

# Day 1: Introducing RStudio

By Miranda McKibben



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## A little about me: My education

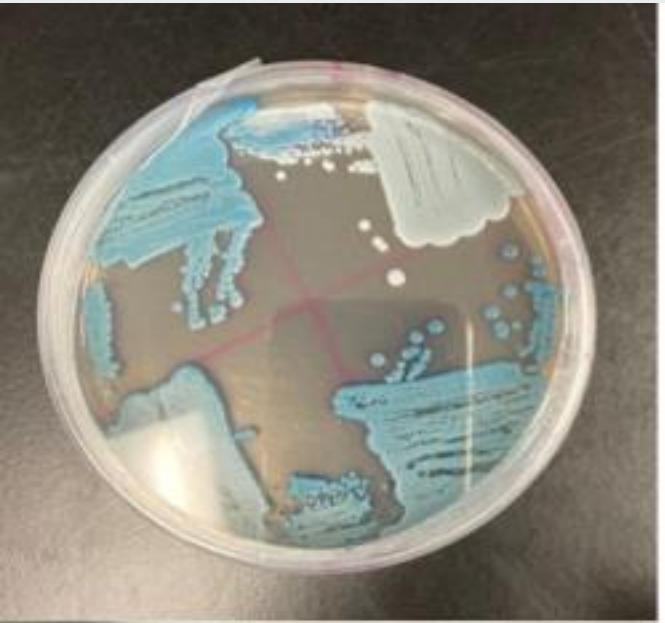
- I graduated from Olentangy Orange High School and the Delaware Area Career Center Zoo School program in 2018.
- I got a B.S. in Biology, specializing in Ecology and Evolution, from the University of Chicago in 2022.
- I am a fourth year PhD student at the University of Georgia.



THE UNIVERSITY OF  
**CHICAGO**



**Department of Plant Biology**  
*Franklin College of Arts and Sciences*  
**UNIVERSITY OF GEORGIA**



I study wild yeast

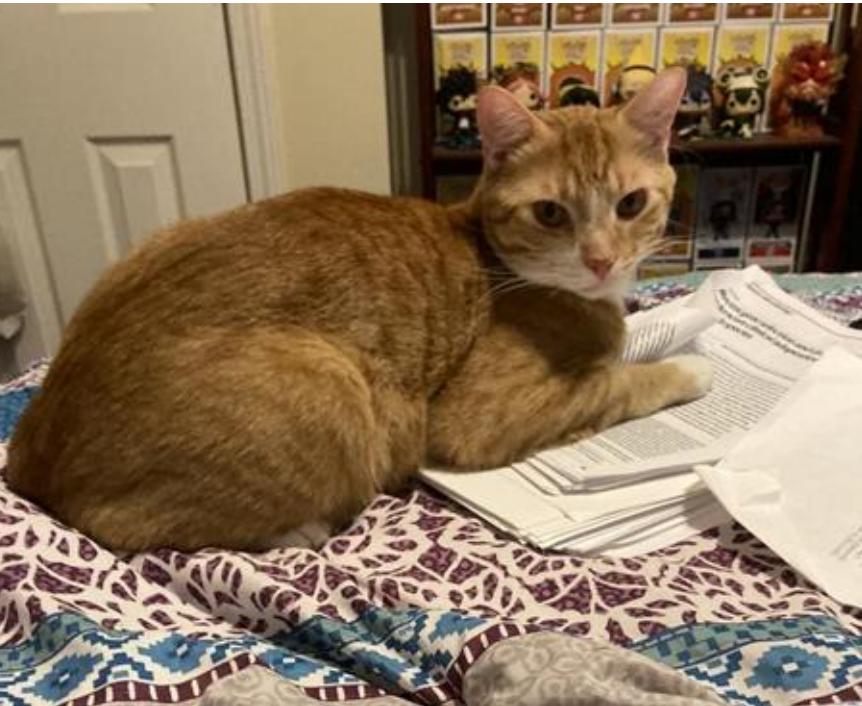


Follow me on Instagram,  
@environmentalyeast



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My interests outside academia: Spelunking  
and cuddling my cat, Toki Roki.



---

## **By the end of this course you will:**

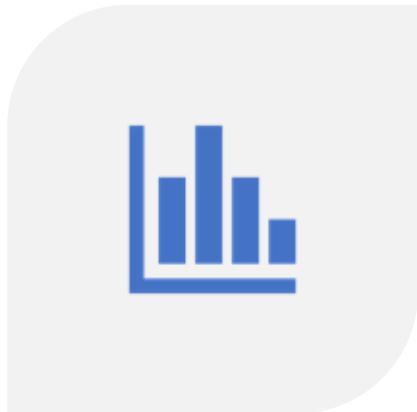
1. Develop computational thinking skills
2. Create RStudio code to analyze datasets
3. Formulate hypotheses
4. Create a publishing quality scientific figure

---

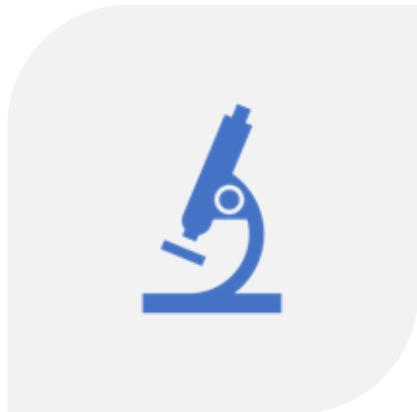
# Learning Objectives 01/08/2026

- Students will be able to navigate the layout of RStudio (i.e. know where to type code, upload files and datasets, and check for installed packages)
- Students will be able to perform basic coding functions in RStudio such as:
  1. Assigning variable names
  2. Obtaining summary statistics such as mean, mode, and variance from a string of numbers
  3. Creating simple plots with publicly available datasets provided on the RStudio platform

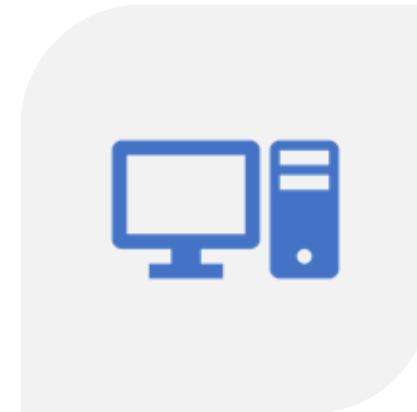
# RStudio



A SYSTEM TO ANALYZE AND  
VISUALIZE DATA



FREE, OPENSOURCE SOFTWARE  
THAT ALLOWS FOR  
REPRODUCIBILITY



A SYSTEM FOR LEARNING HOW TO  
CODE



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Standard

\$75 / month

[Learn more](#)Cloud  
Instructor

\$15 / month

With three options available for covering student costs

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Student

\$5 / month

[Learn more](#)

## SHARED SPACES

1 (with member &amp; project limits)

**Unlimited****Unlimited****Unlimited**

1 (with member &amp; project limits)

## PROJECTS

25

**Unlimited****Unlimited****Unlimited**

25

## OUTPUTS

25

50

100

100

25

## COMPUTE HOURS

25 hours per month

**150 hours**included per month  
additional @ 10¢ per hour**500 hours**included per month  
additional @ 10¢ per hour**300 hours**included per month  
additional @ 10¢ per hour**75 hours**included per month  
additional @ 10¢ per hour

## MAX RAM

1 GB

**8 GB****32 GB****16 GB**

1 GB

Already have an account?

Log In

Sign Up

Email

Password

i

First name

Last name

Sign up

or



Sign up with Google



Sign up with GitHub



Sign up with Clever



Welcome, Miranda McKibben!

You are logged in to Posit. Please select your destination.



Posit Cloud



shinyapps.io



Posit User Settings

or

Log Out

## Spaces

 Your Workspace Intro Course  
Miranda McKibben New Space

## Learn

 Guide What's New Recipes Primers Cheatsheets

## Help

 Current System Status Posit Community

## Info

 Plans & Pricing Terms and Conditions Your Content Archive Trash

## Your Content (1)

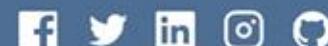
TYPE \* ACCESS \* SORT A Z



## Untitled Project

 RStudio Project  Private Created Oct 15, 2022 2:26 PM    

Terms Status



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## Your Content (1)

TYPE \* ACCESS \* SORT A Z



## Untitled Project

 RStudio Project     Private    Created Oct 15, 2022 2:26 PM    

Terms Status



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## R Basics

Do basic tasks with R, like import data and call functions.

- Read a CSV file (.csv)
- Read a character-delimited file (.txt)
- Read an Excel file (.xls, .xlsx)
- Arithmetic with single numbers
- Call a function on a number
- Obey R's naming rules
- Run a function
- Create a table manually

## Transform Tables

Do things like filter, sort, and pivot your tables of data.

- Extract columns from a table as a new table
- Rename columns in a table
- Add a column to a table and compute its values
- Compute summary statistics for a table
- Compute summary statistics for groups of rows within a table
- Filter your table to rows with specific values
- Group a continuous variable into categories

## Visualize Data

Plot your data in various ways.

- Visualize two vectors using a scatterplot
- Visualize data with a scatterplot
- Visualize counts with a bar chart
- Visualize grouped counts with a stacked bar chart
- Visualize a distribution with a histogram
- Visualize ordered continuous data with a line chart
- Visualize distributions with boxplots
- Change the axis labels of a plot

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Intro Course  
Miranda McKibben

Content Data Members Usage About

Spaces

- Your Workspace
- Intro Course  
Miranda McKibben
- New Space

Learn

- Guide
- What's New
- Primers
- Cheat Sheets

Help

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- Posit Community

Info

- Plans & Pricing
- Terms and Conditions

All Content (0)

Type \* Access \* Sort A Z

New Project

All Content

Your Content

Templates

Archive

Trash

+ New List

This space can have up to 10 more projects or outputs.

Archive or trash existing content to make room for additional content. If you need more capacity in this space, please upgrade your account.

Upgrade Account

no content

posit Cloud

[Terms](#) [Status](#)

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File Edit Code View Plots Session Build Debug Profile Tools Help

    Go to file/function

Addins

R 4.3.1

Console Terminal  Background Jobs 

 R 4.3.1 · /cloud/project/ 

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"  
Copyright (C) 2023 The R Foundation for Statistical Computing  
Platform: x86_64-pc-linux-gnu (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.
```

```
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  126 MiB 

R  Global Environment 

Environment is empty

Files Plots Packages Help Viewer Presentation

 New Folder  New Blank File  Upload  Delete  Rename  More

 Cloud > project

	Name	Size	Modified
	..		
	.Rhistory	0 B	Oct 18, 2023, 12:07 PM
	project.Rproj	205 B	Oct 18, 2023, 12:07 PM

File Edit Code View Plots Session Build Debug Profile Tools Help

    Go to file/function  Addins

R 4.3.1

Console Terminal  Background Jobs 

R 4.3.1 · /cloud/project/ 

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"  
Copyright (C) 2023 The R Foundation for Statistical Computing  
Platform: x86_64-pc-linux-gnu (64-bit)
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Type 'q()' to quit R.
```

&gt;



Environment History Connections Tutorial

 Import Dataset 

R  Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

 New Folder  New Blank File  Upload  Delete  Rename  More

 Cloud > project

	Name	Size	Modified
	..		
	.Rhistory	0 B	Oct 18, 2023, 12:07 PM
	project.Rproj	205 B	Oct 18, 2023, 12:07 PM

Untitled1

Run Source

1 |

Environment History Connections Tutorial

Import Dataset 133 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

New Folder New Blank File Upload Delete Rename More

Cloud > project

	Name	Size	Modified
	..		
	.Rhistory	0 B	Oct 18, 2023, 12:07 PM
	project.Rproj	205 B	Oct 18, 2023, 12:07 PM

1:1 (Top Level) R Script

Console Terminal Background Jobs

R 4.3.1 · /cloud/project/

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

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'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.
```

# RStudio Terminology!

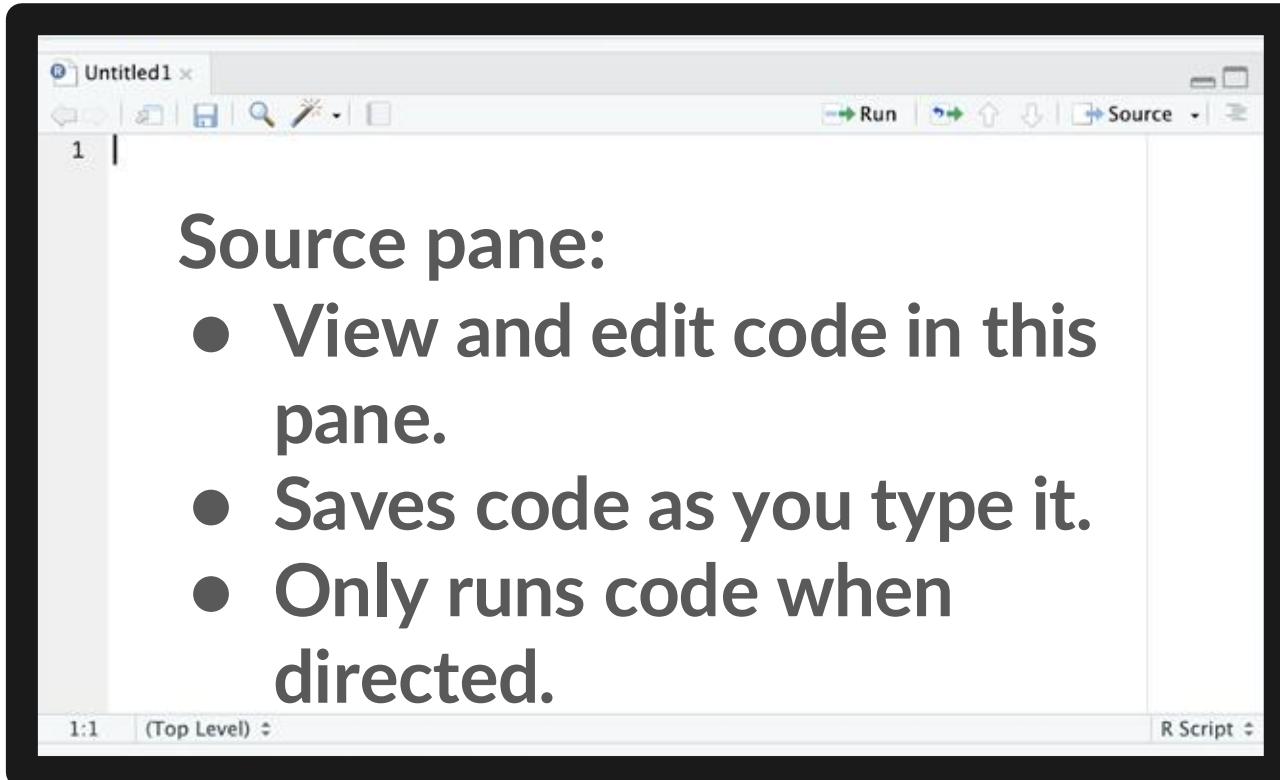
The screenshot displays the RStudio interface with several panes:

- Source pane**: The leftmost pane shows a single line of code "1 |". The title bar indicates it's an "Untitled1" script.
- Environment pane**: The top-right pane shows the global environment. A message at the top states "Environment is empty". Below is a file browser table:

Name	Size	Modified
..	0 B	Oct 18, 2023, 12:07 PM
.Rhistory	205 B	Oct 18, 2023, 12:07 PM
project.Rproj		

- R Console**: The bottom-left pane displays the R startup message and license information.

