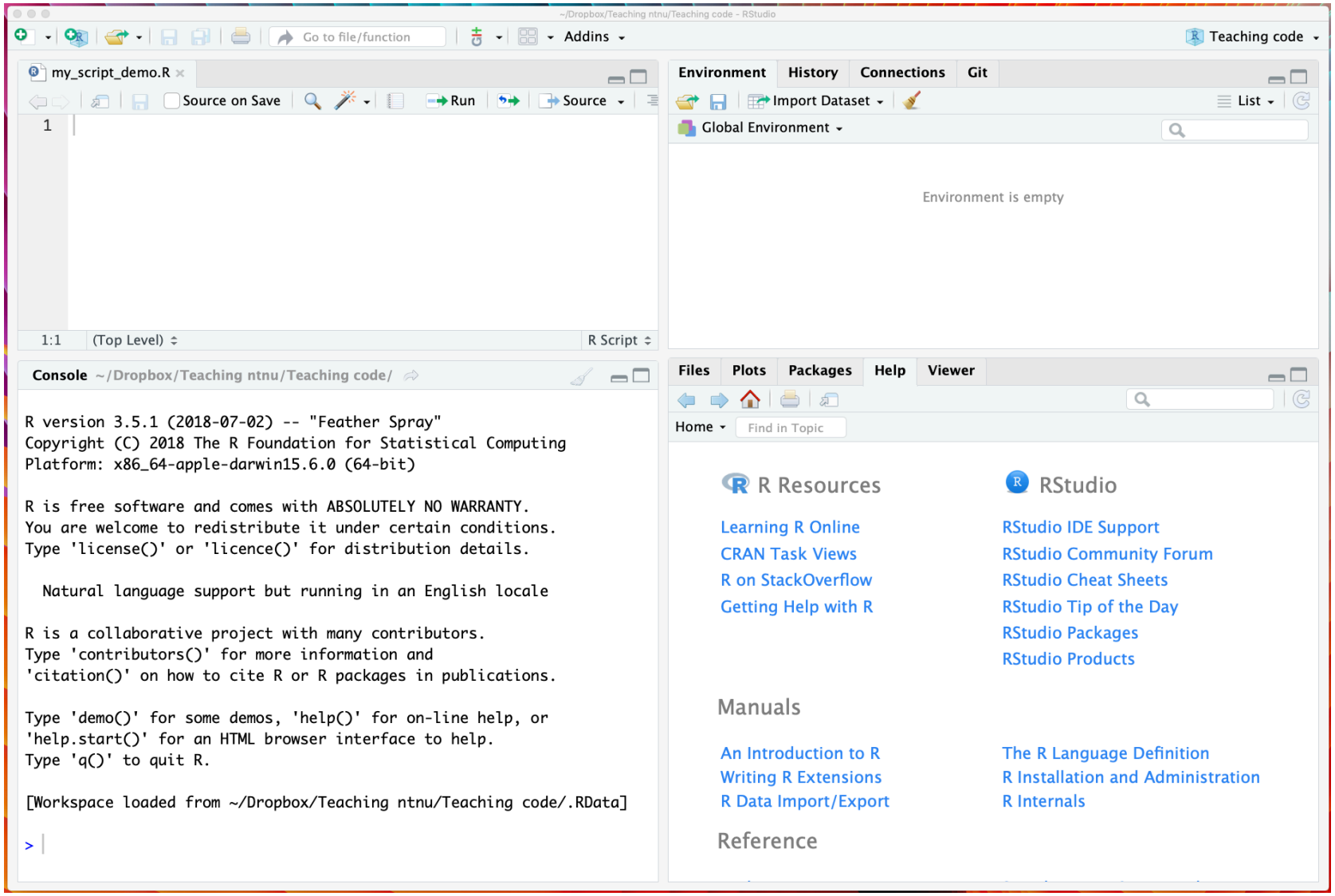
Open the file.

Work through Part A.

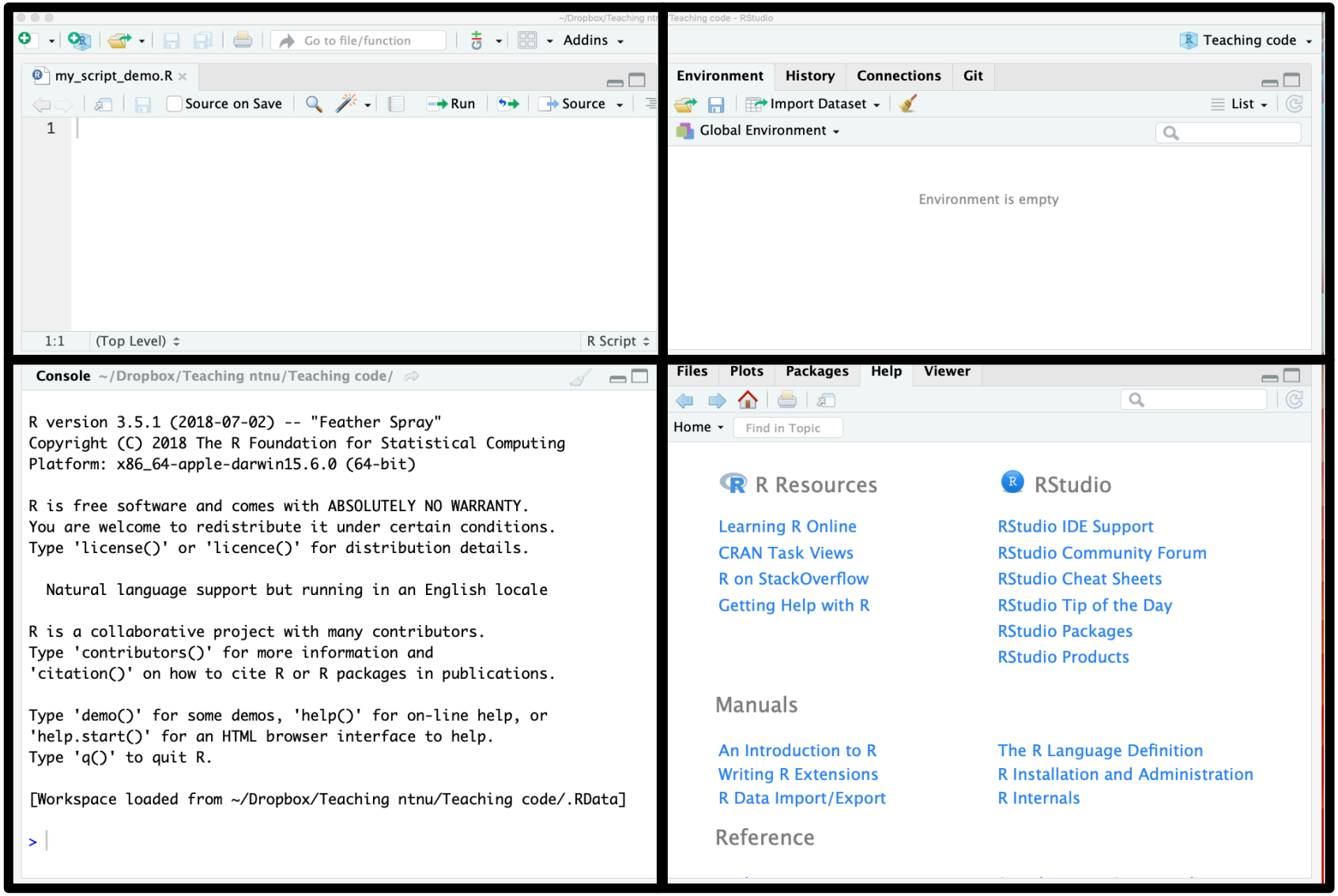
Ask if you need help! That's what we are here for ☺

