Initiation à la statistique avec R, code et compléments chapitre 2

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#Chapitre 2  
#page 22  
data(package="datasets")  
?iris   
  
#page 23  
help(iris)  
iris

## Sepal.Length Sepal.Width Petal.Length Petal.Width Species  
## 1 5.1 3.5 1.4 0.2 setosa  
## 2 4.9 3.0 1.4 0.2 setosa  
## 3 4.7 3.2 1.3 0.2 setosa  
## 4 4.6 3.1 1.5 0.2 setosa  
## 5 5.0 3.6 1.4 0.2 setosa  
## 6 5.4 3.9 1.7 0.4 setosa  
## 7 4.6 3.4 1.4 0.3 setosa  
## 8 5.0 3.4 1.5 0.2 setosa  
## 9 4.4 2.9 1.4 0.2 setosa  
## 10 4.9 3.1 1.5 0.1 setosa  
## 11 5.4 3.7 1.5 0.2 setosa  
## 12 4.8 3.4 1.6 0.2 setosa  
## 13 4.8 3.0 1.4 0.1 setosa  
## 14 4.3 3.0 1.1 0.1 setosa  
## 15 5.8 4.0 1.2 0.2 setosa  
## 16 5.7 4.4 1.5 0.4 setosa  
## 17 5.4 3.9 1.3 0.4 setosa  
## 18 5.1 3.5 1.4 0.3 setosa  
## 19 5.7 3.8 1.7 0.3 setosa  
## 20 5.1 3.8 1.5 0.3 setosa  
## 21 5.4 3.4 1.7 0.2 setosa  
## 22 5.1 3.7 1.5 0.4 setosa  
## 23 4.6 3.6 1.0 0.2 setosa  
## 24 5.1 3.3 1.7 0.5 setosa  
## 25 4.8 3.4 1.9 0.2 setosa  
## 26 5.0 3.0 1.6 0.2 setosa  
## 27 5.0 3.4 1.6 0.4 setosa  
## 28 5.2 3.5 1.5 0.2 setosa  
## 29 5.2 3.4 1.4 0.2 setosa  
## 30 4.7 3.2 1.6 0.2 setosa  
## 31 4.8 3.1 1.6 0.2 setosa  
## 32 5.4 3.4 1.5 0.4 setosa  
## 33 5.2 4.1 1.5 0.1 setosa  
## 34 5.5 4.2 1.4 0.2 setosa  
## 35 4.9 3.1 1.5 0.2 setosa  
## 36 5.0 3.2 1.2 0.2 setosa  
## 37 5.5 3.5 1.3 0.2 setosa  
## 38 4.9 3.6 1.4 0.1 setosa  
## 39 4.4 3.0 1.3 0.2 setosa  
## 40 5.1 3.4 1.5 0.2 setosa  
## 41 5.0 3.5 1.3 0.3 setosa  
## 42 4.5 2.3 1.3 0.3 setosa  
## 43 4.4 3.2 1.3 0.2 setosa  
## 44 5.0 3.5 1.6 0.6 setosa  
## 45 5.1 3.8 1.9 0.4 setosa  
## 46 4.8 3.0 1.4 0.3 setosa  
## 47 5.1 3.8 1.6 0.2 setosa  
## 48 4.6 3.2 1.4 0.2 setosa  
## 49 5.3 3.7 1.5 0.2 setosa  
## 50 5.0 3.3 1.4 0.2 setosa  
## 51 7.0 3.2 4.7 1.4 versicolor  
## 52 6.4 3.2 4.5 1.5 versicolor  
## 53 6.9 3.1 4.9 1.5 versicolor  
## 54 5.5 2.3 4.0 1.3 versicolor  
## 55 6.5 2.8 4.6 1.5 versicolor  
## 56 5.7 2.8 4.5 1.3 versicolor  
## 57 6.3 3.3 4.7 1.6 versicolor  
## 58 4.9 2.4 3.3 1.0 versicolor  
## 59 6.6 2.9 4.6 1.3 versicolor  
## 60 5.2 