# RStudio Terminology!



## Source pane:

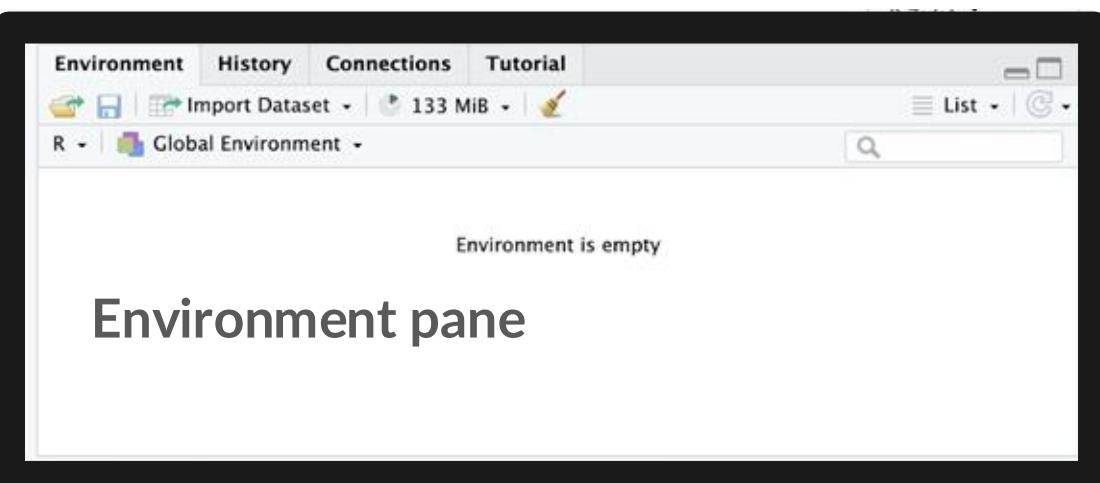
- View and edit code in this pane.
- Saves code as you type it.
- Only runs code when directed.

The screenshot shows the RStudio interface with the Environment pane highlighted. The pane title is 'Global Environment'. It displays the message 'Environment is empty'. Below this, there is a file browser titled 'Cloud > project' with the following contents:

Name	Size	Modified
..		
.Rhistory	0 B	Oct 18, 2023, 12:07 PM
project.Rproj	205 B	Oct 18, 2023, 12:07 PM

The status bar at the bottom indicates 'R 4.3.1 · /cloud/project/ ·'.

# RStudio Terminology!



The screenshot shows the RStudio interface with several panes visible:

- Top Bar:** Includes tabs for "Untitled1", "File", "Edit", "View", "Run", "Source", and "Help".
- Left Sidebar:** Contains icons for file operations like "New", "Open", "Save", "Import Dataset", "133 MiB", and "Global Environment".
- Environment Pane:** Labeled "Environment" at the top. It displays the message "Environment is empty".
- Console Pane:** Shows the R startup message and basic information about the R environment.
- Output Pane:** Shows the R startup message and basic information about the R environment.
- Files Pane:** Shows a list of files in the "Cloud > project" directory, including ".Rhistory" (0 B, Oct 18, 2023) and "project.Rproj" (205 B, Oct 18, 2023).

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

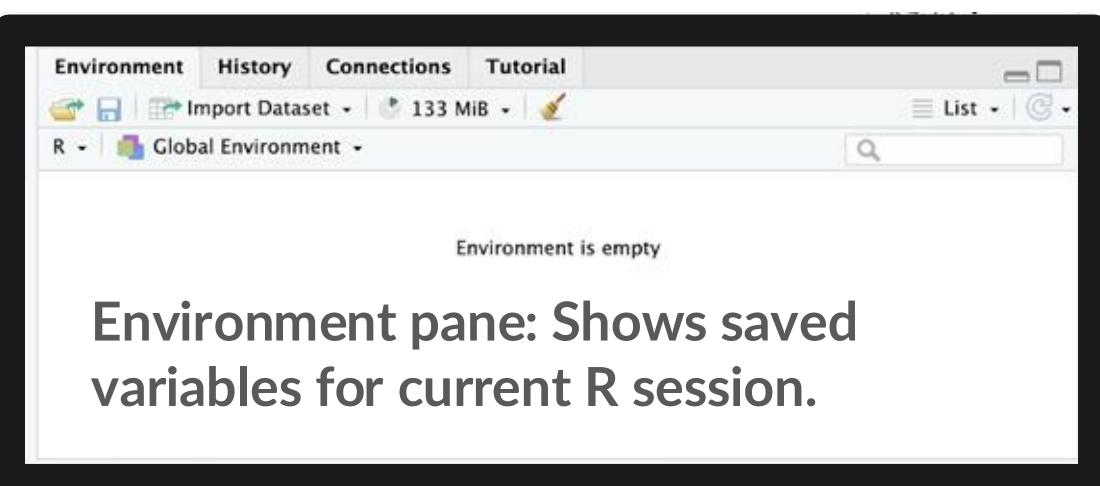
R is free software and comes with ABSOLUTELY NO WARRANTY.
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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
```



# RStudio Terminology!



The screenshot shows the RStudio interface with the following components visible:

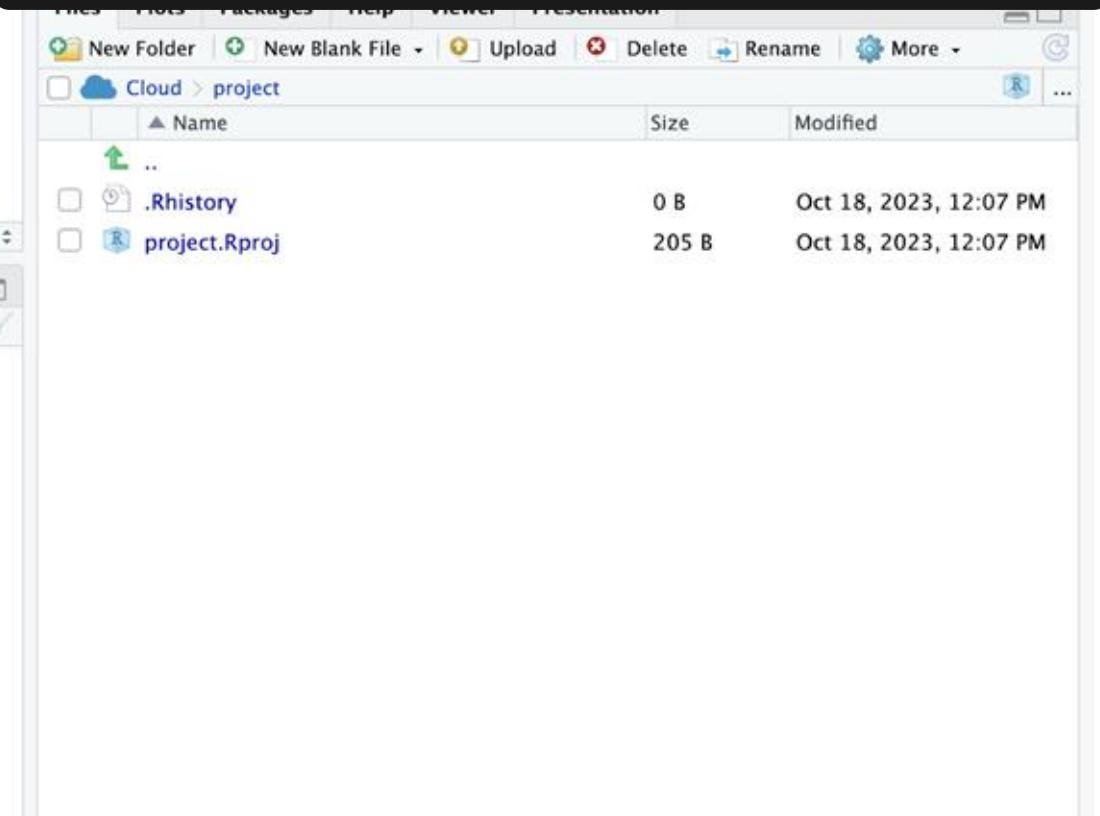
- Top Bar:** Includes tabs for "Untitled1", "File", "Edit", "View", "Run", "Source", and "Help".
- Left Sidebar:** Contains icons for file operations like Open, Save, Find, and Print.
- Environment Pane:** Shows the message "Environment is empty".
- Console:** Displays the R startup message and license information.
- Terminal:** Shows the command "R 4.3.1 · /cloud/project/".
- Background Jobs:** Shows no active jobs.
- Bottom Status Bar:** Displays "R Script" and other status indicators.

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (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.

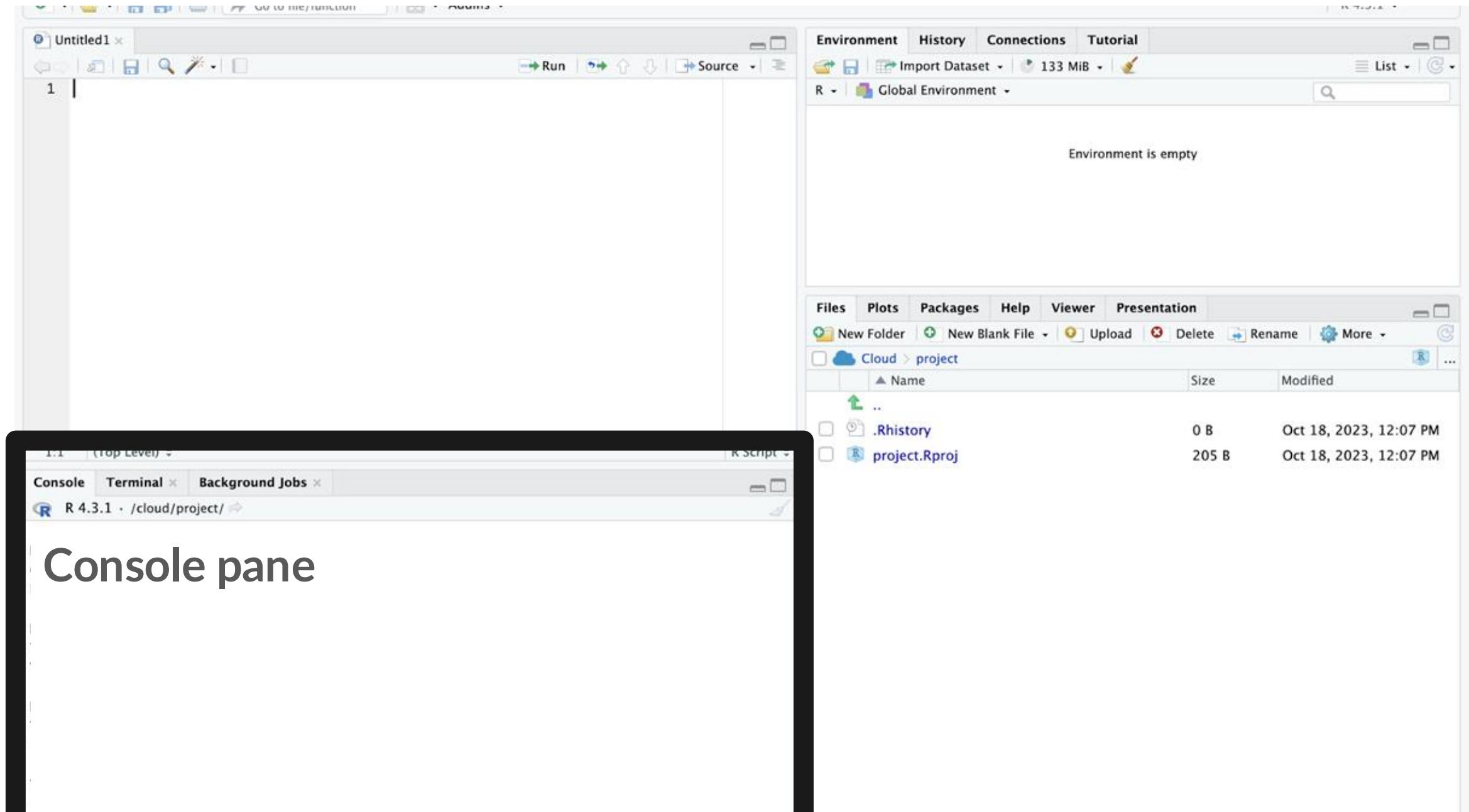
R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
```

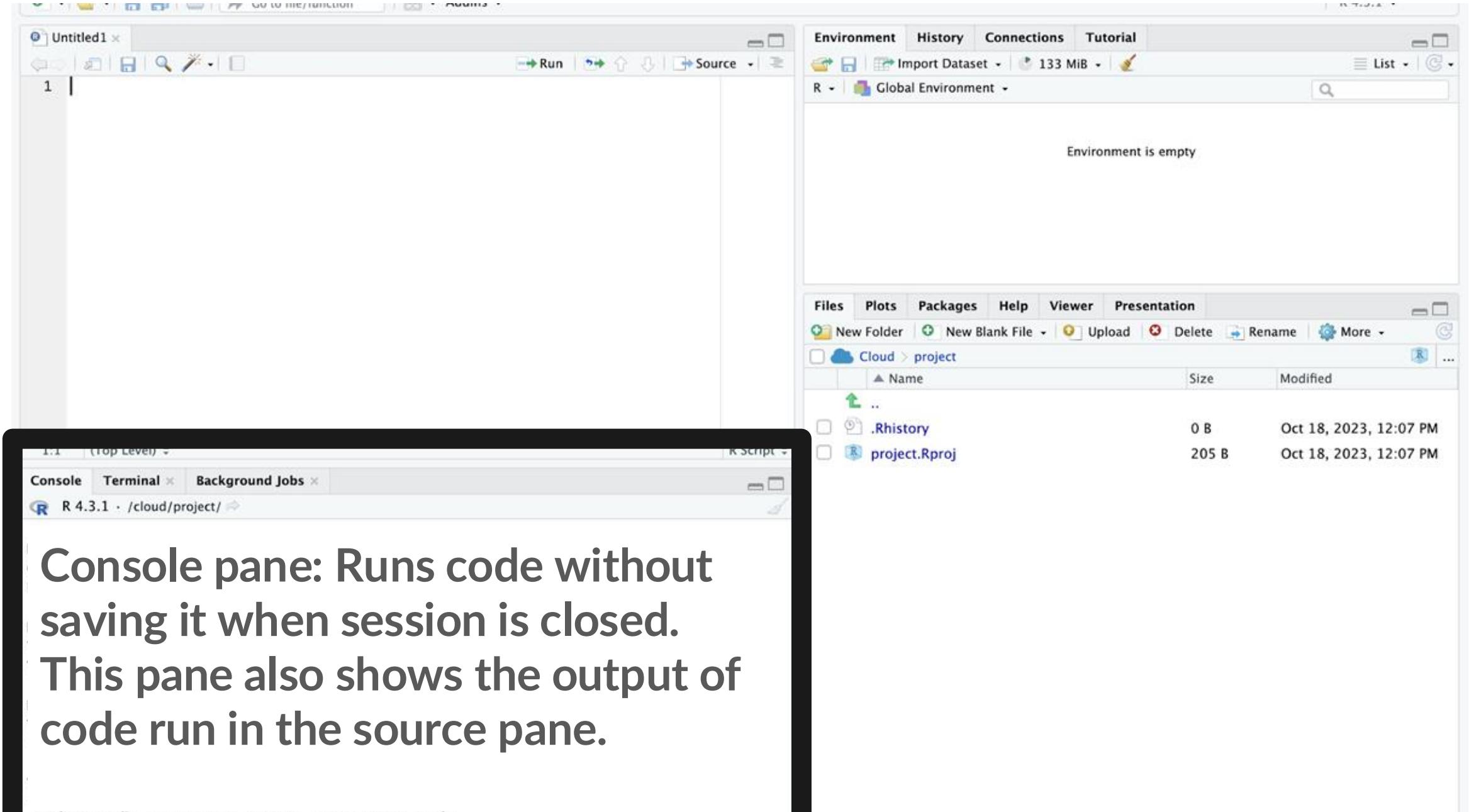


Environment pane: Shows saved variables for current R session.

