TSE
Toulouse School of Economics
École d'économie de Toulouse

UNIVERSITÉ TOULOUSE 1 CAPITOLE

Université Toulouse 1 Capitole
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Semestre 1

Master 1 Economics & Statistics
Epreuve : Statistical Softwares for Data Scientists
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Exercise 1 (6 points)

Let the following matrix `X`

```
     [,1] [,2] [,3]
[1,]    7    1    2
[2,]    3    4    6
```

Give the outputs of the following instructions

```
a) X[-1,]      b) X[c(F,F,T)]      c) X[X>3]<-2 ; X
```

d) Give the instruction that enables to calculate the maximum of each row of `X`

Exercise 2 (6 points)

Let's consider the match() function presented as follows in the help of R:

Description
match returns a vector of the positions of (first) matches of its first argument in its second.
Usage
match(x, table, nomatch = NA_integer_, incomparables = NULL)
Arguments

x	vector or NULL: the values to be matched. Long vectors are supported
table	vector or NULL: the values to be matched against. Long vectors are not supported.
nomatch	the value to be returned in the case when no match is found. Note that it is coerced to integer.
incomparables	a vector of values that cannot be matched. Any value in x matching a value in this vector is assigned the nomatch value. For historical reasons, FALSE is equivalent to NULL.

Give various examples of calls for the match() function and explain the matching between the arguments of the call and the parameters (also called 'formal arguments') of the function.

Exercise 3 (8 points)

R offers the 2 following functions:
`substr(x, first, last)` which, if `x` is a string of characters and `first`, `last` are integer, returns the substring between the `first` and `last` characters of `x`.
Example:

```
> substr("abcvx", 2, 3)
[1] "bc"
```

`nchar(x)` which returns the number of characters of the string `x`.
Write a R function `F` such that, at least,

```
> F(1:5)
[1] 5 4 3 2 1
>F("abcdef")
[1]  "fedcba"
```