Recap

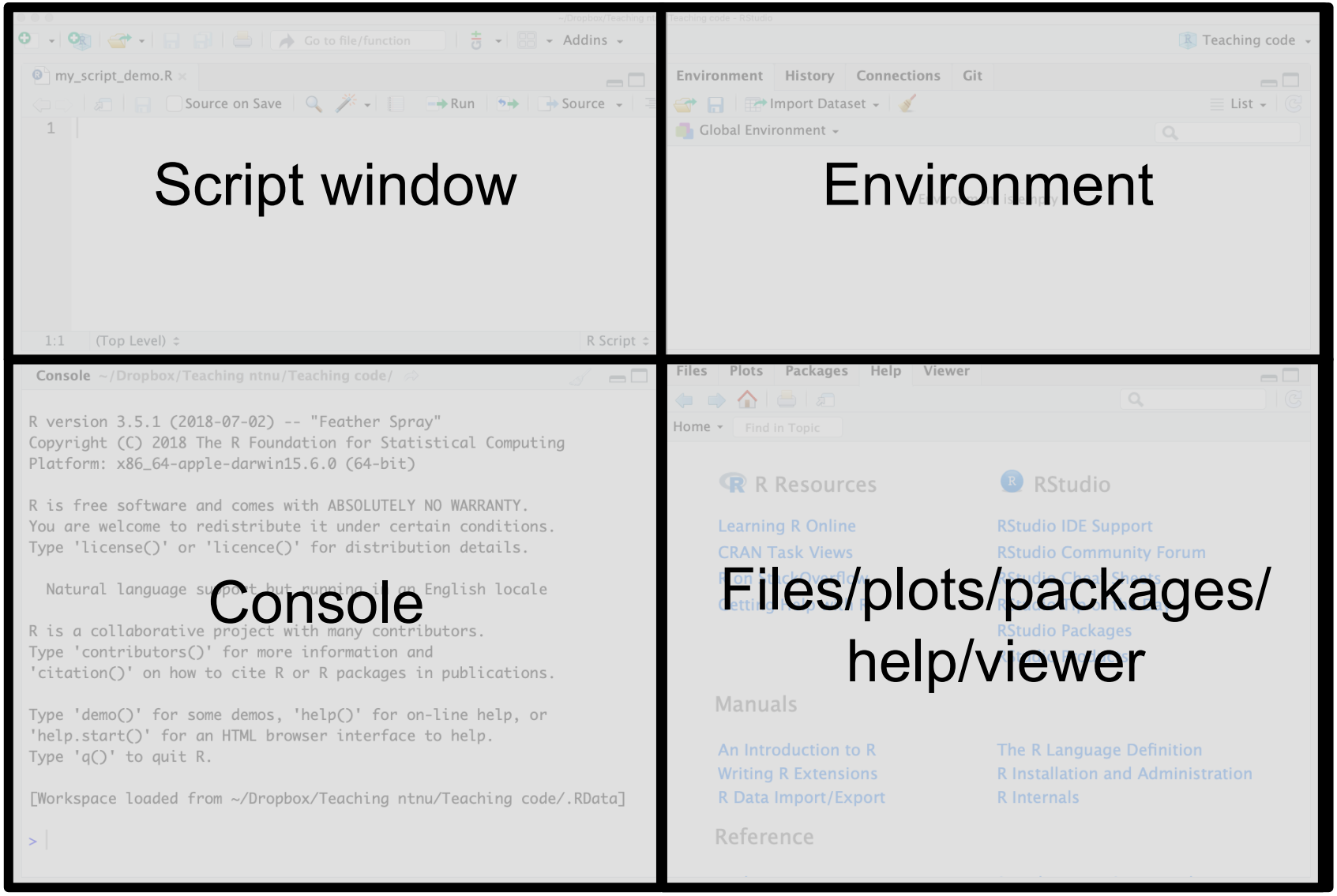
Using RStudio



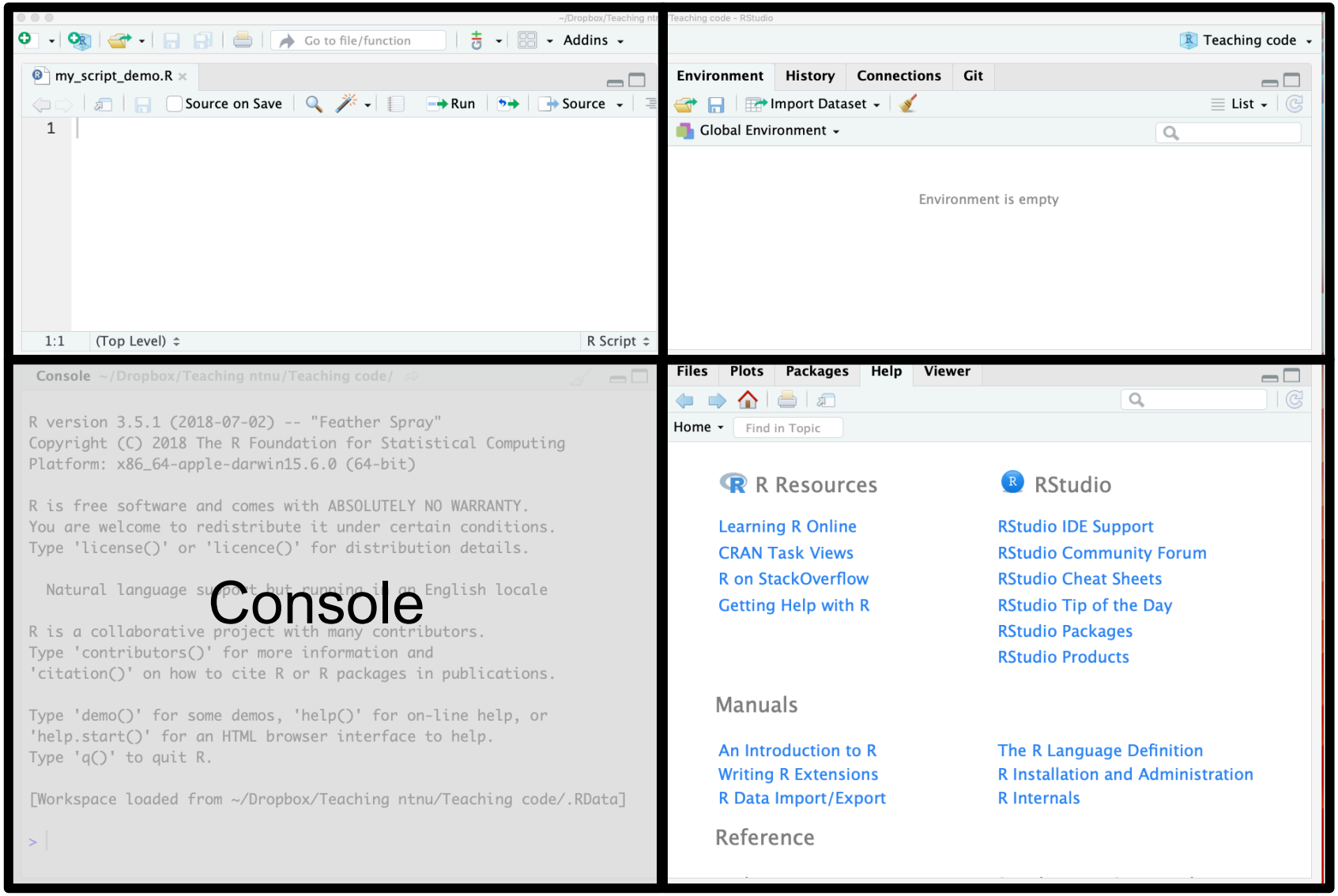
Using RStudio



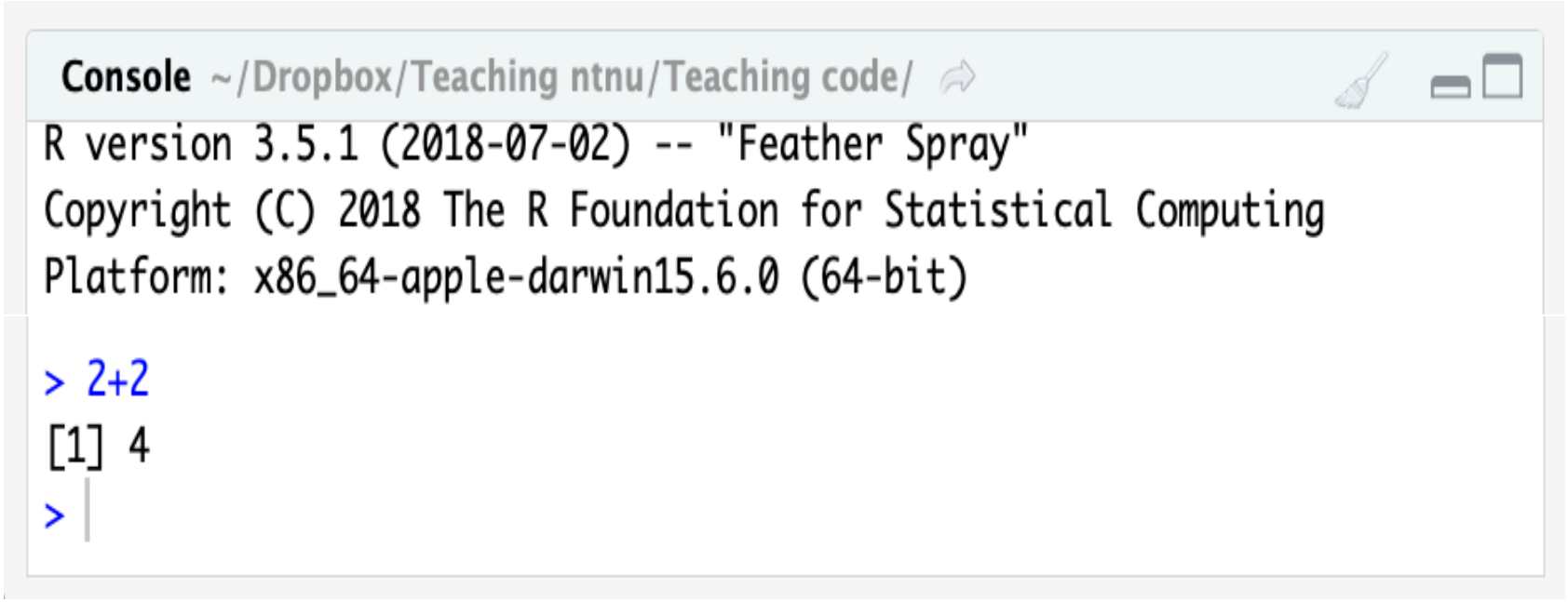
Using RStudio



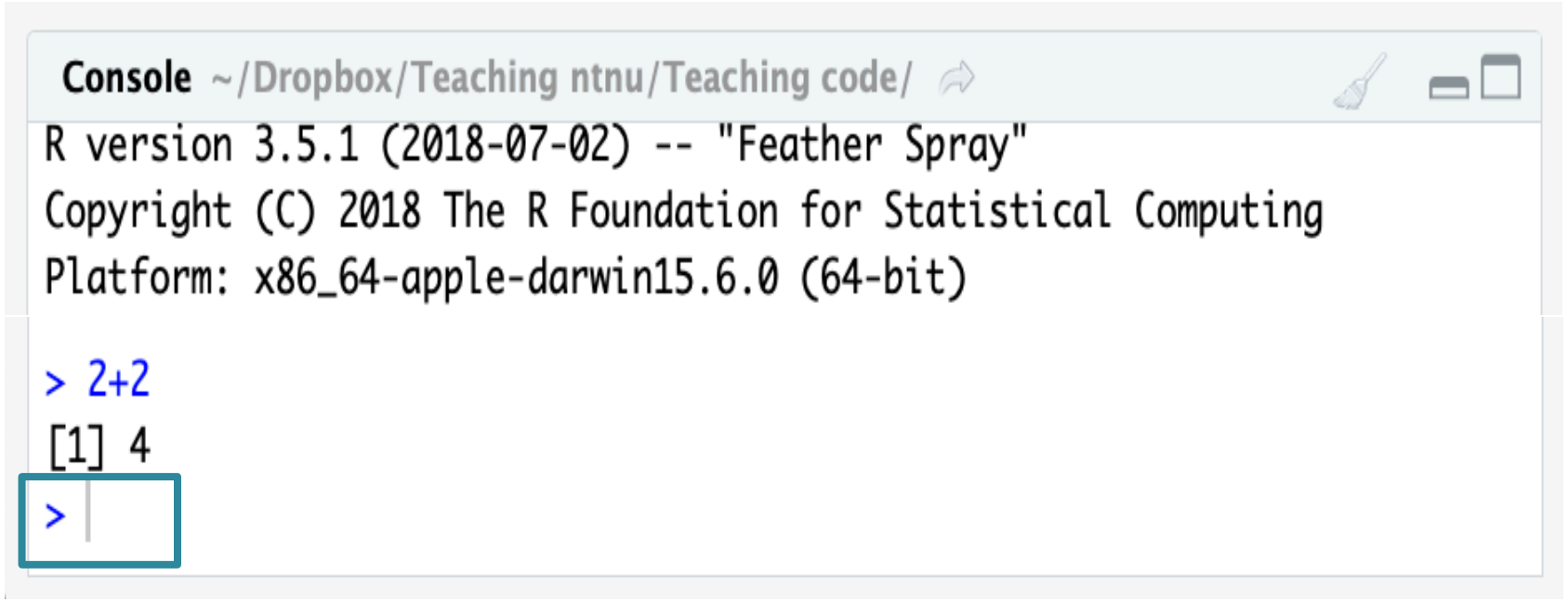