# RStudio Terminology!



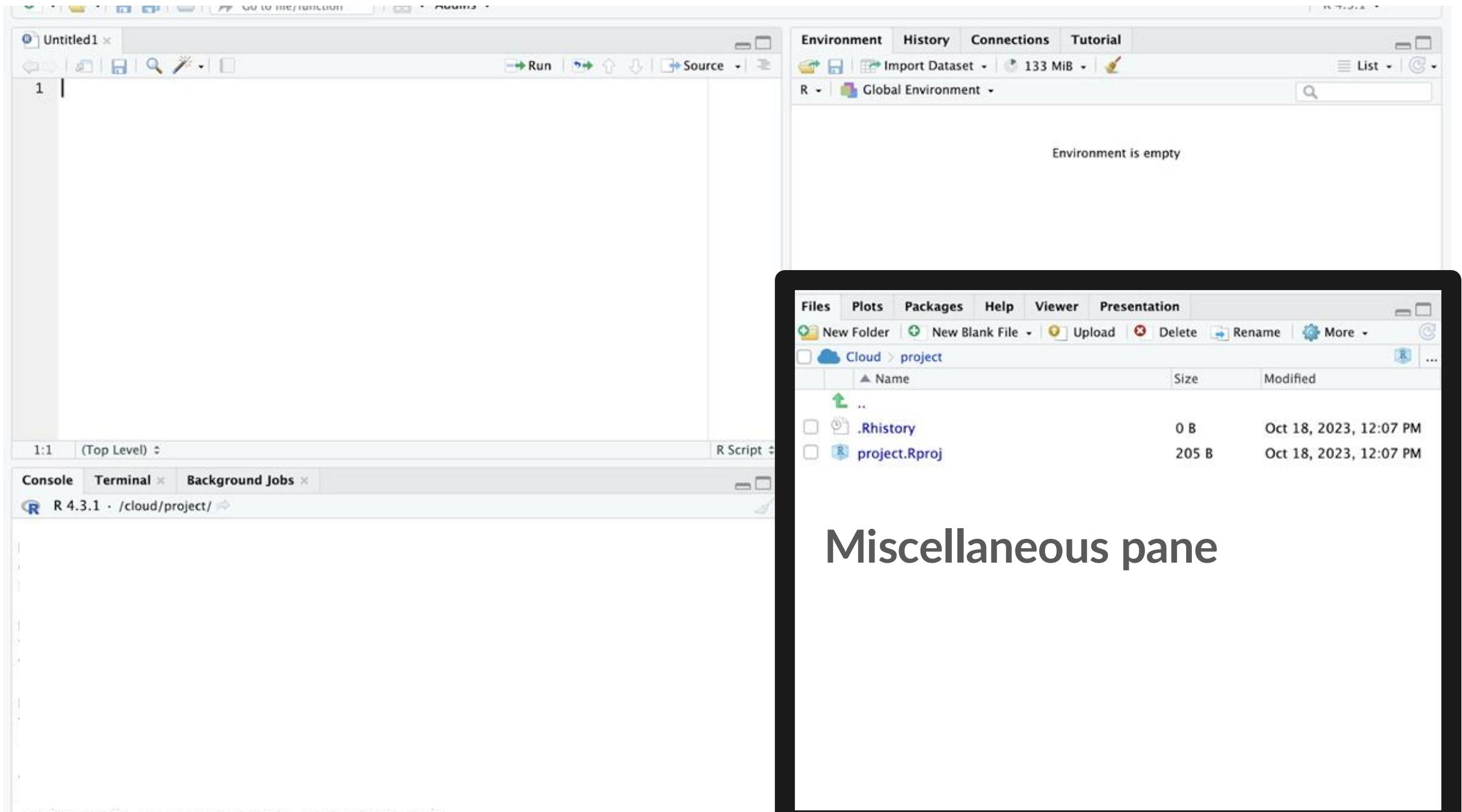
# RStudio Terminology!



The screenshot shows the RStudio desktop application window. The top menu bar includes File, Edit, View, Project, Code, Tools, Help, and Help & Topics. The top toolbar contains icons for file operations like Open, Save, Print, and a search bar. The Source pane on the left has a tab for 'Untitled1' with the number '1' and a cursor. The Environment pane in the top right shows 'Global Environment' with the message 'Environment is empty'. The Files pane in the bottom right shows a project named 'Cloud > project' containing files: an empty folder icon, a history file (.Rhistory) of size 0 B last modified on Oct 18, 2023, and a project file (project.Rproj) of size 205 B last modified on Oct 18, 2023. The bottom-left corner features a callout box with a black border containing the following text:

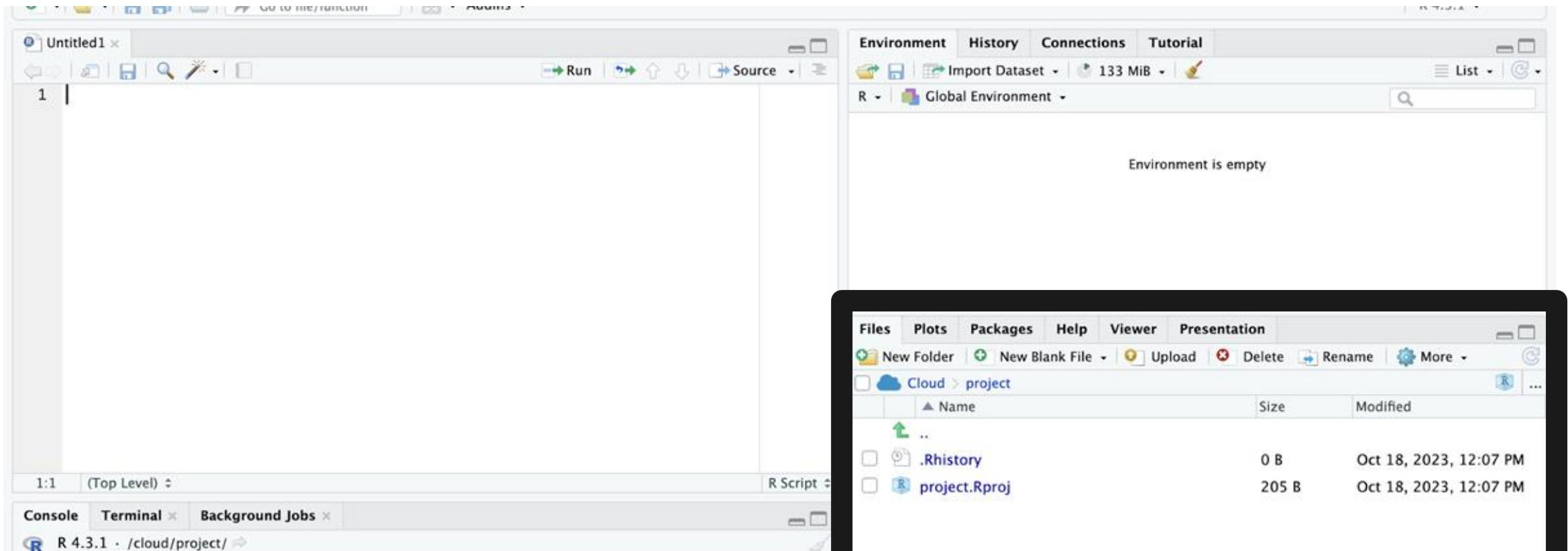
**Console pane:** Runs code without saving it when session is closed.  
This pane also shows the output of code run in the source pane.

# RStudio Terminology!



Miscellaneous pane

# RStudio Terminology!



Miscellaneous pane: Stores generated plots, uploaded files, and information about R packages.

github.com/mmckibben273/R-tist-Studio

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Notifications Fork 0 Star 0

Code Issues Pull requests Actions Projects Security Insights

main 1 Branch 0 Tags Go to file Code

mmckibben273 Add files via upload 3acb5d7 · 4 hours ago 18 Commits

Cheatsheets Delete Cheatsheets/filler 6 hours ago

Codes Delete Codes/filler 6 hours ago

Datasets Delete Datasets/filler 5 hours ago

Papers Add files via upload 4 hours ago

Powerpoints Create filler 6 hours ago

Poll Everywhere Login.pdf Add files via upload 5 hours ago

README.md Initial commit 6 hours ago

README

R-tist-Studio

About

Introductory class for highschool students to learn coding in RStudio

Readme

Activity

0 stars

1 watching

0 forks

Report repository

Releases

No releases published

Packages

No packages published

Languages

R 100.0%

main  

Go to file 

- >  Cheatsheets
- ▽  Codes
  -  Day1.Rmd
- >  Datasets
- >  Papers
- >  Powerpoints
-  Poll Everywhere Login.pdf
-  README.md

Code

Blame

139 lines (105 loc) · 5.6 KB

Raw



```
1 ---  
2 title: "Intro to R"  
3 output: html_document  
4 date: "2023-10-13"  
5 ---  
6  
7 When performing calculations in RStudio Markdown, make sure to type your code in the shaded areas. These are called "code chunks." To pe  
8 + for addition  
9 - for subtraction  
10 * for multiplication  
11 / for division  
12 ^ for exponentials  
13  
14 Run the code chunk below by clicking on the green arrow in the right hand corner of the shaded area.  
15 ```{r}  
16 2+3  
17 2-3  
18 2*3  
19 2^3  
20 2/3  
21 ...  
22  
23 Try typing in some of your own small equations in the empty chunk below. Make sure you type your code between the ```{r} and ```.  
24 ```{r}  
25 ...
```

## Spaces

Your Workspace

Test version  
Miranda McKibben

New Space

## Learn

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Recipes

Cheatsheets

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File Edit Code View Plots Session Build Debug Profile Tools Help

+ Go to file/function Addins

R 4.3.3

Untitled1\* Untitled2

ABC Knit

Source Visual

```
1 ---  
2 title: "Untitled"  
3 output: html_document  
4 date: "2025-01-07"  
5 ---  
6  
7 ```{r setup, include=FALSE}  
8 knitr::opts_chunk$set(echo = TRUE)  
9 ```  
10  
11 ## R Markdown  
12  
13 This is an R Markdown document. Markdown is a simple formatting syntax for  
authoring HTML, PDF, and MS Word documents. For more details on using R Markdown  
see http://rmarkdown.rstudio.com.
```

2:1 Untitled

Outline

Console Terminal Background Jobs

```
R 4.3.3 · /cloud/project/  
Loading required package: XVector  
Loading required package: GenomeInfoDb
```

```
Attaching package: 'Biostrings'
```

```
The following object is masked from 'package:base':
```

```
strsplit
```

```
Session restored from your saved work on 2024-Jan-30 15:52:14 UTC (343 days ago)  
R version change [4.3.2 -> 4.3.3] detected when restoring session; search path not resto  
red  
> |
```

Environment History Connections Tutorial

Import Dataset 467 MiB

R Global Environment

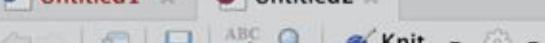
Environment is empty

Files Plots Packages Help Viewer Presentation

New Folder	New Blank File	Upload	Delete	Rename	More
Cloud > project					
	Name	Size	Modified		
	..				
	.Rhistory	0 B	Jan 30, 2024, 10:24 AM		
	fastq				
	project.Rproj	205 B	Jan 7, 2025, 3:57 PM		



Untitled1\* Untitled2\*



Source Visual

```
1 ---  
2 title: "Untitled"  
3 output: html_document  
4 date: "2025-01-07"  
5 ---  
6  
7 ```{r setup, include=FALSE}  
8 knitr::opts_chunk$set(echo = TRUE)  
9 ---  
10  
11 ## R Markdown  
12  
13 This is an R Markdown document. Markdown is a simple  
authoring language for creating HTML, PDF, and MS Word documents. For more  
see <http://rmarkdown.rstudio.com>.
```

2:1 # Untitled

Console Terminal Background Jobs

R 4.3.3 · /cloud/project/

Loading required package: XVector

Loading required package: GenomeInfoDb

Attaching package: 'Biostrings'

The following object is masked from 'package:base':

strsplit

Session restored from your saved work on 2024-Jan-30 15:52:14 UTC (343 days ago)

R version change [4.3.2 -&gt; 4.3.3] detected when restoring session; search path not restored

&gt;

Upload Files

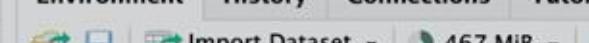
Target directory:  
 [Browse...](#)

File to upload:  
[Choose File](#) No file chosen

TIP: To upload multiple files or a directory, create a zip file.  
The zip file will be automatically expanded after upload.

[OK](#) [Cancel](#)

Environment History Connections Tutorial



R Global Environment



Environment is empty

Pages	Help	Viewer	Presentation
New Blank File	<a href="#">Upload</a>	<a href="#">Delete</a>	<a href="#">Rename</a>

project.kproj 0 B Jan 30, 2024, 10:24 AM

205 B Jan 7, 2025, 3:57 PM

## Upload Files

Target directory:

[Browse...](#)

File to upload:

[Choose File](#) Day1.Rmd

**TIP:** To upload multiple files or a directory, create a zip file.  
The zip file will be automatically expanded after upload.

