

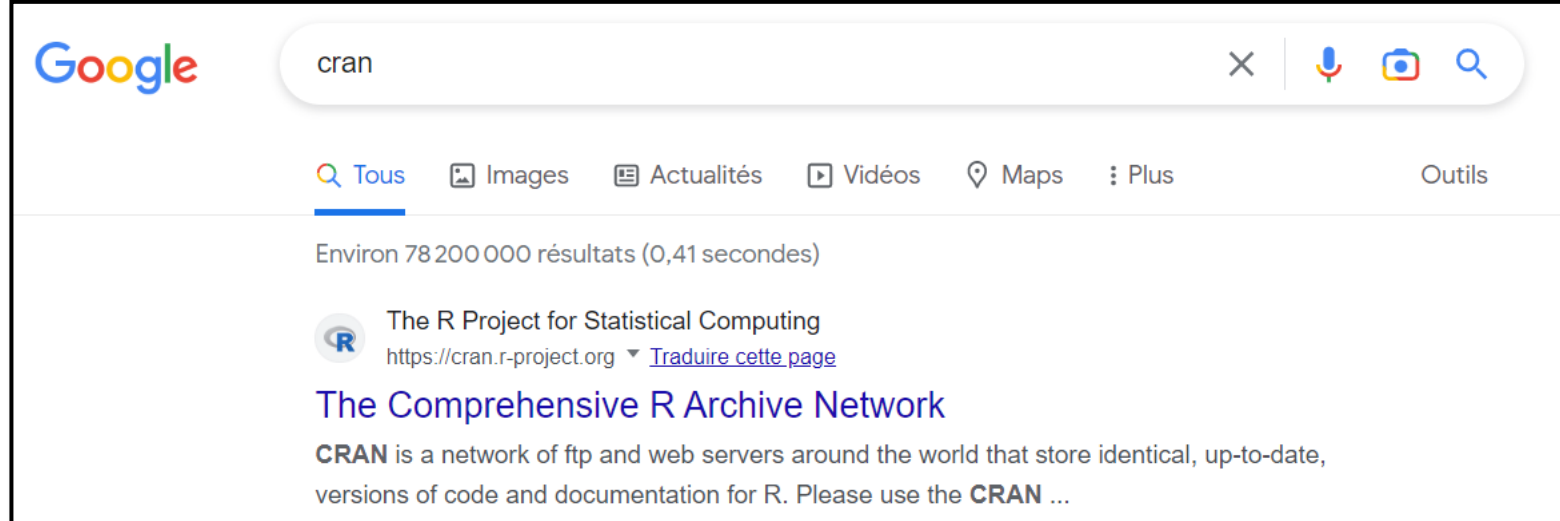
# **HGEN 47900 1 (Spring 2023)**

## **Lab 0: R basics and tidyverse**

Sebastien Bastide – March 24<sup>th</sup>, 2023

# How to download R?

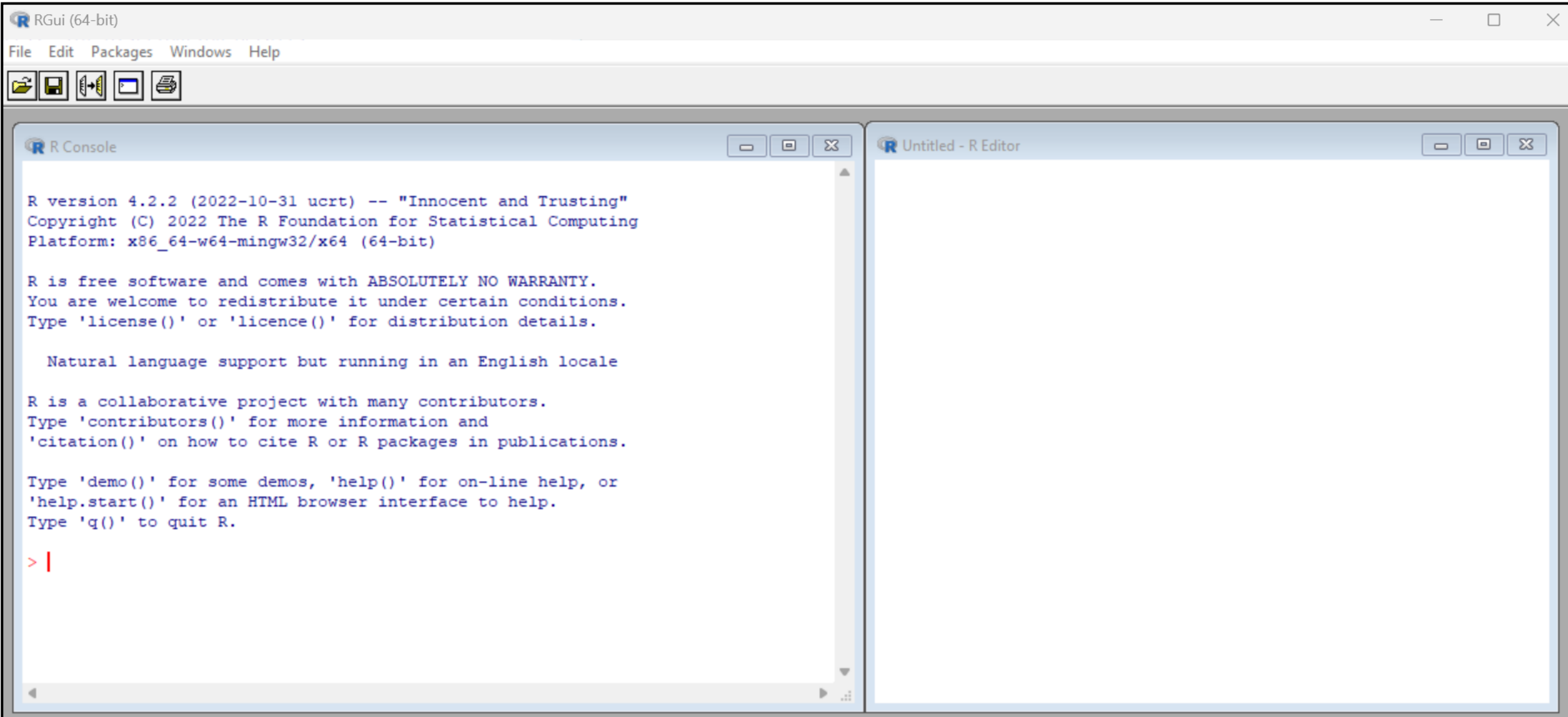
1. Go to the CRAN website (<https://cran.r-project.org/>).



2. Download the binary/installer for your system (or follow the installation instructions):
  - For Mac: <https://cran.r-project.org/bin/macosx/>
  - For Windows: <https://cran.r-project.org/bin/windows/>
  - For Linux (Ubuntu): <https://cran.r-project.org/bin/linux/ubuntu>

# Why use RStudio?

R is a command line-based program, but the default code editor is ugly.



# Why use RStudio?

Rstudio has a much better GUI and additional features.

The screenshot shows the RStudio interface with several panels and annotations. The main editor window on the left contains a code editor with the text "1 |" and a red annotation: "• Code editor for scripting" and "• Preview for some data types (e.g., tables)". Below the editor is a console window showing the R prompt and some help text, with a red annotation: "Prompt for writing commands + Terminal". On the right side, there are two panels. The top panel is the "Environment" panel, which shows "Global Environment" and "92 MiB" of memory used, with a red annotation: "Different tabs: • Variables currently in memory, • History of commands, • ...". The bottom panel is the "Files" panel, which shows a file explorer view of the directory "C:\Users\bseba\Desktop\Comp\_Lab1", with a red annotation: "Different tabs: • File explorer • Plots (with history) • Packages • Help • ...".

- Code editor for scripting
- Preview for some data types (e.g., tables)

Prompt for writing commands + Terminal

Different tabs:

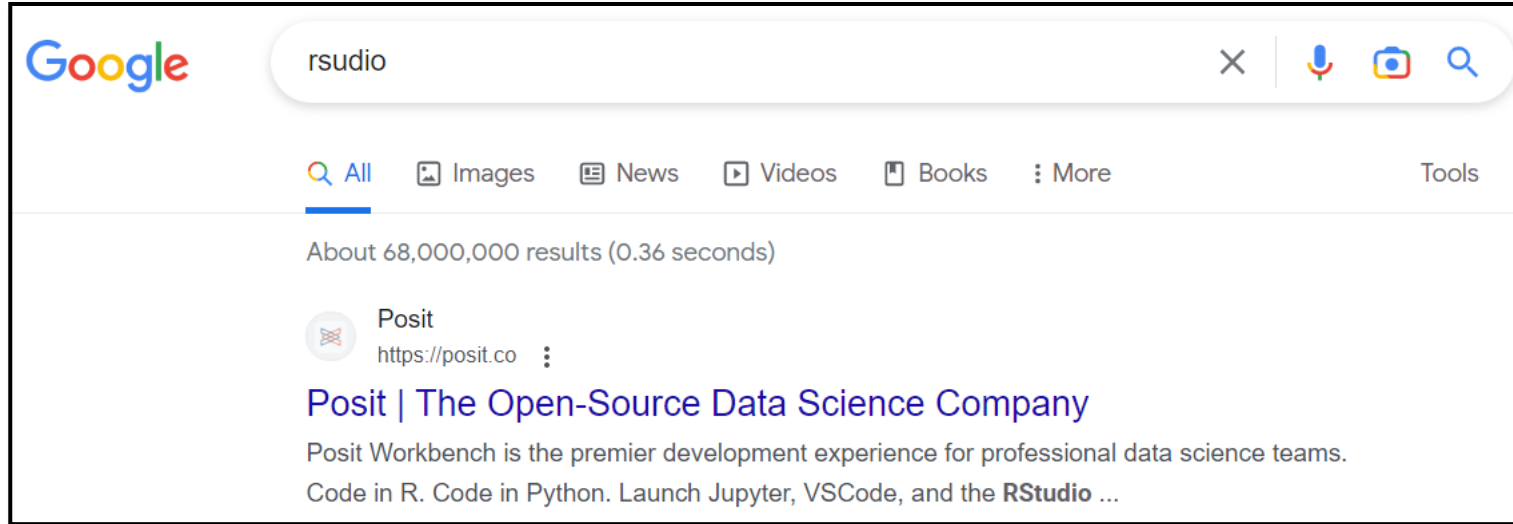
- Variables currently in memory,
- History of commands,
- ...

Different tabs:

- File explorer
- Plots (with history)
- Packages
- Help
- ...

# How to download RStudio?

1. Go to the Posit website (<https://posit.co/>).



2. Download the RStudio binary/installer for your system (or follow the installation instructions):
  - For Mac: <https://download1.rstudio.org/electron/macOS/RStudio-2022.12.0-353.dmg>
  - For Windows: <https://download1.rstudio.org/electron/windows/RStudio-2022.12.0-353.exe>
  - For Linux (Ubuntu): it depends on your distribution (see <https://posit.co/download/rstudio-desktop/>)

# OK, now what?

You can change the theme of RStudio: Tools > Global Options > Appearance

I like Cobalt for two reasons:

- It prevents my eyes from dying (the dark background helps in a light environment).
- It highlights specific elements of the R syntax and makes code easier to read.
- (Also, you are now a hackerman)

```
1  # Create a function that sorts a vector vec using bubble sort
2  # Input:  a numeric vector
3  # Output: a sorted numeric vector
4  bubble_sort <- function(vec) {
5    len_vec <- length(vec)
6    swap <- TRUE
7    # As long as there's been a swap in the previous step, re-iterate through the vector
8    while(swap) {
9      swap <- FALSE
10     # Iterate through the vector and swap numbers to put them in ascending order
11     for (i in 1:(len_vec-1)) {
12       if (vec[i+1] < vec[i]) {
13         smaller <- vec[i+1]
14         vec[i+1] <- vec[i]
15         vec[i] <- smaller
16         swap <- TRUE
17       }
18     }
19   }
20   return(vec)
21 }
22
23 test_vec <- c(3, 6, 4, 7, 8, 6, 5, 3)
24 bubble_sort(test_vec)
25
```

# Some shortcuts to remember

- |  |   |
|--|---|
| 1. <code>ctrl (Cmd) + Enter</code> :     | <b>Runs current line of code or highlighted code.</b> |
| 2. <code>ctrl (Cmd) + Shift + N</code> : | Creates a new script.                                 |
| 3. <code>ctrl (Cmd) + I</code> :         | Reindent lines.                                       |
| 4. <code>ctrl (Cmd) + Shift + A</code> : | Reformat code.  |
| 5. <code>ctrl (Cmd) + Shift + C</code> : | Comment/uncomment lines.                              |