Using RStudio



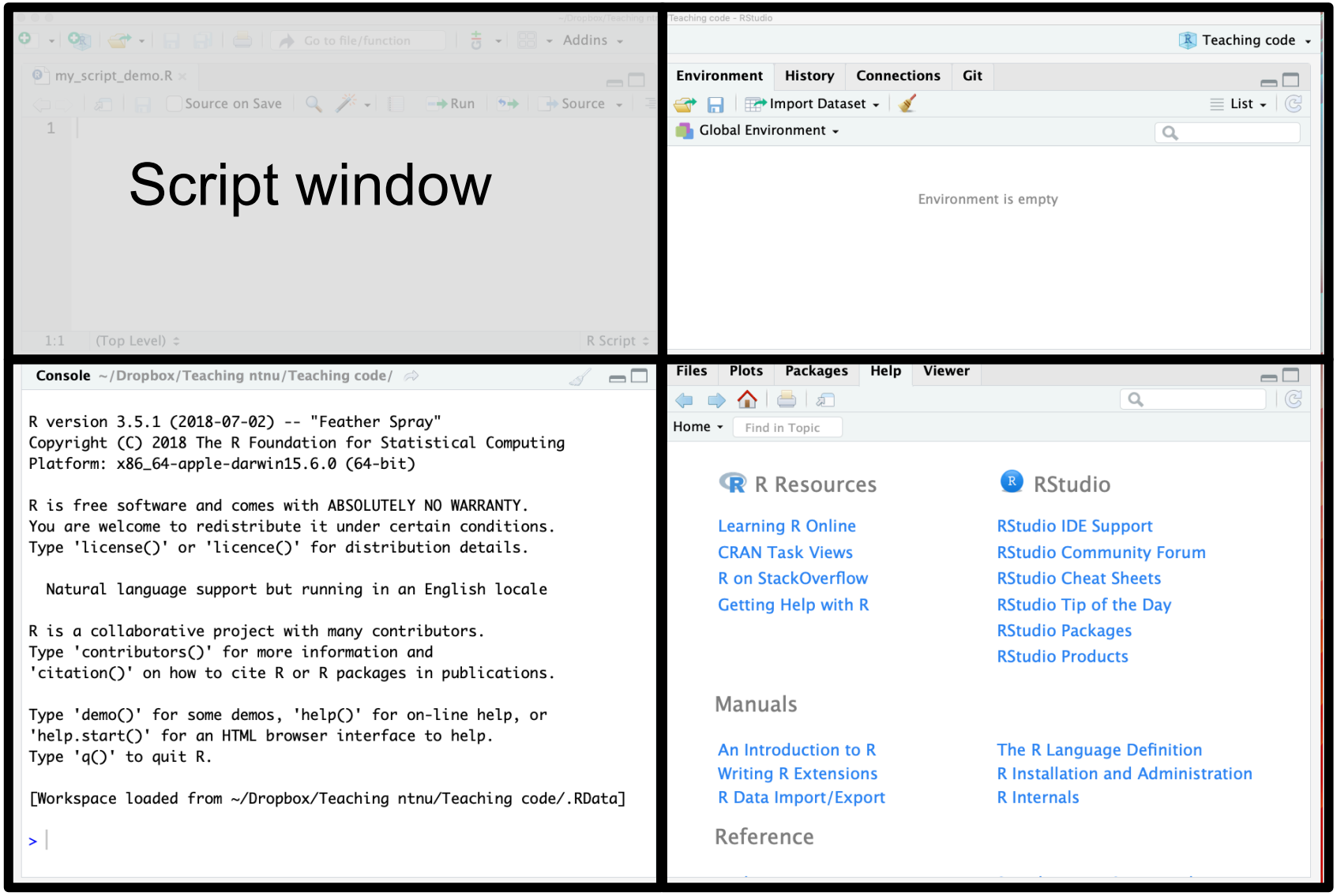
Using RStudio



Using RStudio



Using scripts in RStudio



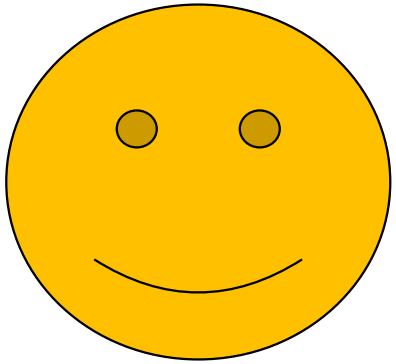
Why use **scripts**?