[OK](#)[Cancel](#)

project.kproj

File Edit Code View Plots Session Build Debug Profile Tools Help



R 4.5.2

Day1.Rmd x

ABC Knit Run Publish

Source Visual

! Packages rmarkdown, ggplot2, and tidyverse required but are not installed. [Install](#) [Don't Show Again](#)

```
1 ---  
2 title: "Intro to R"  
3 output: html_document  
4 date: "2023-10-13"  
5 ---  
6  
7 When performing calculations in RStudio Markdown, make sure to type your code in the shaded areas. These are called "code chunks." To perform basic equations:  
8 + for addition  
9 - for subtraction  
10 * for multiplication  
11  
1:1 # Intro to R
```

R Markdown

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↵

```
R version 4.5.2 (2025-10-31) -- "[Not] Part in a Rumble"  
Copyright (C) 2025 The R Foundation for Statistical Computing  
Platform: x86_64-pc-linux-gnu
```

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Environment History Connections Tutorial

Import Dataset 130 MiB

R Global Environment

Environment is empty

Files	Plots	Packages	Help	Viewer	Presentation	More
New Folder	New File	Upload	Delete	Rename	More	
Cloud > project						
	Name		Size	Modified		
	..					
<input type="checkbox"/>	.Rhistory		0 B	Jan 7, 2026, 10:02 PM		
<input type="checkbox"/>	project.Rproj		205 B	Jan 7, 2026, 10:02 PM		
<input type="checkbox"/>	Day1.Rmd		5.8 KB	Jan 7, 2026, 10:03 PM		

R Script ⌘N

Quarto Document...

Quarto Presentation...

R Notebook

R Markdown... **(circled)**

Shiny Web App...

Plumber API...

Text File

C++ File

Python Script

SQL Script

Stan File

D3 Script

R Sweave

R HTML

R Documentation...

Run ⌘R

Source ⌘S

Import Dataset ⌘I

192 MiB

List ⌘L

Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

Name	Description	Version
base	The R Base Package	4.3.1
boot	Bootstrap Functions (Originally by Angelo Canty for S)	1.3-28.1
class	Functions for Classification	7.3-22
cluster	"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.1.4
codetools	Code Analysis Tools for R	0.2-19
compiler	The R Compiler Package	4.3.1
datasets	The R Datasets Package	4.3.1
foreign	Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ...	0.8-84
graphics	The R Graphics Package	4.3.1
grDevices	The R Graphics Devices and Support for Colours and Fonts	4.3.1
grid	The Grid Graphics Package	4.3.1
KernSmooth	Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-21
lattice	Trellis Graphics for R	0.21-8
MASS	Support Functions and Datasets for Venables and Ripley's MASS	7.3-60
Matrix	Sparse and Dense Matrix Classes and Methods	1.5-4.1
methods	Formal Methods and Classes	4.3.1

Console Terminal × Background Jobs ×

R 4.3.1 · /cloud/project/ ↵

```
R version 4.3.1 (2023-06-16) -- "Beagle Scouts"
Copyright (C) 2023 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (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.

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.
```

Go to file/function Addins

Untitled1 x Run Source

1

Environment History Connections Tutorial Import Dataset 217 MiB Global Environment

Environment is empty

Install Required Packages

Creating R Markdown documents requires updated versions of the following packages: base64enc, digest, evaluate, glue, highr, htmltools, jsonlite, knitr, magrittr, markdown, mime, rmarkdown, stringi, stringr, xfun, yaml.

Do you want to install these packages now?

Yes No

1:1 (Top Level) Console Terminal Background Jobs R 4.3.1 · /cloud/project/

R version 4.3.1 (2023-06-16) -- "Beagle Scouts"  
Copyright (C) 2023 The R Foundation for Statistical Computing  
Platform: x86\_64-pc-linux-gnu (64-bit)

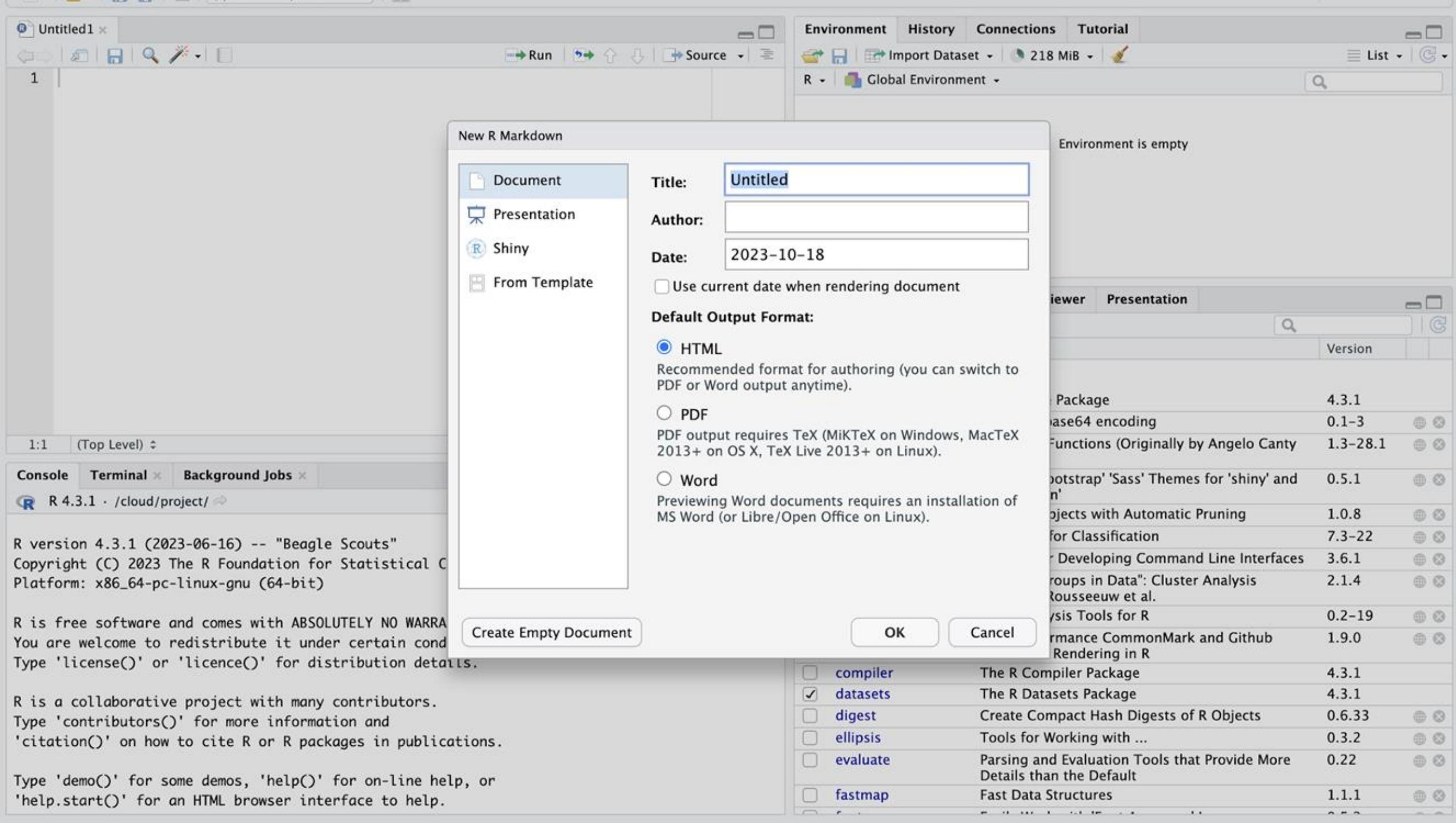
R is free software and comes with ABSOLUTELY NO WARRANTY.  
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'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or  
'help.start()' for an HTML browser interface to help.

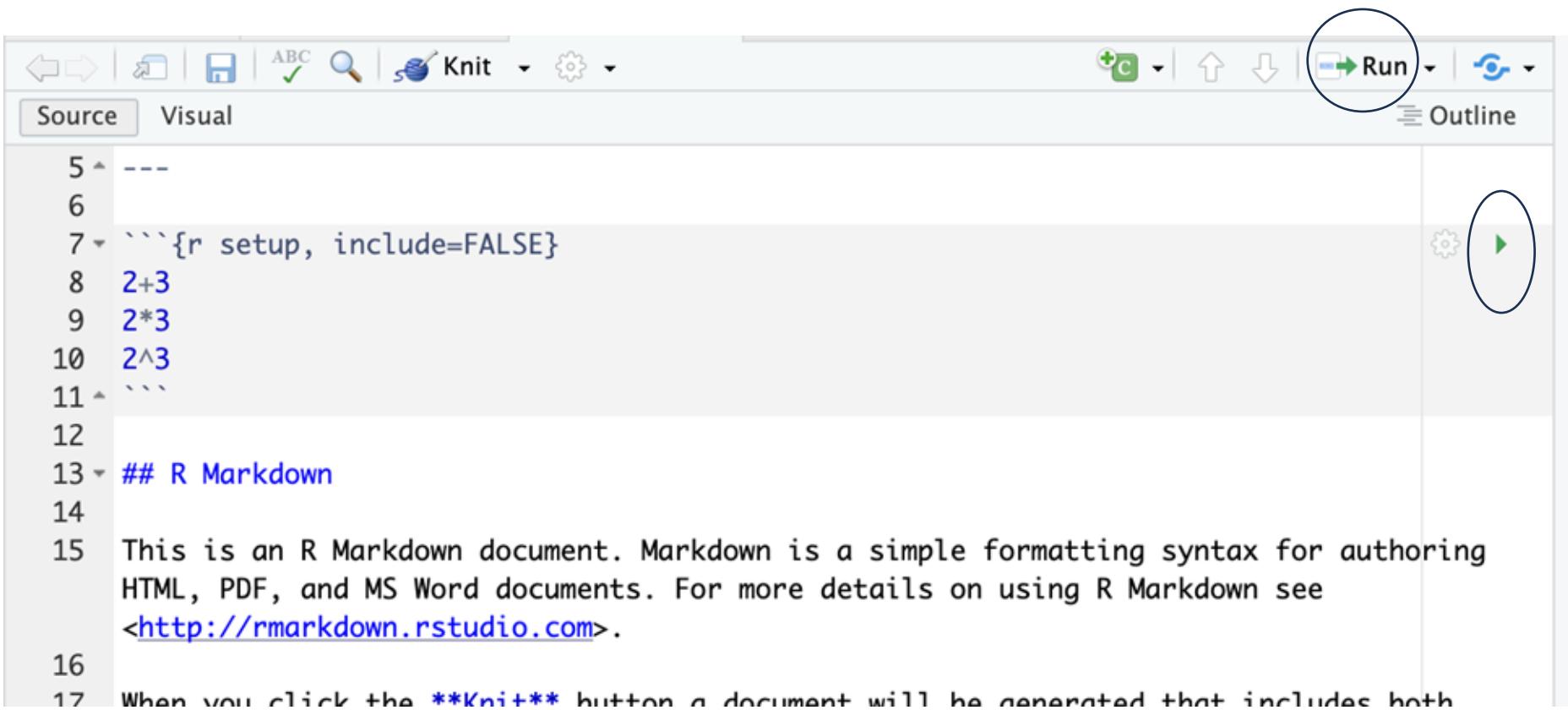
Pages Help Viewer Presentation Description Version

The R Base Package	4.3.1
Bootstrap Functions (Originally by Angelo Canty for S)	1.3-28.1
Functions for Classification	7.3-22
"Finding Groups in Data": Cluster Analysis Extended Rousseeuw et al.	2.1.4
Code Analysis Tools for R	0.2-19
The R Compiler Package	4.3.1
The R Datasets Package	4.3.1
Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ...	0.8-84
The R Graphics Package	4.3.1
The R Graphics Devices and Support for Colours and Fonts	4.3.1
The Grid Graphics Package	4.3.1
Functions for Kernel Smoothing Supporting Wand & Jones (1995)	2.23-21
Trellis Graphics for R	0.21-8
Support Functions and Datasets for Venables and Ripley's MASS	7.3-60
Sparse and Dense Matrix Classes and Methods	1.5-4.1
Formal Methods and Classes	4.3.1



```
1 --
2 title: "Intro to R"
3 output: html_document
4 date: "2023-10-18"
5 ---
6
7 ```{r setup, include=FALSE}
8 knitr::opts_chunk$set(echo = TRUE)
9 ```
10
11 ## R Markdown
12
13 This is an R Markdown document. Markdown is a simple formatting syntax
14 for writing plain text documents. It can be converted to HTML, PDF, and MS Word documents. For more details on using R Markdown,
15 see http://rmarkdown.rstudio.com.
16
17 When you click the **Knit** button a document will be generated that
18 contains both the content as well as the output of any embedded R code chunks within
```

# Try typing in equations:



The screenshot shows the RStudio interface with the following elements:

- Toolbar:** Includes icons for back, forward, file, ABC, search, Knit (highlighted with a blue circle), settings, and run.
- Source Tab:** Active tab, showing the R Markdown code.
- Visual Tab:** Available tab.
- Code Editor:** Displays the following R Markdown code:

```
5 ---  
6  
7 ```{r setup, include=FALSE}  
8 2+3  
9 2*3  
10 2^3  
11 ```  
12  
13 ## R Markdown  
14  
15 This is an R Markdown document. Markdown is a simple formatting syntax for authoring  
HTML, PDF, and MS Word documents. For more details on using R Markdown see  
http://rmarkdown.rstudio.com.  
16  
17 When you click the Knit button a document will be generated that includes both
```
- Run Button:** Located in the toolbar, highlighted with a blue circle.
- Outline View:** Shows a tree structure of the document's structure.
- Right Panel:** Shows a preview of the rendered document, with a green play button icon highlighted with a blue oval.

File Edit Code View Plots Session Build Debug Profile Tools Help

Go to file/function Addins

R 4.5.2

Day1.Rmd x

Source Visual

```
13
14 Run the code chunk below by clicking on
the shaded area.
15 `r
16 2+3
17 2-3
18 2*3
19 2^3
20 2/3
21 ``
22
23 Try typing in some of your own small equ
18:4 C Chunk 1
```

Run Selected Line(s) ⌘ ↵

- Run Current Chunk ⌘ ⌘ ↵
- Run Next Chunk ⌘ ⌘ N
- Run Setup Chunk
- Run Setup Chunk Automatically
- Run All Chunks Above ⌘ ⌘ P
- Run All Chunks Below
- Restart R and Run All Chunks
- Restart R and Clear Output
- Run All ⌘ ⌘ R

corner of

Make sure

R Markdown

Environment History Connections Tutorial

Import Dataset 336 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

Name	Description	Version	
foreign	(Factors) Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ...	0.8-90	
fs	Cross-Platform File System Operations Based on 'libuv'	1.6.6	
gargle	Utilities for Working with Google APIs	1.6.0	
generics	Common S3 Generics not Provided by Base R Methods Related to Model Fitting	0.1.4	
ggplot2	Create Elegant Data Visualisations Using the Grammar of Graphics	4.0.1	
glue	Interpreted String Literals	1.8.0	
googledrive	An Interface to Google Drive	2.1.2	
googlesheets4	Access Google Sheets using the Sheets API V4	1.1.2	
graphics	The R Graphics Package	4.5.2	<input checked="" type="checkbox"/>
grDevices	The R Graphics Devices and Support for Colours and Fonts	4.5.2	<input checked="" type="checkbox"/>
grid	The Grid Graphics Package	4.5.2	
gttable	Arrange 'Grobs' in Tables	0.3.6	
haven	Import and Export 'SAS', 'Stata' and 'SPSS' Files	2.5.5	

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.