# Installing and loading R packages

R comes with a very large library of packages. Packages are typically hosted either:

- On the CRAN repository, and can be installed with:

```
install.packages ("packageName")
```

e.g., `install.packages ("BiocManager")`

- On the Bioconductor (<https://www.bioconductor.org/>) repository, and can be installed with

```
BiocManager::install ("packageName")
```

**NOTE:** here, “`install`” is function from the `BiocManager` package.

To use functions from packages, you normally first need to load them using

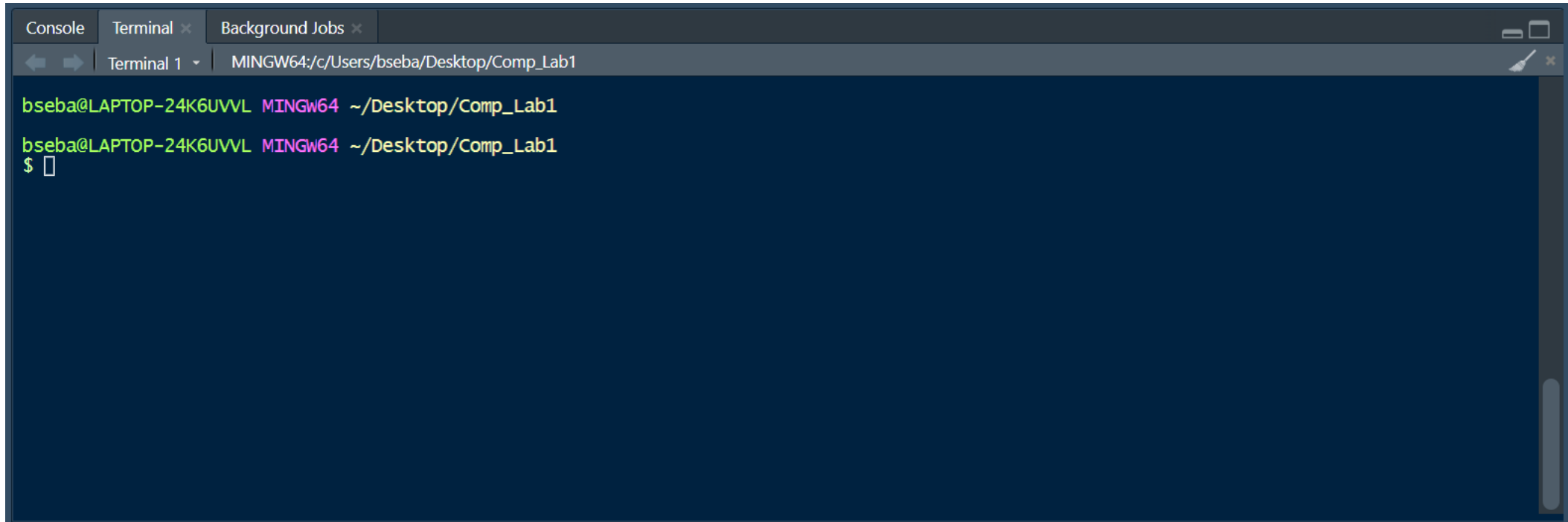
```
library (packageName)
```

However, you can use a function directly, without loading the entire package, by telling R where to find the function. This is done by adding “`packageName::`” in front of the function’s name.



# Using the RStudio terminal

RStudio comes with a terminal



```
Console | Terminal x | Background Jobs x
Terminal 1 | MINGW64:/c/Users/bseba/Desktop/Comp_Lab1
bseba@LAPTOP-24K6UVVL MINGW64 ~/Desktop/Comp_Lab1
bseba@LAPTOP-24K6UVVL MINGW64 ~/Desktop/Comp_Lab1
$
```

On Windows, it uses Git Bash (a Unix shell) which includes a bunch of useful commands (`cd`, `ls`, `mv`, `cp`, `rm`, `ssh`, `nano`, `vim`, `touch` ...). We'll learn how to use those

# Just in case: Rtools

To install some packages on windows, you may need to install Rtools:

<https://cran.r-project.org/bin/windows/Rtools/>