You can save your code

Easier to change the code

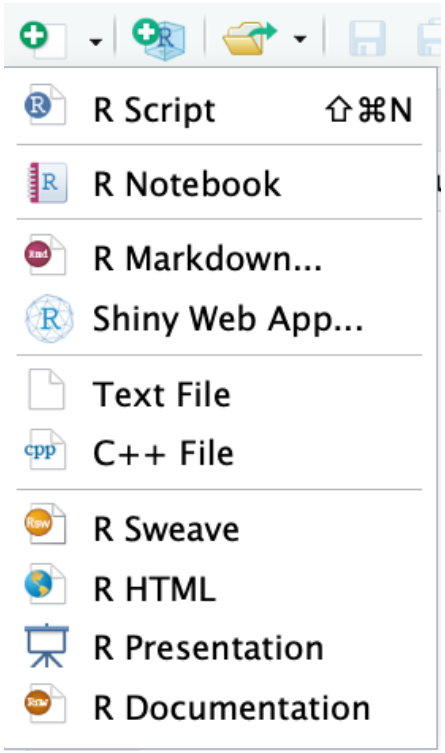
Easier to repeat analyses

You can use **comments**

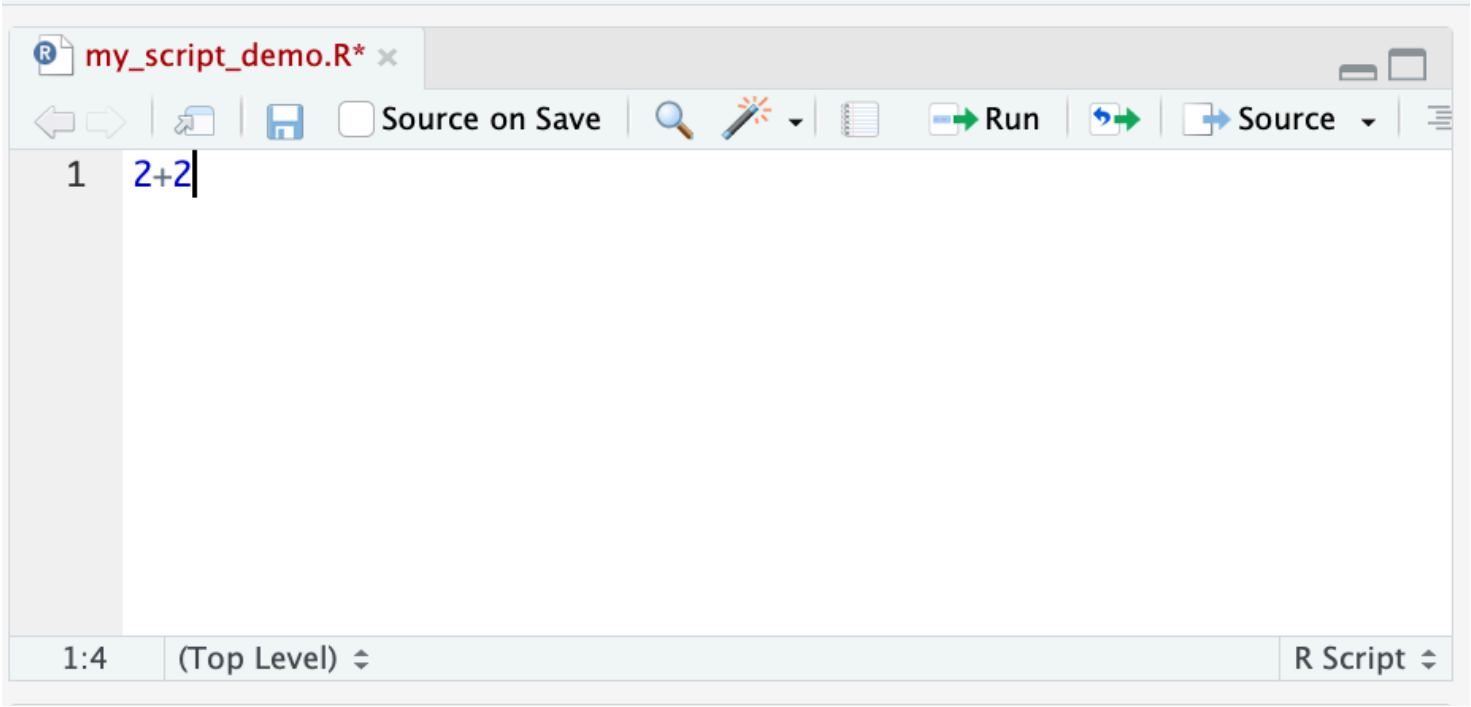


Basics of an R script

To open a new script



Basics of an R script



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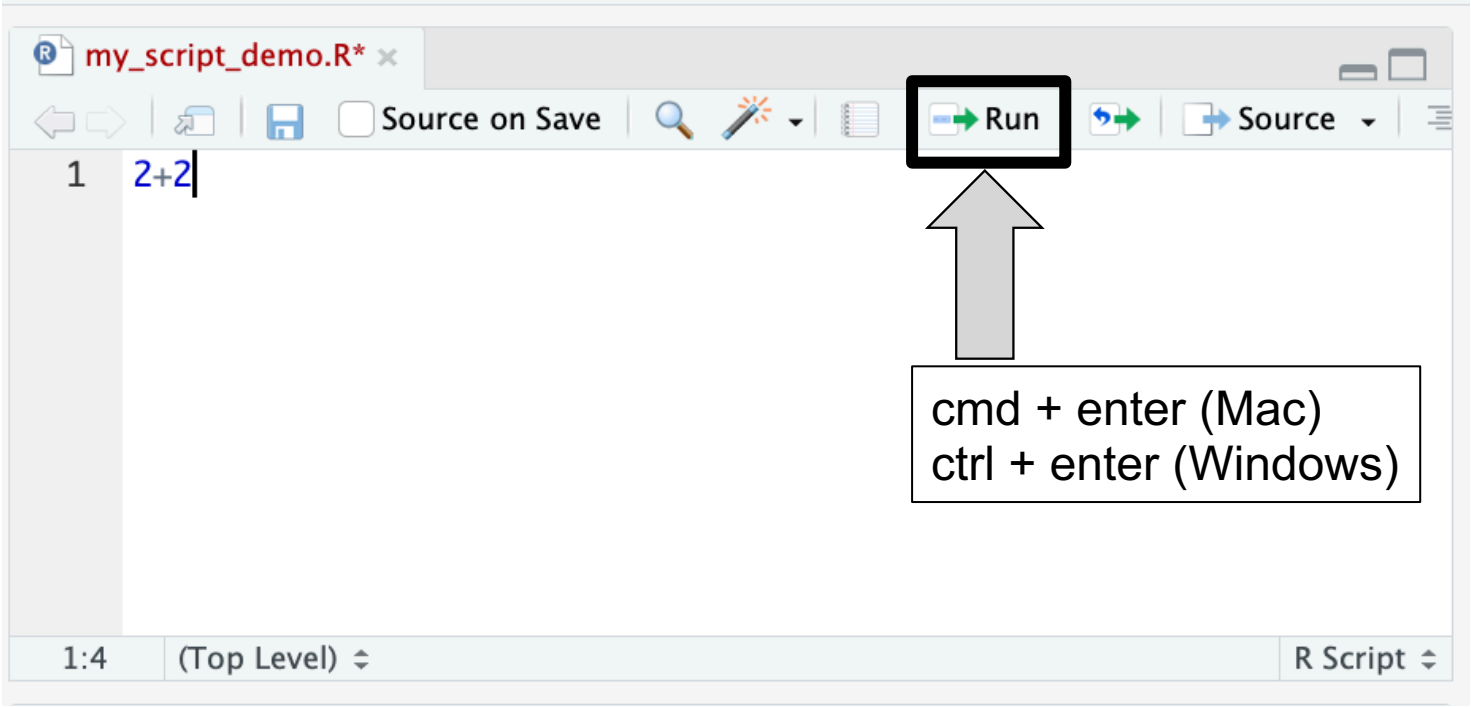