>

Day1.Rmd x

ABC Knit Settings Run Publish Outline

Source Visual

```
15 ``{r}
16 2+3
17 2-3
18 2*3
19 2^3
20 2/3
21 ````
```

```
[1] 5
[1] -1
[1] 6
[1] 8
[1] 0.6666667
```

20:3 C Chunk 1 R Markdown

Console Terminal Background Jobs

R 4.5.2 · /cloud/project/ ↗

```
> 2+3
[1] 5
> 2-3
[1] -1
> 2*3
[1] 6
> 2^3
[1] 8
> 2/3
```

Environment History Connections Tutorial

Import Dataset 336 MiB Global Environment

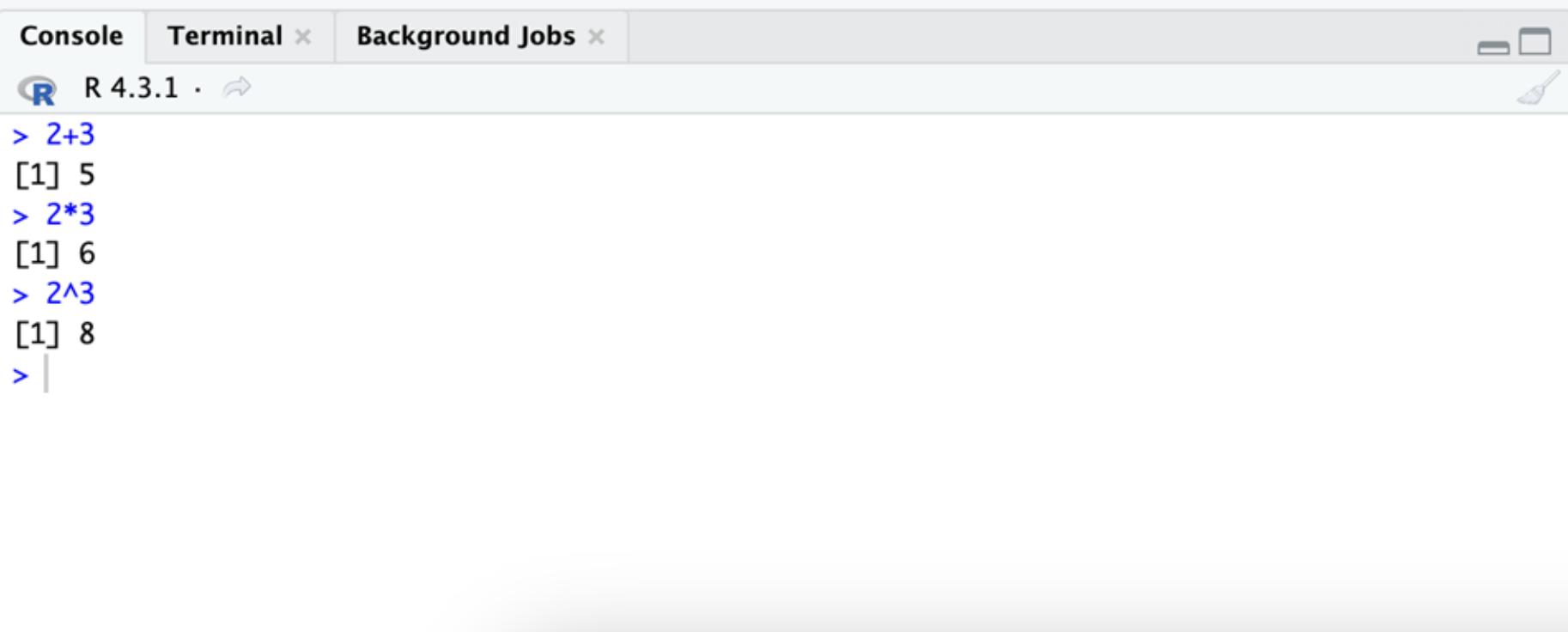
Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

Name	Description	Version
foreign	Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ...	0.8-90
fs	Cross-Platform File System Operations Based on 'libuv'	1.6.6
gargle	Utilities for Working with Google APIs	1.6.0
generics	Common S3 Generics not Provided by Base R Methods Related to Model Fitting	0.1.4
ggplot2	Create Elegant Data Visualisations Using the Grammar of Graphics	4.0.1
glue	Interpreted String Literals	1.8.0
googledrive	An Interface to Google Drive	2.1.2
googlesheets4	Access Google Sheets using the Sheets API V4	1.1.2
graphics	The R Graphics Package	4.5.2
grDevices	The R Graphics Devices and Support for Colours and Fonts	4.5.2
grid	The Grid Graphics Package	4.5.2
gttable	Arrange 'Grobs' in Tables	0.3.6
haven	Import and Export 'SPSS', 'Stata' and 'SAS' Files	2.5.5

# The results appear in the console pane.

A screenshot of the RStudio interface, specifically the 'Console' tab. The window title bar shows 'Console' as the active tab, along with 'Terminal x' and 'Background Jobs x'. Below the title bar, the R logo and the text 'R 4.3.1 ·' are visible. The main area of the window displays the following R session:

```
> 2+3  
[1] 5  
> 2*3  
[1] 6  
> 2^3  
[1] 8  
> |
```

The text is in blue, indicating it is part of the R session history. The right side of the window has standard OS X-style window controls (minimize, maximize, close) and a small icon in the top right corner.

Day1.Rmd x

ABC 🔎 Knit ⚙️ Run Publish

Source Visual

[1] 0.6666667

22

23 Try typing in some of your own small equations in the empty chunk below. Make sure you type your code between the `r` and ``.

24 `r`

25 ``

26 ``

27

28 While we can see the results of our equations, we probably don't want to retype the equation every time we want a certain value. To save the number we can assign it a "variable name." A variable name can be a single letter or a word. Be careful: RStudio is case sensitive (lowercase letters and uppercase letters matter), meaning a variable saved as "Data" will not be recognized if you try to use "data" instead.

29

20:3 C Chunk 1 R Markdown

Console Terminal Background Jobs

R 4.5.2 · /cloud/project/ ↗

```
> 2+3
[1] 5
> 2-3
[1] -1
> 2*3
[1] 6
> 2^3
[1] 8
> 2/3
```

Environment History Connections Tutorial

Import Dataset 336 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

Name	Description	Version
foreign	Read Data Stored by 'Minitab', 'S', 'SAS', 'SPSS', 'Stata', 'Systat', 'Weka', 'dBase', ...	0.8-90
fs	Cross-Platform File System Operations Based on 'libuv'	1.6.6
gargle	Utilities for Working with Google APIs	1.6.0
generics	Common S3 Generics not Provided by Base R Methods Related to Model Fitting	0.1.4
ggplot2	Create Elegant Data Visualisations Using the Grammar of Graphics	4.0.1
glue	Interpreted String Literals	1.8.0
googledrive	An Interface to Google Drive	2.1.2
googlesheets4	Access Google Sheets using the Sheets API V4	1.1.2
graphics	The R Graphics Package	4.5.2
grDevices	The R Graphics Devices and Support for Colours and Fonts	4.5.2
grid	The Grid Graphics Package	4.5.2
gttable	Arrange 'Grobs' in Tables	0.3.6
bigr	Import and Export 'SPSS', 'Stata' and 'SAS' Files	2.5.5

# Assigning variable names

```
5 ^ ----
6
7 ^ ````{r setup, include=FALSE}
8 x<-2+3
9 y<-2*3
10 z<-2^3
11 ^ ``
12
```



# Assigning variable names

```
5 ^ ---  
6  
7 ^ ````{r setup, include=FALSE}  
8 x<-2+3  
9 y<-2*3  
10 z<-2^3  
11 ^ ````  
12
```

The screenshot shows the RStudio interface with the Environment tab selected. The Global Environment pane displays three variables:

Values	
x	5
y	6
z	8

```
```{r }
x <- c(1,3,5,7,9,11)
y <- c(y,z)
```
```



```
```{r }
x <- c(1,3,5,7,9,11)
y <- c(y,z)
```
```

Environment   History   Connections   Tutorial

Import Dataset | 264 MiB |

R | Global Environment |

Values

|   |                        |
|---|------------------------|
| x | num [1:6] 1 3 5 7 9 11 |
| y | num [1:2] 6 8          |
| z | 8                      |

# Summary Statistics

```
```{r pressure, echo=FALSE}
min(x) #minimum value in x
max(x) #maximum value in x
mean(x) #average value of x
length(x) #number of variables in x
sum(x) #sum of x
var(x) #variance of x
summary(x) #summary of x
```
```

```
> min(x)
[1] 1
> max(x)
[1] 11
> mean(x)
[1] 6
> length(x)
[1] 6
> sum(x)
[1] 36
> var(x)
[1] 14
> summary(x)
   Min. 1st Qu. Median Mean 3rd Qu. Max.
   1.0    3.5    6.0   6.0   8.5   11.0
```

# Pulling out parts of a dataset

```
30 ~ ` ``{r}
31 first_three <- x[1:3] #Pulls out the first 3 variables from the vector
32 picknchoose <- x[c(1,3,5)] #Pulls out the first, third, and fifth variable from the
vector
33 ~ ```
```

|             |                 |
|-------------|-----------------|
| first_three | num [1:3] 1 3 5 |
| picknchoose | num [1:3] 1 5 9 |

Day1.Rmd x

ABC Knit ▾

Source Visual

datasets. Run the code below to see some of the datasets.

```
75  
76 ` ``{r}  
77 data()  
78 ` ``  
79  
80 Notice that at the bottom of the dataset list it says "Use 'data(package =  
.packages(all.available = TRUE))'"  
81 to list the data sets in all *available* packages." Let's try that!  
82 ` ``{r}  
83 data(package = .packages(all.available = TRUE))  
84 ` ``  
85  
86  
87 We are going to start with a simple data set with several variables. Use the code  
chunk below to load airquality and preview the dataset.  
88 ` ``{r}  
89 data <- airquality #This line calls the airquality set and gives it the name "data"  
90 head(data) #This shows a preview of the dataset  
91 ` ``  
101:1 C Chunk 12 ▾
```

R Markdown ▾

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↗

Name of the column you want.  
> summary(Wind) #Provides some information about the column, such as minimum value, maximum,  
mean, etc.  
Min 1st Qu Median Mean 3rd Qu Max

Environment History Connections Tutorial

Import Dataset 201 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

| Name                                     | Description   | Version |
|--|---|---------|
| askpass                                  | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| backports                                | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input checked="" type="checkbox"/> base | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> base64enc       | Tools for base64 encoding   | 0.1-3   |
| <input type="checkbox"/> bit             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> bit64           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> blob            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> boot            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> broom           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> bslib           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> cachem          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> callr           | Call R from R   | 3.7.6   |
| "  |   | 1.1.0   |

Day1.Rmd x R data sets x

Data sets in package 'datasets':

|                        |   |
|------------------------|---|
| AirPassengers          | Monthly Airline Passenger Numbers 1949–1960                     |
| Bjsales                | Sales Data with Leading Indicator                               |
| Bjsales.lead (Bjsales) | Sales Data with Leading Indicator                               |
| BOD                    | Biochemical Oxygen Demand                                       |
| CO2                    | Carbon Dioxide Uptake in Grass Plants                           |
| ChickWeight            | Weight versus age of chicks on different diets                  |
| DNase                  | Elisa assay of DNase  |
| EuStockMarkets         | Daily Closing Prices of Major European Stock Indices, 1991–1998 |
| Formaldehyde           | Determination of Formaldehyde                                   |
| HairEyeColor           | Hair and Eye Color of Statistics Students                       |
| Harman23.cor           | Harman Example 2.3  |
| Harman74.cor           | Harman Example 7.4  |
| Indometh               | Pharmacokinetics of Indomethacin                                |
| InsectSprays           | Effectiveness of Insect Sprays                                  |
| JohnsonJohnson         | Quarterly Earnings per Johnson & Johnson Share                  |
| LakeHuron              | Level of Lake Huron 1875–1972                                   |
| LifeCycleSavings       | Intercountry Life-Cycle Savings Data                            |
| Loblolly               | Growth of Loblolly Pine Trees                                   |
| Nile                   | Flow of the River Nile  |
| Orange                 | Growth of Orange Trees  |
| OrchardSprays          | Potency of Orchard Sprays                                       |
| PlantGrowth            | Results from an Experiment on Plant Growth                      |

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↗

Name of the column you want.

```
> summary(Wind) #Provides some information about the column, such as minimum value, maximum, mean, etc.
```

| Min | 1st Qu. | Median | Mean | 3rd Qu. | Max |
|-----|---------|--------|------|---------|-----|
|-----|---------|--------|------|---------|-----|

Environment History Connections Tutorial

Import Dataset 202 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

| Name                                     | Description   | Version |
|--|---|---------|
| <input type="checkbox"/> askpass         | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| <input type="checkbox"/> backports       | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input checked="" type="checkbox"/> base | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> base64enc       | Tools for base64 encoding   | 0.1-3   |
| <input type="checkbox"/> bit             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> bit64           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> blob            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> boot            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> broom           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> bslib           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> cachem          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> callr           | Call R from R   | 3.7.6   |
| <input type="checkbox"/> " "             |   | 1.1.0   |

Day1.Rmd x

Source Visual Outline

```

86
87 We are going to start with a simple data set with several variables. Use the code
chunk below to load airquality and preview the dataset.
88 ```{r}
89 data <- airquality #This line calls the airquality set and gives it the name "data"
90 head(data) #This shows a preview of the dataset
91 ```
```

|   | Ozone<br><int> | Solar.R<br><int> | Wind<br><dbl> | Temp<br><int> | Month<br><int> | Day<br><int> |
|---|----------------|------------------|---------------|---------------|----------------|--------------|
| 1 | 41             | 190              | 7.4           | 67            | 5              | 1            |
| 2 | 36             | 118              | 8.0           | 72            | 5              | 2            |
| 3 | 12             | 149              | 12.6          | 74            | 5              | 3            |
| 4 | 18             | 313              | 11.5          | 62            | 5              | 4            |
| 5 | NA             | NA               | 14.3          | 56            | 5              | 5            |
| 6 | 28             | NA               | 14.9          | 66            | 5              | 6            |

