Introductory course on the R software

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https://biostatisticien.eu/springeR/courseRw5.pdf

Lafaye de Micheaux, Pierre   Introductory course on the **R** software

Goals of today lecture

Describing the instructions for

- control structures ;
- creating basic functions.

Instructions `if` and `else`

```
> if (TRUE) 1+1
[1] 2
> x <- 2
> y <- -3
> if (x <= y) {
+     z <- y-x
+     print("x smaller than y")
+               } else {
+     z <- x-y
+     print("x larger than y")
+     z
+                       }
[1] "x larger than y"
[1] 5
```

Instruction `for`

```
> for (i in 1:3) print(i)
[1] 1
[1] 2
[1] 3
> x <- c(1,3,7,2)
> for (var in x) print(2*var)
[1] 2
[1] 6
[1] 14
[1] 4
```

Instruction `while`

```
> x <- 2
> y <- 1
> while(x+y<7) x <- x+y
> x
[1] 6
```

The formula $BMI = \frac{Weight}{Height^2}$ is easily programmed in **R** as follows :

```
> BMI <- function(weight,height) {
+   bmi <- weight/height^2
+   names(bmi) <- "BMI"
+ return(bmi)
+ }
```

We can now execute the function BMI() we just created :

```
> BMI(70,1.82)
     BMI
21.13271
> BMI(1.82,70) # Note that it is not possible to swap the
               # arguments of a function,
         BMI
0.0003714286
> BMI(height=1.82,weight=70) # unless they are preceded by their
                             # names.
     BMI
21.13271
```

This function only outputs a single value.

The code below outputs a list of several variables.

```
> BMI <- function(weight,height) {
+  bmi <- weight/height^2
+  res <- list(weight,height,bmi)
+ return(res)
+ }
```

BMI() returns a list of unnamed elements :

```
> BMI(70,1.82)
[[1]]
[1] 70
[[2]]
[1] 1.82
[[3]]
[1] 21.13271
```

To name the elements of the list, you can use the following code

```
> BMI <- function(weight,height) {
+  bmi <- weight/height^2
+  res <- list(Weight=weight,Height=height,BMI=bmi)
+ return(res)
+ }
```

which gives the following result :

```
> BMI(70,1.82)
$Weight
[1] 70
$Height
[1] 1.82
$BMI
[1] 21.13271
```

Your turn to work !

Do the Worksheet F on page 140.

`http://biostatisticien.eu/springeR/Rbook-chap5.pdf`