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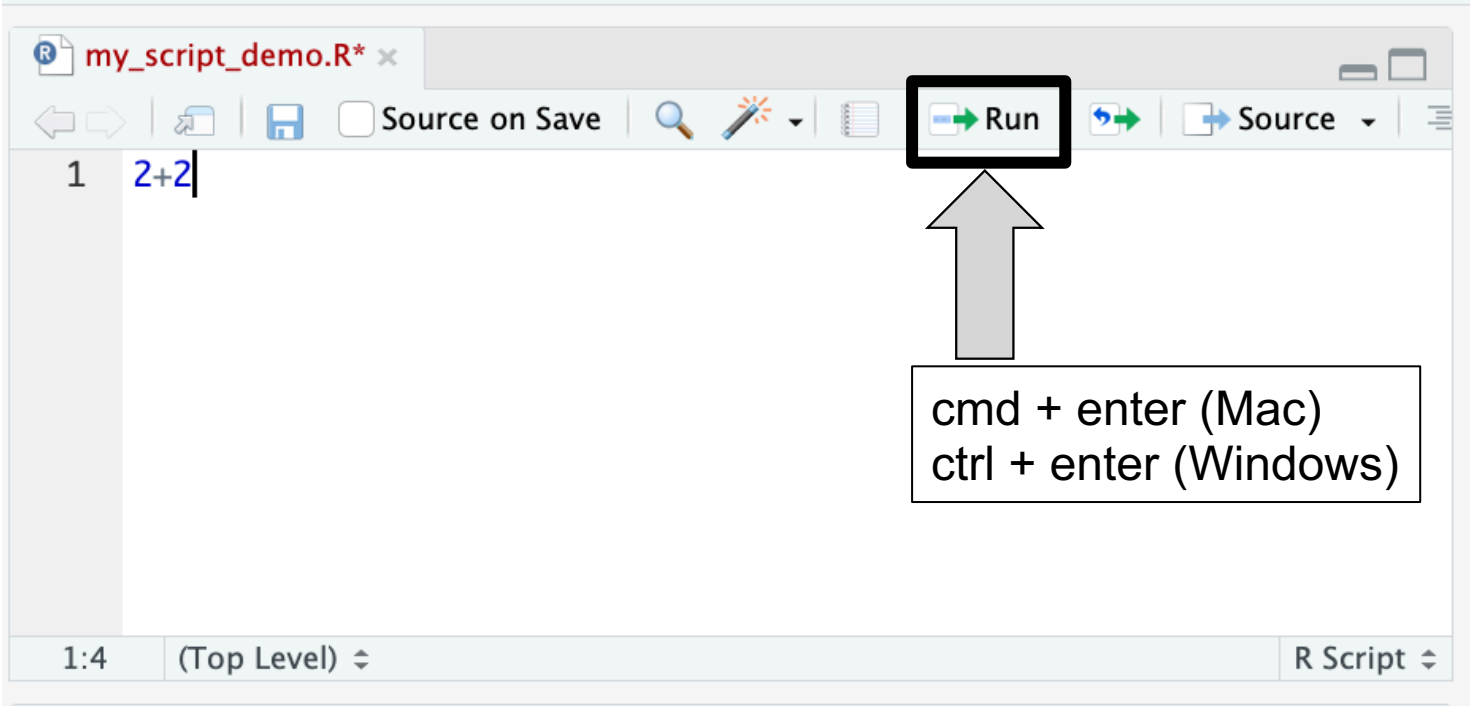
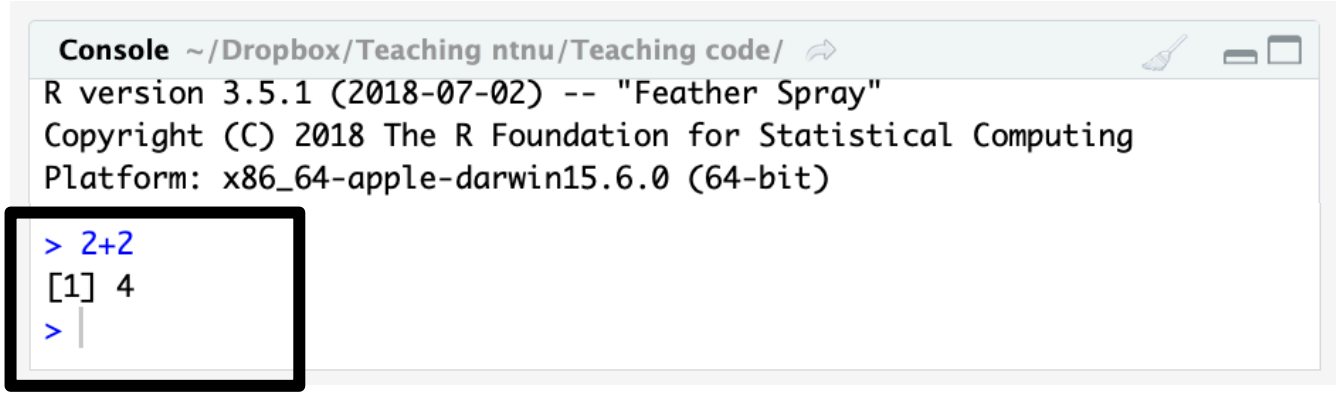