6 rows

101:1 C Chunk 12 R Markdown

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↗

```

ame of the column you want.
> summary(Wind) #Provides some information about the column, such as minimum value, maximum,
mean, etc.
```

Environment History Connections Tutorial

Import Dataset 202 MiB

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

| Name  | Description   | Version |
|---|---|---------|
| <input type="checkbox"/> <code>askpass</code>         | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| <input type="checkbox"/> <code>backports</code>       | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input checked="" type="checkbox"/> <code>base</code> | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> <code>base64enc</code>       | Tools for base64 encoding   | 0.1-3   |
| <input type="checkbox"/> <code>bit</code>             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> <code>bit64</code>           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> <code>blob</code>            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> <code>boot</code>            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> <code>broom</code>           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> <code>bslib</code>           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> <code>cachem</code>          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> <code>callr</code>           | Call R from R   | 3.7.6   |

Day1.Rmd x

Source Visual

Outline

```
92
93 As mentioned before, we can use RStudio to run stats on columns and rows in a
dataset.
94 ````{r}
95 Temp <- data$Temp #Assign variable name to a column in the dataset. To pull out a
column, you can use the variable name you assigned the dataset followed by a dollar
sign ($) and the name of the column you want.
96 summary(Temp) #Provides some information about the column, such as minimum value,
maximum, mean, etc.
97 ````
```

98

```
99 In the code chunk below, write code that will find the average wind speed.
```

100 ````{r}

101 ````

102

103

```
104 There is a small problem with this: What is the unit of measurement for the wind
speed? Often the datasets have simple names for their columns. To learn more about
the context of our data, we need to know where it comes from. Type ?airquality in your
console pane and read about the dataset.
```

105

101:1 C Chunk 12 R Markdown

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↗

```
ame of the column you want.
> summary(Wind) #Provides some information about the column, such as minimum value, maximum,
mean, etc.
Min 1st Qu. Median Mean 3rd Qu. Max
```

Environment History Connections Tutorial

Import Dataset 202 MiB

List C

R Global Environment

Environment is empty

Files Plots Packages Help Viewer Presentation

Install Update

| Name      | Description   | Version |
|-----------|---|---------|
| base      | The R Base Package  | 4.5.2   |
| backports | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| bit       | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| bit64     | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| blob      | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| boot      | Bootstrap Functions   | 1.3-32  |
| broom     | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| bslib     | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| cachem    | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| callr     | Call R from R   | 3.7.6   |
| "         |   |         |

Day1.Rmd x

Source Visual

maximum, mean, etc.

97 ````

98

99 In the code chunk below, write code that will find the average wind speed.

100 ````{r}

101 Wind <- data\$Wind #Assign variable name to a column in the dataset. To pull out a column, you can use the variable name you assigned the dataset followed by a dollar sign (\$) and the name of the column you want.

102 summary(Wind) #Provides some information about the column, such as minimum value, maximum, mean, etc.

103 mean(Wind)

104 ````

105

| Min.         | 1st Qu. | Median | Mean  | 3rd Qu. | Max.   |
|--------------|---------|--------|-------|---------|--------|
| 1.700        | 7.400   | 9.700  | 9.958 | 11.500  | 20.700 |
| [1] 9.957516 |         |        |       |         |        |

106

107 There is a small problem with this: What is the unit of measurement for the wind speed? Often the datasets have simple names for their columns. To learn more about

104:10 C Chunk 12 R Markdown

Console Terminal x Background Jobs x

R 4.5.2 · /cloud/project/ ↗

```
> mean(Wind)
[1] 9.957516
> |
```

Environment History Connections Tutorial

Import Dataset 292 MiB

R Global Environment

Data

data 153 obs. of 6 variables

Values

Wind num [1:153] 7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 ...

Files Plots Packages Help Viewer Presentation

Install Update

| Name      | Description   | Version |
|-----------|---|---------|
| askpass   | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| backports | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| base      | The R Base Package  | 4.5.2   |
| base64enc | Tools for base64 encoding   | 0.1-3   |
| bit       | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| bit64     | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| blob      | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| boot      | Bootstrap Functions   | 1.3-32  |
| broom     | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| bslib     | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| cachem    | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| callr     | Call R from R   | 3.7.6   |
| "         |   | 1.1.0   |

Day1.Rmd x

ABC Knit Run Publish Outline

Source Visual

106  
107 There is a small problem with this: What is the unit of measurement for the wind speed? Often the datasets have simple names for their columns. To learn more about the context of our data, we need to know where it comes from. Type ?airquality in your console pane and read about the dataset.

108  
109  
110 Let's create a simple plot of the dataset. To plot data, we need to tell RStudio what we want the x and y axis to be.

```
111 ``{r}  
112 plot(data$Month,data$Temp)  
113 ```
```

114  
115 This plot is alright, but can be improved. Do you notice what is missing?

116  
117 In addition to adding/changing labels on a plot, we can specify in our code how we want to visualize the data. When we did a simple plot command RStudio automatically created a scatterplot because of the input format. Let's try another plot, like a boxplot.

```
118 ``{r}  
119 ```
```

104:10 C Chunk 12

Console Terminal Background Jobs

R 4.5.2 · /cloud/project/ ↗

```
> mean(Wind)
[1] 9.957516
> |
```

Environment History Connections Tutorial

Import Dataset 293 MiB Global Environment

Data

|      |                                      |
|------|--------------------------------------|
| data | 153 obs. of 6 variables              |
| Wind | num [1:153] 7.4 8 12.6 11.5 14.3 ... |

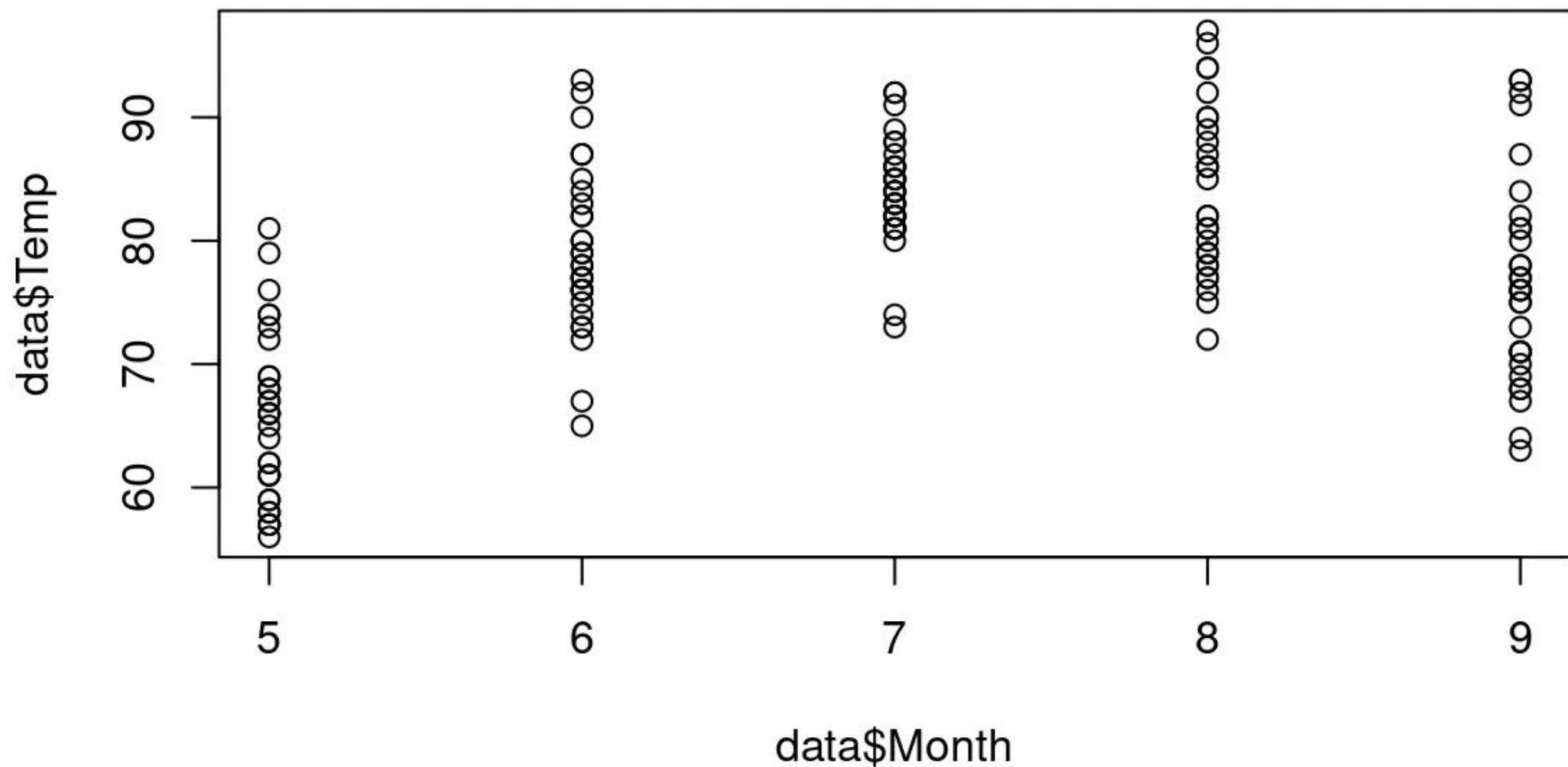
Files Plots Packages Help Viewer Presentation

Install Update

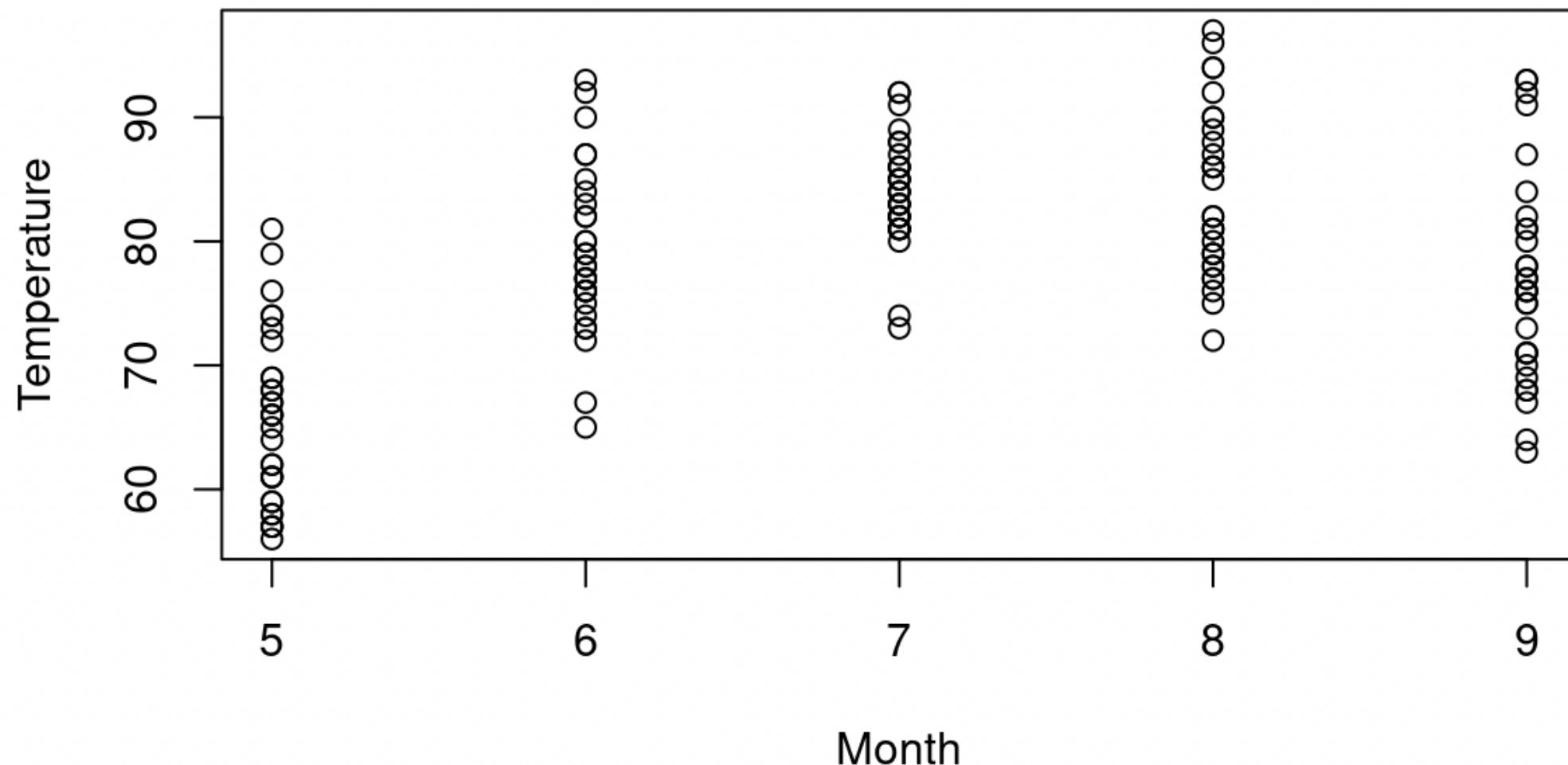
| Name                                     | Description   | Version |
|--|---|---------|
| askpass                                  | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| backports                                | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input checked="" type="checkbox"/> base | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> base64enc       | Tools for base64 encoding   | 0.1-3   |
| <input type="checkbox"/> bit             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> bit64           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> blob            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> boot            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> broom           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> bslib           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> cachem          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> callr           | Call R from R   | 3.7.6   |

