

## Learning Outcomes

At the end of the session, you will be able to:

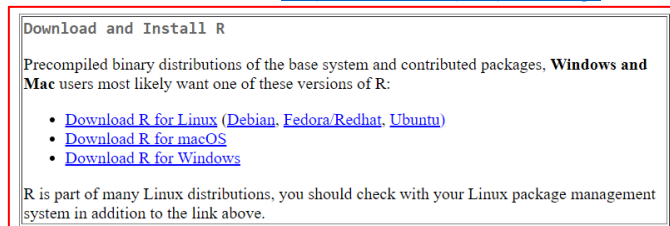
- Install, write, and run R program using RStudio
- Explain the basic R syntax, variables, and mathematical operations

## Activity

### 1. Using RStudio

#### 1.1. Step 1: Install R

- Download the R installer from <https://cran.r-project.org/>



Note: Example of installer for Windows setting: <https://cran.r-project.org/bin/windows/base/>

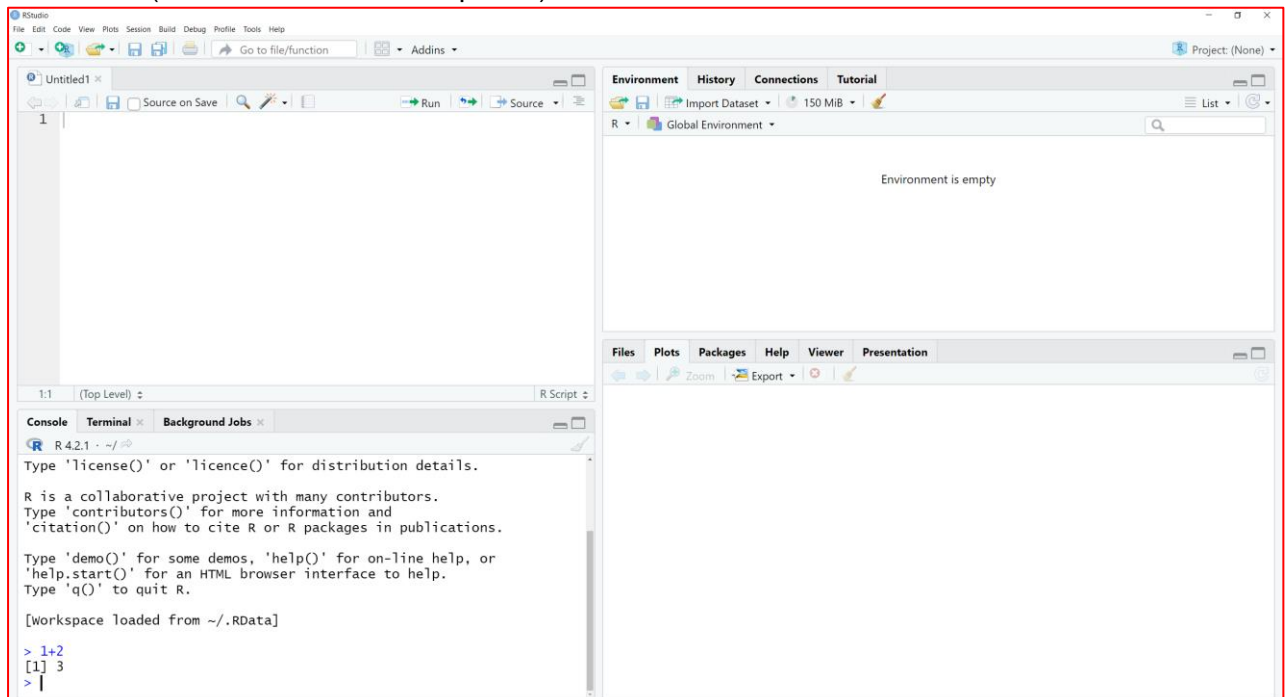
- Run the installer. Default settings are fine. (Make sure this step is done before proceeding to the next step)

#### 1.2. Step 2: Install RStudio

- Download RStudio Desktop installer from <https://www.rstudio.com/products/rstudio/download/>
- Once the installation of R (step 1) has completed successfully (and not before), run the RStudio Desktop installer.