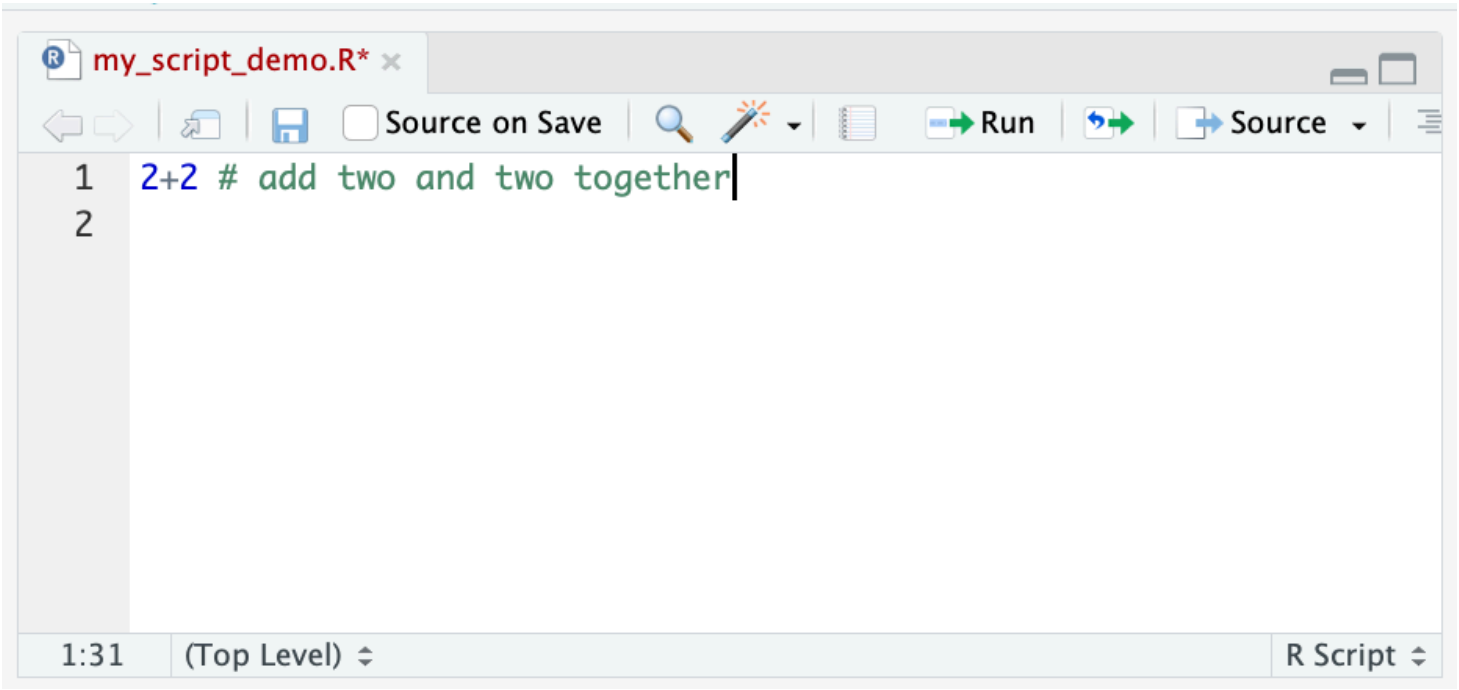
Comments

Comments

```
# this is a comment
```

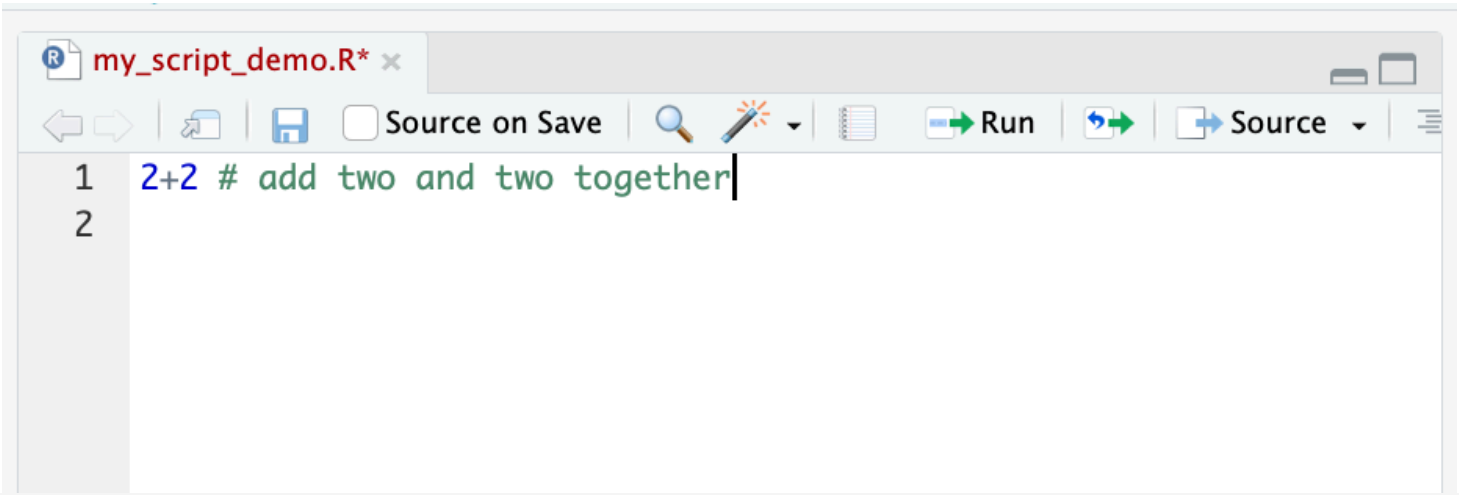
Comments

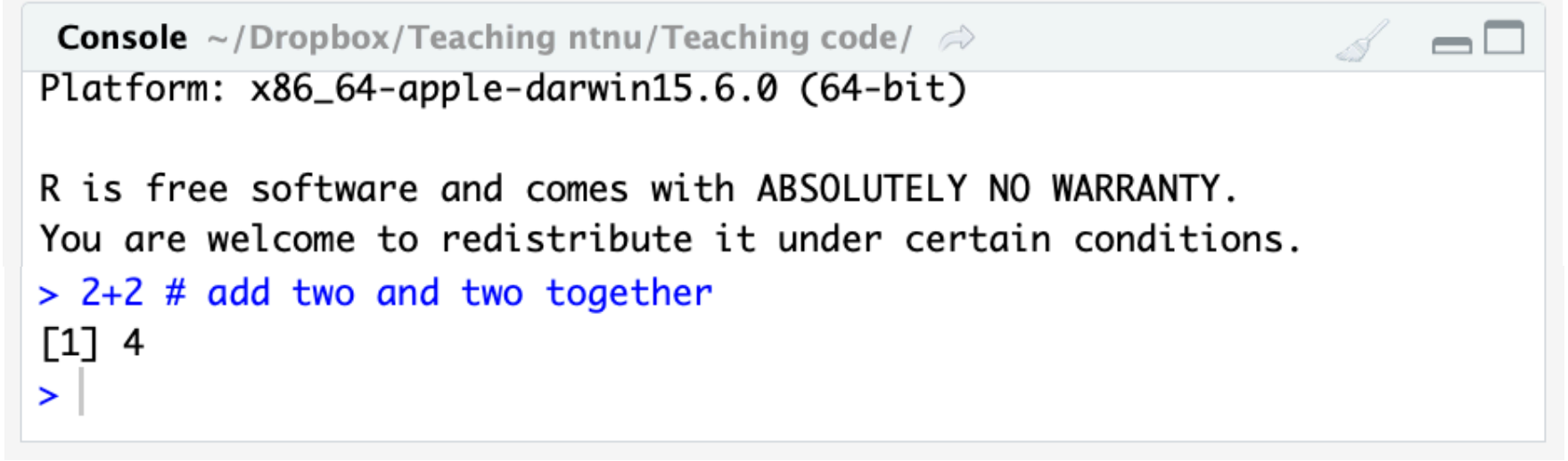
```
# this is a comment
```



Comments

```
# this is a comment
```





Exercise 2: Trying out commands

Work through Part B

We are still here to help! ☺

There are several new words/concepts here but I will explain them afterwards

Key words from exercise 2

Key words from exercise 2

Object

Assign

Functions

Key words from exercise 2

Object

Assign

Functions +

Arguments

Objects

Objects are created when you use **assign** and also created as the output of **functions**

R is object-orientated, so all about objects

Objects

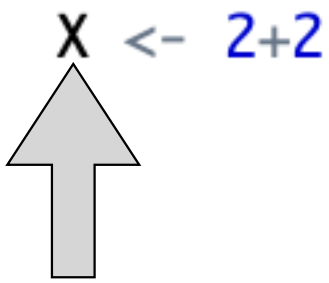
Less formal definition:

A virtual thing

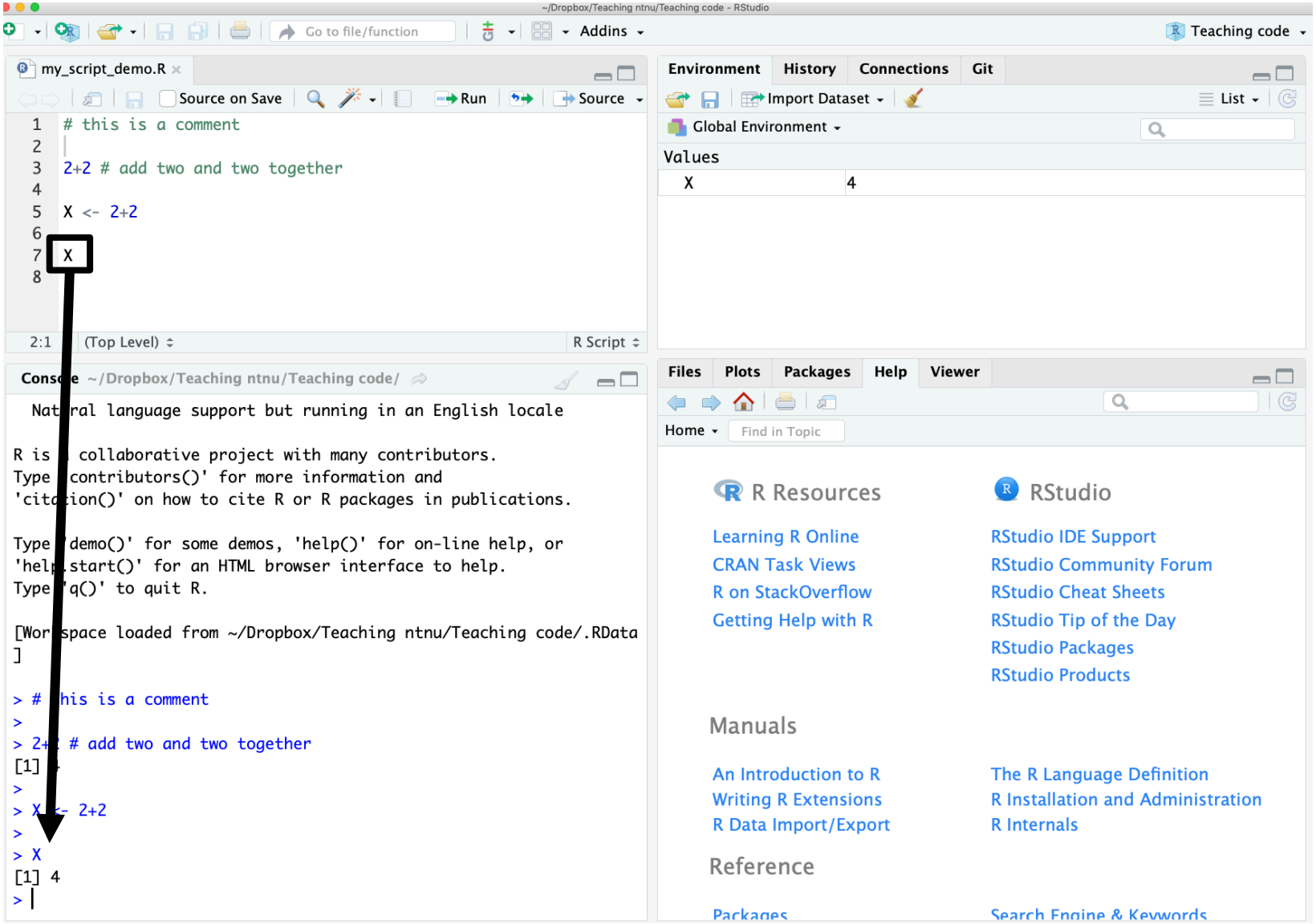
Formal definition:

Everything in R is an object. Something stored in the memory of the programme with attached value or attributes

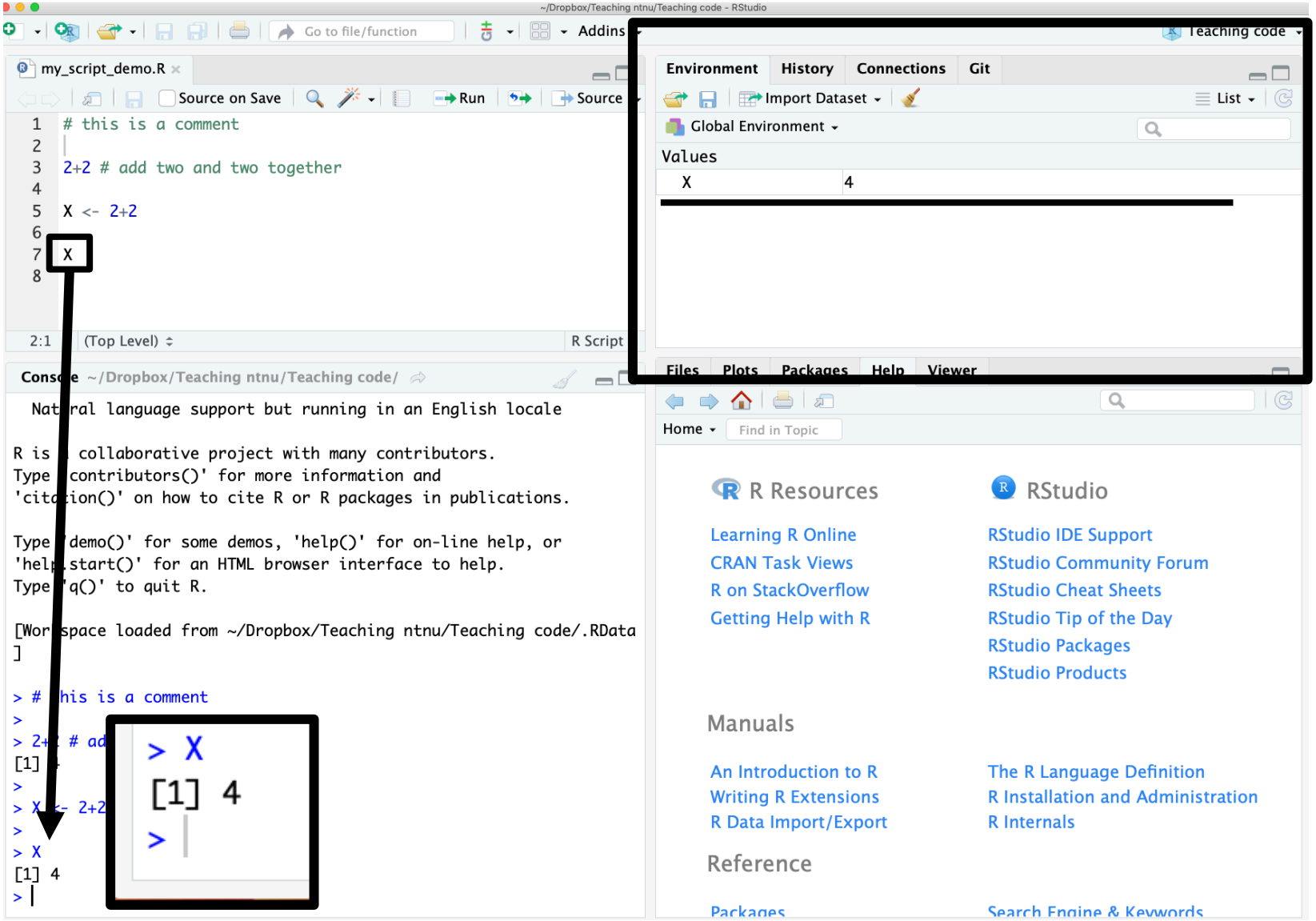
Objects



Objects


~/Dropbox/Teaching ntnu/Teaching code - RStudio
Go to file/function
Addins
Teaching code
my_script_demo.R
Source on Save
Run
Source
1 # this is a comment
2
3 2+2 # add two and two together
4
5 X <- 2+2
6
7 X
8
2:1
(Top Level)
R Script
Console ~/Dropbox/Teaching ntnu/Teaching code/
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.
[Workspace loaded from ~/Dropbox/Teaching ntnu/Teaching code/.RData]
> # this is a comment
>
> 2+2 # add two and two together
[1] 4
>
> X <- 2+2
>
> X
[1] 4
>
Environment
History
Connections
Git
Import Dataset
List
Global Environment
Values
X 4
Files
Plots
Packages
Help
Viewer
Home
Find in Topic
R Resources
Learning R Online
CRAN Task Views
R on StackOverflow
Getting Help with R
RStudio
RStudio IDE Support
RStudio Community Forum
RStudio Cheat Sheets
RStudio Tip of the Day
RStudio Packages
RStudio Products
Manuals
An Introduction to R
Writing R Extensions
R Data Import/Export
The R Language Definition
R Installation and Administration
R Internals
Reference
Packages
Search Engine & Keywords

Objects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Rules for objects

Cannot begin with a number e.g. 1object

Case sensitive e.g. case ≠ Case

Cannot be a fundamental function e.g. mean

Assign/assigning

Assign/assigning

Stores values as a name in R

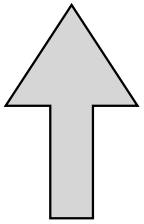
Creates objects

Use = or <-

Assign

```
2+2

x <- 2+2
```



Functions

Stored code that takes an input and gives an output

Functions

Stores code that takes an input and gives an output

- Very useful for repeated processes
- Can make our own or use others
- Always outputs **objects**
- Use **arguments**

Functions

Examples of functions:

```
sqrt() # takes square root

log() # takes log

exp() # takes exponent

c() # combines values into something called a vector

seq() # creates a sequence of numbers

mean() # takes mean
```

Arguments

The input to a function

They are given to the function, which does something with them

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E.g.

```
sqrt(x) # takes square root of x
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Examples