System Library

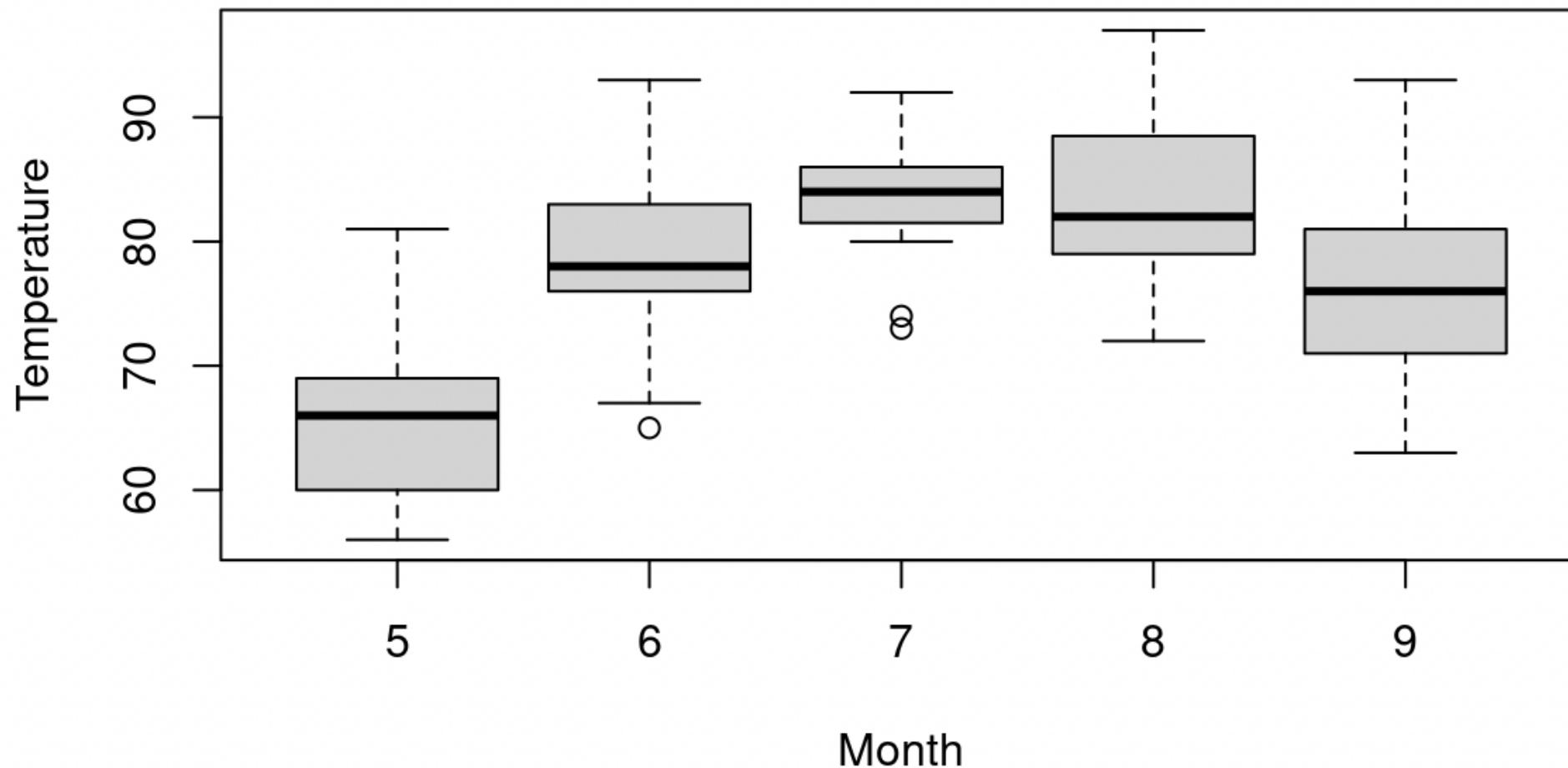
| Name                                     | Description   | Version |
|--|---|---------|
| askpass                                  | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| backports                                | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input checked="" type="checkbox"/> base | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> base64enc       | Tools for base64 encoding   | 0.1-3   |
| <input type="checkbox"/> bit             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> bit64           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> blob            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> boot            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> broom           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> bslib           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> cachem          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> callr           | Call R from R   | 3.7.6   |



## Temperature over each Month



## Temperature over each Month



```

122 Now make your own boxplot for wind speed each month.
123 ````{r}
124 plot(data$Month,data$Wind, xlab = "Month", ylab = "Speed",main = "Wind speed over
each Month")
125 boxplot(Wind~Month, data=data, xlab = "Month", ylab = "Speed",main = "Wind speed over
each Month") #Notice the input for a boxplot is dependent~independent variable
126 ``
127
128 The boxplot is nice, but with other packages we can make it even better.
129 RStudio has a package called ggplot2 (Grammar of Graphics Plot).
130
131 ````{r}
132 library(tidyverse) #RStudio has packages that contain lots of premade functions that
can help us without analysis. To load a package, type library() and put the name of
the package in parentheses
133 library(ggplot2)
134 data$Month <- as.factor(data$Month) #To color code the months, group the data points
that belong to each month first.
135 ggplot(data = data)+ #Specify data set
136   aes(x = Month, y = Temp, fill = Month)+ #Your aesthetics. Identify your x and y
125:81 [C] Chunk 15

```

R Markdown

Console Terminal × Background Jobs ×

R 4.5.2 · /cloud/project/ ↗

```

> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temperature",main = "Temperature ove
r each Month") #Notice the input for a boxplot is dependent~independent variable
>

```

Data

|      |                         |
|------|-------------------------|
| data | 153 obs. of 6 variables |
|------|-------------------------|

Values

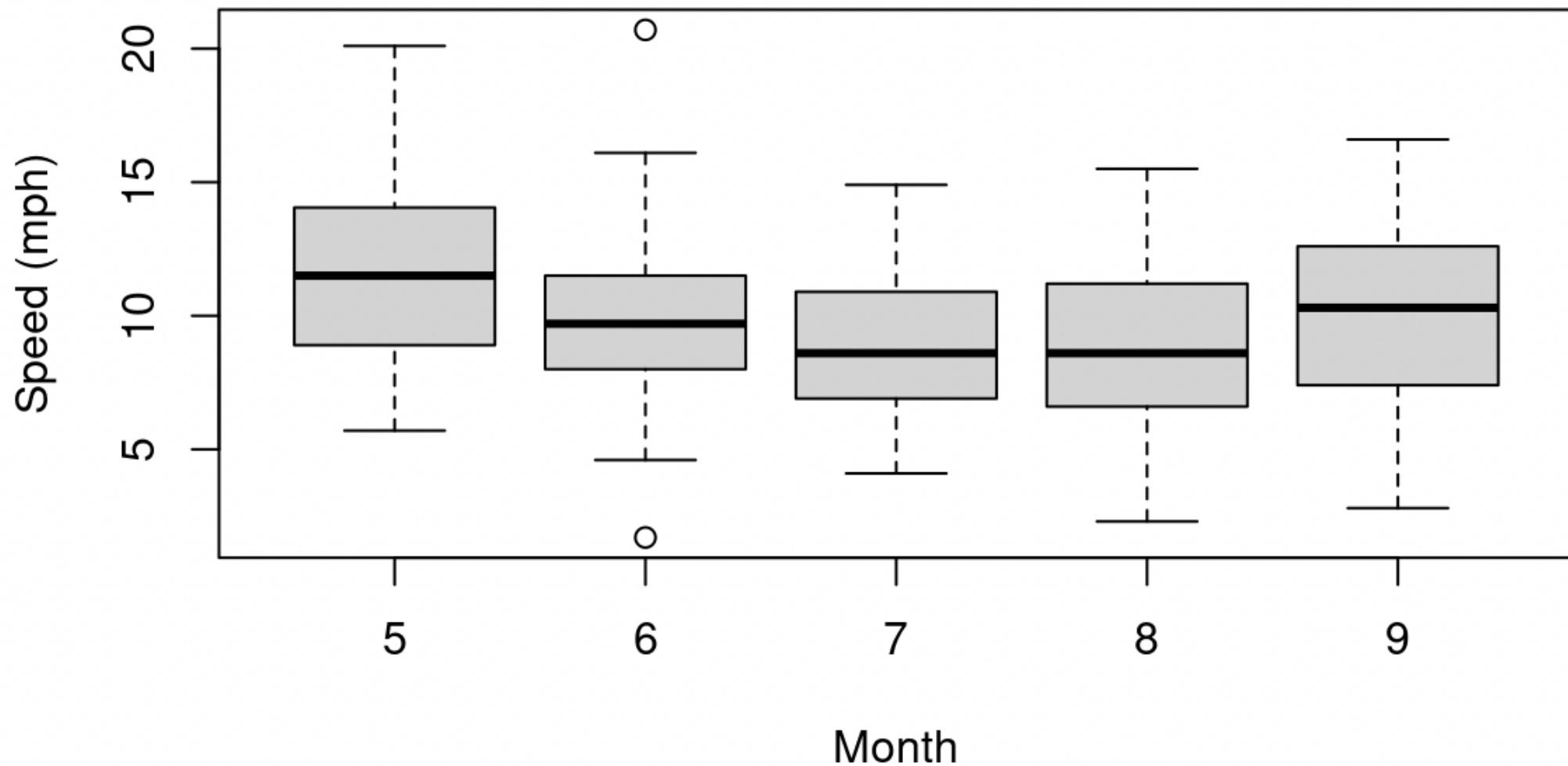
|      |   |
|------|---|
| Wind | num [1:153] 7.4 8 12.6 11.5 14.3 14.9 8.6 13.8 20.1 ... |
|------|---|

Files Plots Packages Help Viewer Presentation

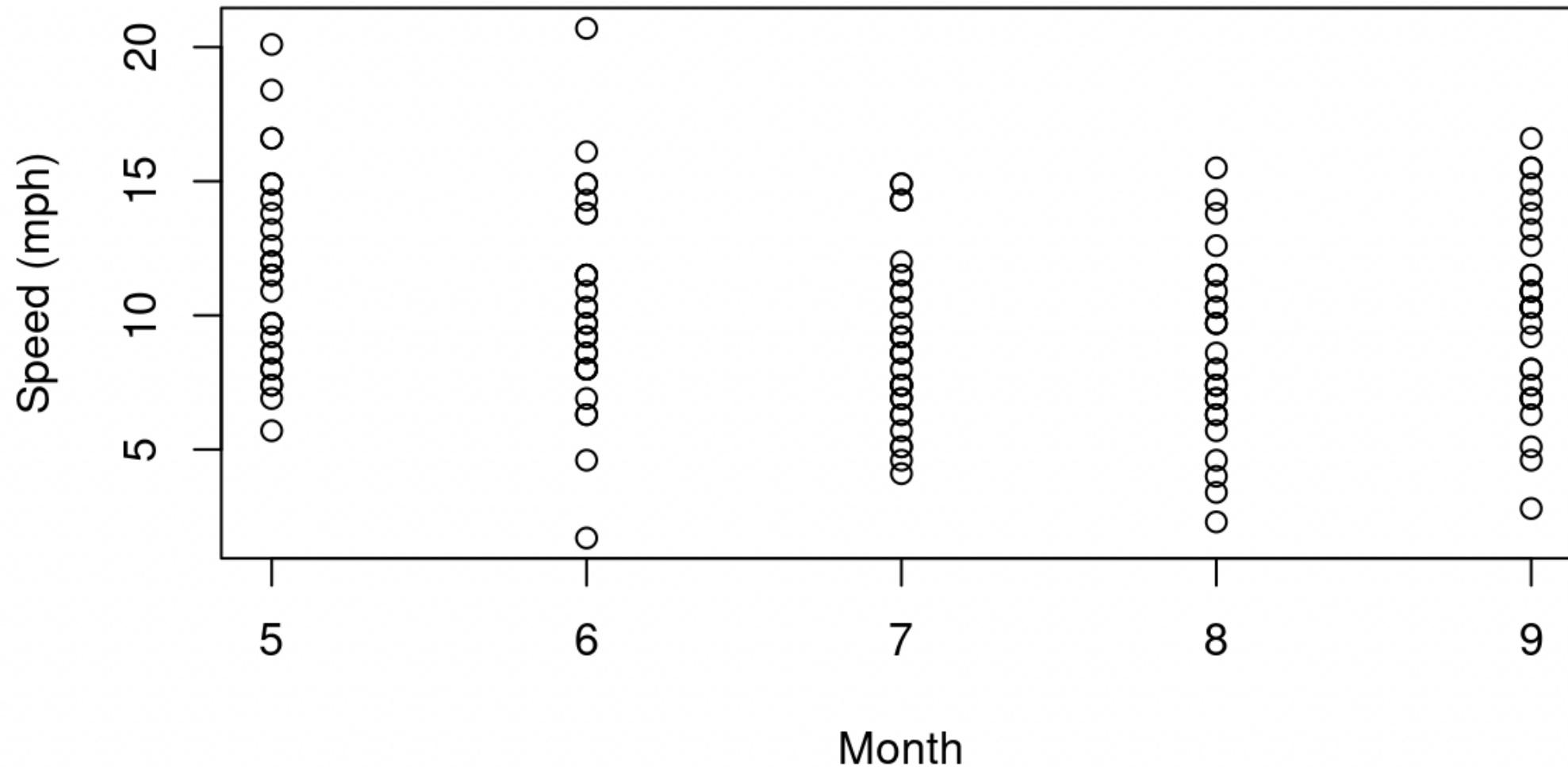
Install Update

| Name                                     | Description   | Version |
|--|---|---------|
| <input checked="" type="checkbox"/> base | The R Base Package  | 4.5.2   |
| <input type="checkbox"/> backports       | Reimplementations of Functions Introduced Since R-3.0.0             | 1.5.0   |
| <input type="checkbox"/> askpass         | Password Entry Utilities for R, Git, and SSH                        | 1.2.1   |
| <input type="checkbox"/> blob            | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4   |
| <input type="checkbox"/> broom           | Convert Statistical Objects into Tidy Tibbles                       | 1.0.11  |
| <input type="checkbox"/> bslib           | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.9.0   |
| <input type="checkbox"/> boot            | Bootstrap Functions   | 1.3-32  |
| <input type="checkbox"/> bit             | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.6.0   |
| <input type="checkbox"/> bit64           | A S3 Class for Vectors of 64bit Integers                            | 4.6.0-1 |
| <input type="checkbox"/> cachem          | Cache R Objects with Automatic Pruning                              | 1.1.0   |
| <input type="checkbox"/> callr           | Call R from R   | 3.7.6   |
| "  |   |         |