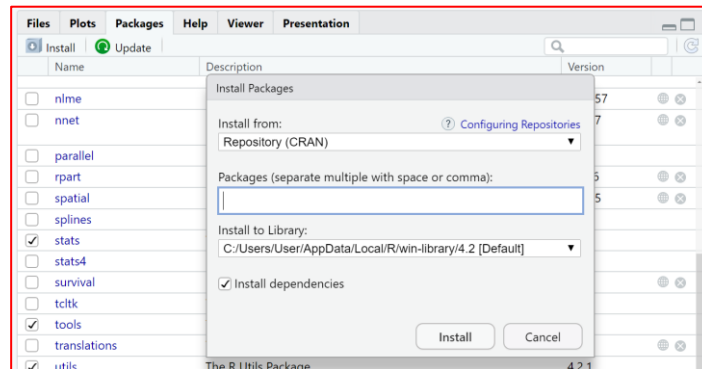
#### 1.3. Step 3: Check that R and RStudio are working

- Open RStudio. It should open a window that looks similar to image below (View>Panes>Show all panes).



- Type '1+2' and hit enter. An output should appear. This means that R and RStudio are working.

- Differentiate the usage of R Script and R Console.
- 1.4. Step 4: Installation of R packages (Optional)
- Click on tab Packages>Install or Tools>Install, type in the package you want to install.



- Or type in Console `install.packages("<the package's name>")` tab.
- To use the packages type in Console `library("<the package's name>")`
- Find out what are the common packages in R for Data Science.

## 2. Syntax, Variables and Operations

### 2.1. Simple R Code

- Write and run the following in R Console:  

```
2+3
print("Hello World!")
```
- Write and run the following code in R Script named test.R:  

```
# My first program in R Programming
myString <- "Hello, World!"
print (myString)
```

### 2.2. R Variables

- Write and run the following in R Console. Make your conclusion about the code:  

```
var.1 = 5
var_1 = 7
x = 1
print(ls())
print(ls(pattern="var"))
```

### 2.3. Assignment Operations

| Operator   | Description           |
|------------|-----------------------|
| <-, <<-, = | Leftwards assignment  |
| ->, ->>    | Rightwards assignment |

- Using the different leftwards/rightwards assignment operator in table above and run the following in R Console. Make your conclusion about the code:

| Variable | Value  | R Syntax          |
|----------|--------|-------------------|
| Gender   | Female | Gender<- "Female" |
| height   | 152    | height<-152       |

|        |                |                                     |
|--------|----------------|-------------------------------------|
| Weight | 81             | Weight=81                           |
| f      | 3              | 3 -> f                              |
| x      | 23.5           | 23.5->> x                           |
| b      | 0 1 2 3 4 5    | b <- seq(from = 0, to = 5)          |
| c      | 0 2 4 6 8 10   | c <- seq(from = 0, to = 10, by = 2) |
| v      | 2L             | v = 2L                              |
| w      | 2+5i           | w <-2+5i                            |
| a      | 48 65 6c 6c 6f | a<-charToRaw("Hello")               |

- You can always check the class of an object by calling the function `class()`:

```
print(class(Gender))
print(class(height))
print(class(f))
print(class(x))
print(class(b))
print(class(v))
print(class(w))
```

## 2.4. Arithmetic Operations

| Operator | Description                       |
|----------|-----------------------------------|
| +        | Addition                          |
| -        | Subtraction                       |
| *        | Multiplication                    |
| ** or ^  | Exponentiation                    |
| /        | Division                          |
| %%       | Modulus (Remainder from division) |
| %/%      | Integer Division                  |

- Using the arithmetic operators and reuse the variable assignment and run the following in R Console. Make your conclusion about the code:

```
print(f+3)
print(height-x)
print(Weight*2)
print(b**2)
print(c^5)
m = height/100
print(Weight/(m**2))
BMI = Weight/(m**2)
print(b%%2)
print(c/%2)
```

## 2.5. User Input

- Write and run the following in R Script:

```
name <- readline(prompt="Enter name: ")
age <- readline(prompt="Enter age: ")
# convert character into numeric
age <- as.numeric(age)
print(paste("Hi,", name, "this year you are", age, "years old."))
```

2.6. Extra

- Write and run the following in R Console. Make your conclusion about the code:  
`?paste`  
`demo(graphics)`  
`demo(image)`