```
W_times <- c(12.2,11.9,11.5,11.5,11,11.4,11.08)
```

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W_times <- c(12.2,11.9,11.5,11.5,11,11.4,11.08)
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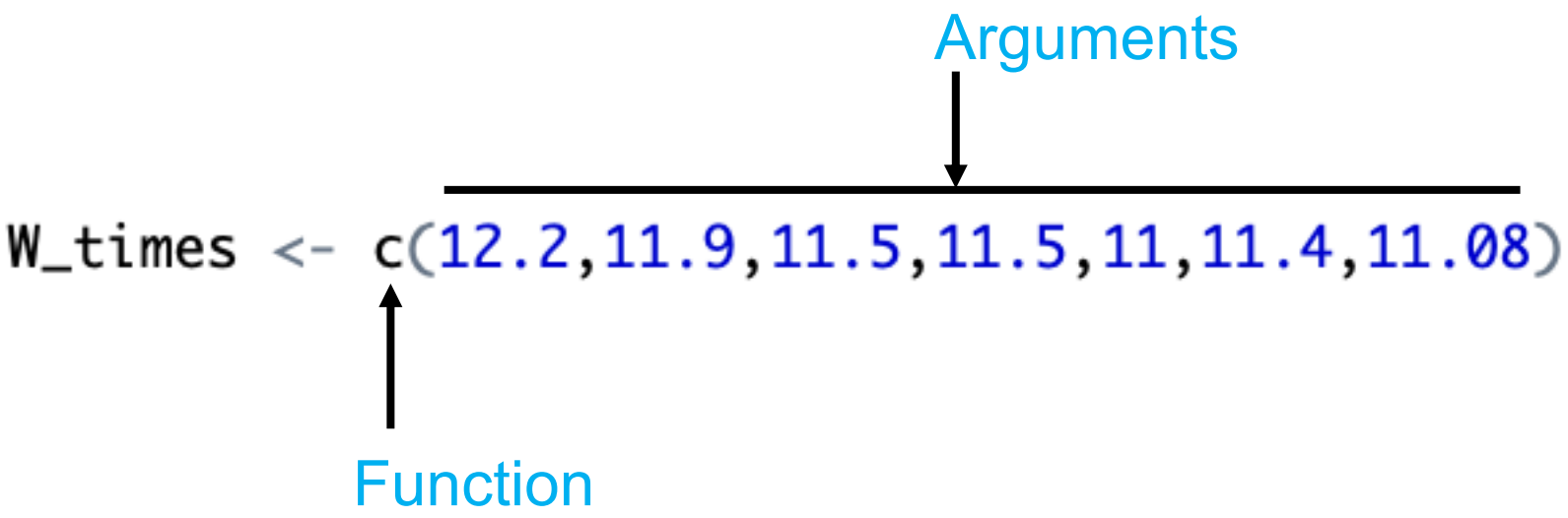
Function

Examples



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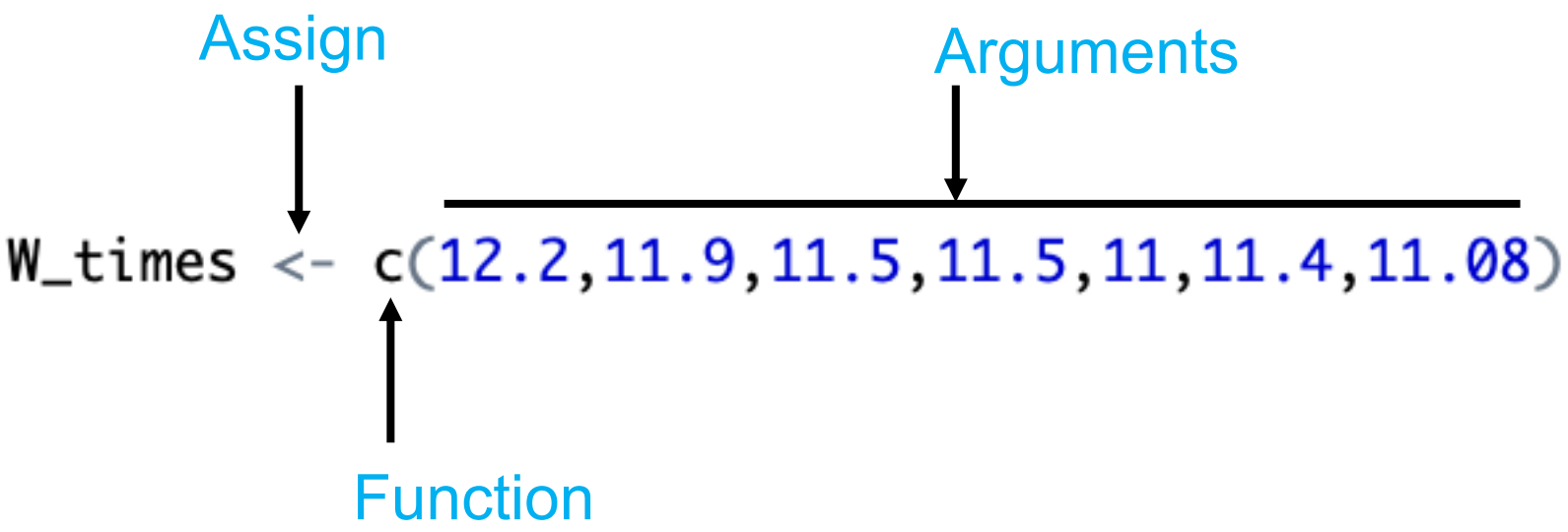
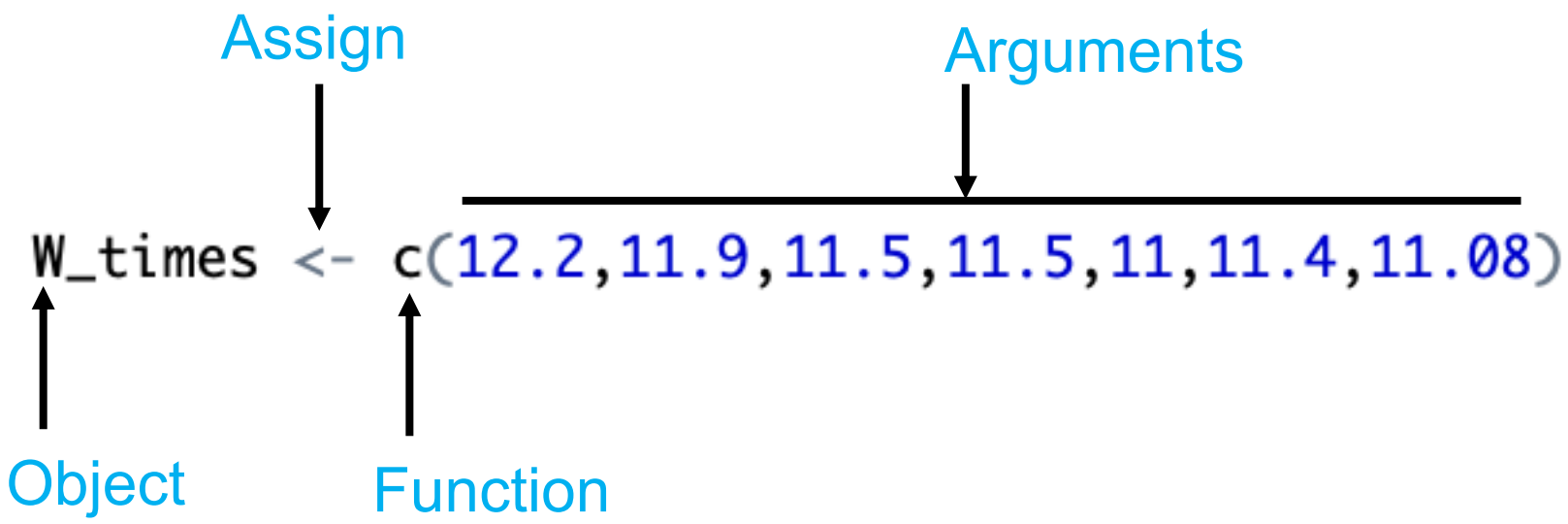

Assign
Arguments
W_times <- c(12.2,11.9,11.5,11.5,11,11.4,11.08)
Function

Examples


Assign
Arguments
W_times <- c(12.2,11.9,11.5,11.5,11,11.4,11.08)
Object
Function

Exercise 3: Using objects and functions in R

Work through Part C

We are still here to help! ☺

Summary

What is R and why do we use it?

Downloading R and RStudio

Basics of using R

Objects, assigning, and functions

Summary

What is R and why do we use it?

Open source statistical programming language

Free and flexible!

Downloading R and RStudio

Should be done

Basics of using R

Looked at **scripts, comments,** console, running

Objects, assigning, and functions

Looked at how to assign objects and how to use functions

How to learn more about R

How to learn more about R

Search for and ask for help!

Google is great resource

Help files in RStudio

CRAN (where you download R)

Ask us

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Ask us

None of us have memorised it all!

How to learn more about R

https://digit.ntnu.no/courses/course-v1:NTNU+IMF001+2020/course/

Nice R course that can follow on from the tutorial for this course