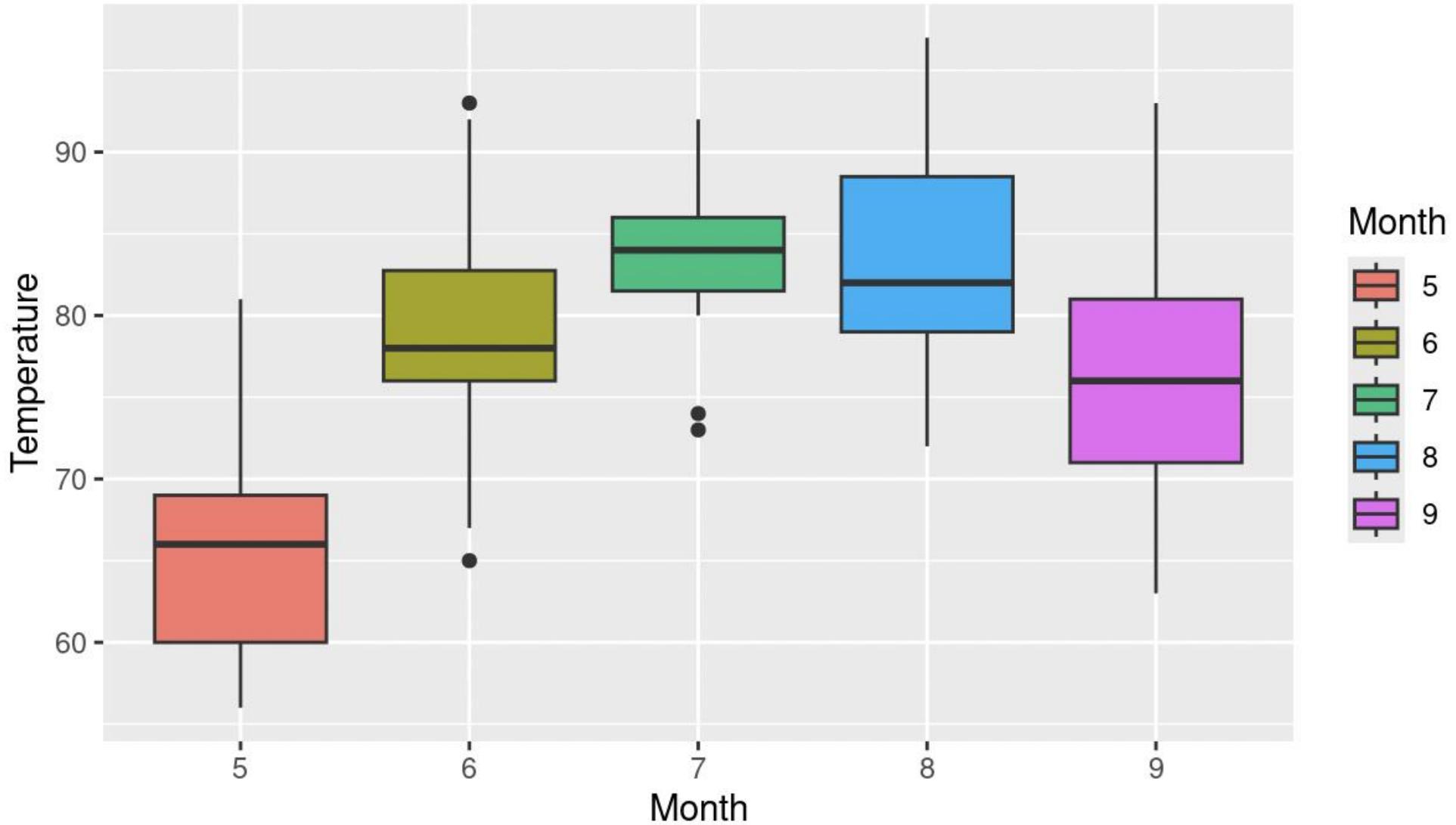
## Wind speed over each Month



## Wind speed over each Month



## Temperature over each Month



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+ Go to file/function

R 4.3.1

Untitled2\* Practice.Rmd x Intro to R.Rmd x

ABC Knit

Run Outline

```
1: ---  
2: title: "Untitled"  
3: output: html_document  
4: date: "2023-11-08"  
5: ---  
6:  
7: ```{r setup, include=FALSE}  
8: x<-2^3  
9: y<-2^3  
10: z<-2^3  
11: ...  
12:  
13:  
14: ```{r }  
15: x <- c(1,3,5,7,9,11)  
16: y <- c(y,z)  
17: ...  
18:  
19:  
20:
```

50:1 C Chunk 5

Environment History Connections Tutorial

Import Dataset 296 MiB

R Global Environment

## Data

data 153 obs. of 6 variables

## Values

x 5  
y 6  
z 8

Files Plots Packages Help Viewer Presentation

Install Update

| Name   | Description   | Version  |  |
|--|---|----------|--|
| <b>System Library</b>                        |   |          |  |
| <input checked="" type="checkbox"/> airports | Data on Airports  | 0.1.0    |  |
| <input type="checkbox"/> askpass             | Password Entry Utilities for R, Git, and SSH                        | 1.2.0    |  |
| <input type="checkbox"/> backports           | Reimplementations of Functions Introduced Since R-3.0.0             | 1.4.1    |  |
| <input checked="" type="checkbox"/> base     | The R Base Package  | 4.3.1    |  |
| <input type="checkbox"/> base64enc           | Tools for base64 encoding   | 0.1-3    |  |
| <input type="checkbox"/> bit                 | Classes and Methods for Fast Memory-Efficient Boolean Selections    | 4.0.5    |  |
| <input type="checkbox"/> bit64               | A S3 Class for Vectors of 64bit Integers                            | 4.0.5    |  |
| <input type="checkbox"/> blob                | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') | 1.2.4    |  |
| <input type="checkbox"/> boot                | Bootstrap Functions (Originally by Angelo Canty for S)              | 1.3-28.1 |  |
| <input type="checkbox"/> broom               | Convert Statistical Objects into Tidy Tibbles                       | 1.0.5    |  |
| <input type="checkbox"/> bslib               | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        | 0.5.1    |  |
| <input type="checkbox"/> cachem              | Cache R Objects with Automatic Pruning                              | 1.0.8    |  |
| <input type="checkbox"/> callr               | Call R from R   | 3.7.3    |  |

Console Terminal x Background Jobs x

```
R 4.3.1 · /cloud/project/  
> plot(data$Month,data$Temp, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")  
> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")  
> library(tidyverse)  
> library(ggplot2)  
> data$Month <- as.factor(data$Month)  
> ggplot(data = data)+ aes(x = Month, y = Temp, fill = Month)+ geom_boxplot()
```

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Untitled2\* Practice.Rmd\* Intro to R.Rmd\*

Source Visual Outline

```
1: ---  
2: title: "Untitled"  
3: output: html_document  
4: date: "2023-11-08"  
5: ---  
6:  
7: ```{r setup, include=FALSE}  
8: x<-2^3  
9: y<-2^3  
10: z<-2^3  
11: ```  
12:  
13:  
14: ```{r l  
50:1 C Chunk 5
```

Install Packages

Install from: [Configuring Repositories](#)

Repository (CRAN)

Packages (separate multiple with space or comma):

tidyverse

tidyverse library:

/cloud/lib/x86\_64-pc-linux-gnu-library/4.3 [Default]

Install dependencies

Install Cancel

Console Terminal Background Jobs

```
R 4.3.1 · /cloud/project/  
> plot(data$Month,data$temp, xlab = "Month", ylab = "Temperature over each Month")  
> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temp each Month")  
> library(tidyverse)  
> library(ggplot2)  
> data$Month <- as.factor(data$Month)  
> ggplot(data = data)+ aes(x = Month, y = Temp, fill = Month)+ geom_boxplot()  
+ ylab("Temperature") + # x label  
+ xlab("Month") + # y label  
+ ggtitle("Temperature over each Month")  
> ?googlesheets4
```

Session restored from your saved work on 2023-Nov-09 16:09:57 UTC (1 hour ago)

Environment History Connections Tutorial

Import Dataset - 301 MiB

R Global Environment

Data

data 153 obs. of 6 variables

Values

5  
6  
8

ges Help Viewer Presentation

Description

Data on Airports  
Password Entry Utilities for R, Git, and SSH  
Reimplementations of Functions Introduced in R-3.0.0  
The R Base Package  
Tools for base64 encoding  
Classes and Methods for Fast Memory-Efficient Boolean Selections  
A S3 Class for Vectors of 64bit Integers  
A Simple S3 Class for Representing Vector Binary Data ('BLOBS')  
Bootstrap Functions (Originally by Angelo for S)  
Convert Statistical Objects into Tidy Tibbles  
Custom 'Bootstrap' 'Sass' Themes for 'shiny' 'rmarkdown'  
Cache R Objects with Automatic Pruning  
Call R from R

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Go to file/function | Addins

Untitled2\* Practice.Rmd Intro to R.Rmd

Source Visual

18  
19 - Bullet 1  
20 - Bullet 2  
21 - Bullet 3  
22  
23 ## Slide with R Output  
24  
25 ```{r cars, echo = TRUE}  
26 summary(cars)  
27 ```  
28  
29 ## Slide with Plot  
30  
31 ```{r pressure}  
32 plot(pressure)  
33 ```  
34  
35  
36  
37

35:1 # Slide with Plot R Markdown

**Console Terminal Background Jobs**

R 4.3.1 - /cloud/project/  
> plot(data\$Month,data\$Temp, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")  
> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")  
> library(tidyverse)  
> library(ggplot2)  
> data\$Month <- as.factor(data\$Month)

Run Knit

Outline

Environment History Connections Tutorial

Import Dataset - 296 MiB

R Global Environment

Data

|        |                         |
|--------|-------------------------|
| data   | 153 obs. of 6 variables |
| Values |                         |
| x      | 5                       |
| y      | 6                       |
| z      | 8                       |

Files Plots Packages Help Viewer Presentation

Install Update

| Name   | Description   |
|--|---|
| <b>System Library</b>                        |   |
| <input checked="" type="checkbox"/> airports | Data on Airports  |
| <input type="checkbox"/> askpass             | Password Entry Utilities for R, Git, and SSH                        |
| <input type="checkbox"/> backports           | Reimplementations of Functions Introduced R-3.0.0                   |
| <input checked="" type="checkbox"/> base     | The R Base Package  |
| <input type="checkbox"/> base64enc           | Tools for base64 encoding   |
| <input type="checkbox"/> bit                 | Classes and Methods for Fast Memory-Efficient Boolean Selections    |
| <input type="checkbox"/> bit64               | A S3 Class for Vectors of 64bit Integers                            |
| <input type="checkbox"/> blob                | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') |
| <input type="checkbox"/> boot                | Bootstrap Functions (Originally by Angelo Caneiro for S)            |
| <input type="checkbox"/> broom               | Convert Statistical Objects into Tidy Tibbles                       |
| <input type="checkbox"/> bslib               | Custom 'Bootstrap' 'Sass' Themes for 'shiny' 'rmarkdown'            |
| <input type="checkbox"/> cachem              | Cache R Objects with Automatic Pruning                              |
| <input type="checkbox"/> callr               | Call R from R   |

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Source Visual

```
18
19 - Bullet 1
20 - Bullet 2
21 - Bullet 3
22
23 ## Slide with R Output
24
25 ```{r cars, echo = TRUE}
26 summary(cars)
27 ```
28
29 ## Slide with Plot
30
31 ```{r pressure}
32 plot(pressure)
33 ```
34
35
36
37
38 # Slide with Plot
```

R Markdown

Console Terminal Background Jobs

```
R 4.3.1 · /cloud/project/
> plot(data$Month, data$Temp, xlab = "Month", ylab = "Temperature", main = "Temperature over each Month")
> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temperature", main = "Temperature over each Month")
> library(tidyverse)
> library(ggplot2)
> data$Month <- as.factor(data$Month)
> ggplot(data = data) + aes(x = Month, y = Temp, fill = Month) + geom_boxplot() +
```

**R**

- Bash
- D3
- Python
- Rcpp
- SQL
- Stan

Environment History Connections Tutorial

Import Dataset 296 MiB

R Global Environment

Data

|      |                         |
|------|-------------------------|
| data | 153 obs. of 6 variables |
|------|-------------------------|

Values

|   |   |
|---|---|
| x | 5 |
| y | 6 |
| z | 8 |

Files Plots Packages Help Viewer Presentation

Install Update

| Name      | Description   |
|-----------|---|
| airports  | Data on Airports  |
| askpass   | Password Entry Utilities for R, Git, and SSH                        |
| backports | Reimplementations of Functions Introduced Since R-3.0.0             |
| base      | The R Base Package  |
| base64enc | Tools for base64 encoding   |
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| blob      | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') |
| boot      | Bootstrap Functions (Originally by Angelo Canty for S)              |
| broom     | Convert Statistical Objects into Tidy Tibbles                       |
| bslib     | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        |
| cachem    | Cache R Objects with Automatic Pruning                              |
| callr     | Call R from R   |

System Library

|  |   |
|--|---|
| <input checked="" type="checkbox"/> airports | Data on Airports  |
| <input type="checkbox"/> askpass             | Password Entry Utilities for R, Git, and SSH                        |
| <input type="checkbox"/> backports           | Reimplementations of Functions Introduced Since R-3.0.0             |
| <input checked="" type="checkbox"/> base     | The R Base Package  |
| <input type="checkbox"/> base64enc           | Tools for base64 encoding   |
| <input type="checkbox"/> bit                 | Classes and Methods for Fast Memory-Efficient Boolean Selections    |
| <input type="checkbox"/> bit64               | A S3 Class for Vectors of 64bit Integers                            |
| <input type="checkbox"/> blob                | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS') |
| <input type="checkbox"/> boot                | Bootstrap Functions (Originally by Angelo Canty for S)              |
| <input type="checkbox"/> broom               | Convert Statistical Objects into Tidy Tibbles                       |
| <input type="checkbox"/> bslib               | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'        |
| <input type="checkbox"/> cachem              | Cache R Objects with Automatic Pruning                              |
| <input type="checkbox"/> callr               | Call R from R   |

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# Intro Course / Intro to R

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Untitled2\* Practice.Rmd x Intro to R.Rmd x

Source Visual

```
19 - Bullet 1
20 - Bullet 2
21 - Bullet 3
22
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24
25 ```{r cars, echo = TRUE}
26 summary(cars)
27 ```
28
29 ## Slide with Plot
30
31 ```{r pressure}
32 plot(pressure)
33 ```
34
35 ```{r}
36
37 ```
38
```

36:1 C Chunk 4 R Markdown

Console Terminal Background Jobs

```
R 4.3.1 · /cloud/project/
> plot(data$Month,data$Temp, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")
> boxplot(Temp~Month, data=data, xlab = "Month", ylab = "Temperature",main = "Temperature over each Month")
> library(tidyverse)
> library(ggplot2)
> data$Month <- as.factor(data$Month)
> ggplot(data = data)+ aes(x = Month, y = Temp, fill = Month)+ geom_boxplot()+
```

Environment History Connections Tutorial

Import Dataset 296 MiB

R Global Environment

Data

|      |                         |
|------|-------------------------|
| data | 153 obs. of 6 variables |
|------|-------------------------|

Values

|   |   |
|---|---|
| x | 5 |
| y | 6 |
| z | 8 |

Files Plots Packages Help Viewer Presentation

Install Update

| Name      | Description  |
|-----------|--|
| airports  | Data on Airports   |
| askpass   | Password Entry Utilities for R, Git, and SSH                                       |
| backports | Reimplementations of Functions Introduced in R-3.0.0                               |
| base      | The R Base Package   |
| base64enc | Tools for base64 encoding  |
| bit       | Classes and Methods for Fast Memory-Efficient Boolean Selections                   |
| bit64     | A S3 Class for Vectors of 64bit Integers   |
| blob      | A Simple S3 Class for Representing Vectors of Binary Data ('BLOBS')                |
| boot      | Bootstrap Functions (Originally by Angelo GaglieANDOM, Maintained by Brian Ripley) |
| broom     | Convert Statistical Objects into Tidy Tibbles                                      |
| bslib     | Custom 'Bootstrap' 'Sass' Themes for 'shiny' and 'rmarkdown'                       |
| cachem    | Cache R Objects with Automatic Pruning   |
| callr     | Call R from R  |

System Library

|           |  |
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