2.7 3.9 1.4 versicolor  
## 61 5.0 2.0 3.5 1.0 versicolor  
## 62 5.9 3.0 4.2 1.5 versicolor  
## 63 6.0 2.2 4.0 1.0 versicolor  
## 64 6.1 2.9 4.7 1.4 versicolor  
## 65 5.6 2.9 3.6 1.3 versicolor  
## 66 6.7 3.1 4.4 1.4 versicolor  
## 67 5.6 3.0 4.5 1.5 versicolor  
## 68 5.8 2.7 4.1 1.0 versicolor  
## 69 6.2 2.2 4.5 1.5 versicolor  
## 70 5.6 2.5 3.9 1.1 versicolor  
## 71 5.9 3.2 4.8 1.8 versicolor  
## 72 6.1 2.8 4.0 1.3 versicolor  
## 73 6.3 2.5 4.9 1.5 versicolor  
## 74 6.1 2.8 4.7 1.2 versicolor  
## 75 6.4 2.9 4.3 1.3 versicolor  
## 76 6.6 3.0 4.4 1.4 versicolor  
## 77 6.8 2.8 4.8 1.4 versicolor  
## 78 6.7 3.0 5.0 1.7 versicolor  
## 79 6.0 2.9 4.5 1.5 versicolor  
## 80 5.7 2.6 3.5 1.0 versicolor  
## 81 5.5 2.4 3.8 1.1 versicolor  
## 82 5.5 2.4 3.7 1.0 versicolor  
## 83 5.8 2.7 3.9 1.2 versicolor  
## 84 6.0 2.7 5.1 1.6 versicolor  
## 85 5.4 3.0 4.5 1.5 versicolor  
## 86 6.0 3.4 4.5 1.6 versicolor  
## 87 6.7 3.1 4.7 1.5 versicolor  
## 88 6.3 2.3 4.4 1.3 versicolor  
## 89 5.6 3.0 4.1 1.3 versicolor  
## 90 5.5 2.5 4.0 1.3 versicolor  
## 91 5.5 2.6 4.4 1.2 versicolor  
## 92 6.1 3.0 4.6 1.4 versicolor  
## 93 5.8 2.6 4.0 1.2 versicolor  
## 94 5.0 2.3 3.3 1.0 versicolor  
## 95 5.6 2.7 4.2 1.3 versicolor  
## 96 5.7 3.0 4.2 1.2 versicolor  
## 97 5.7 2.9 4.2 1.3 versicolor  
## 98 6.2 2.9 4.3 1.3 versicolor  
## 99 5.1 2.5 3.0 1.1 versicolor  
## 100 5.7 2.8 4.1 1.3 versicolor  
## 101 6.3 3.3 6.0 2.5 virginica  
## 102 5.8 2.7 5.1 1.9 virginica  
## 103 7.1 3.0 5.9 2.1 virginica  
## 104 6.3 2.9 5.6 1.8 virginica  
## 105 6.5 3.0 5.8 2.2 virginica  
## 106 7.6 3.0 6.6 2.1 virginica  
## 107 4.9 2.5 4.5 1.7 virginica  
## 108 7.3 2.9 6.3 1.8 virginica  
## 109 6.7 2.5 5.8 1.8 virginica  
## 110 7.2 3.6 6.1 2.5 virginica  
## 111 6.5 3.2 5.1 2.0 virginica  
## 112 6.4 2.7 5.3 1.9 virginica  
## 113 6.8 3.0 5.5 2.1 virginica  
## 114 5.7 2.5 5.0 2.0 virginica  
## 115 5.8 2.8 5.1 2.4 virginica  
## 116 6.4 3.2 5.3 2.3 virginica  
## 117 6.5 3.0 5.5 1.8 virginica  
## 118 7.7 3.8 6.7 2.2 virginica  
## 119 7.7 2.6 6.9 2.3 virginica  
## 120 6.0 2.2 5.0 1.5 virginica  
## 121 6.9 3.2 5.7 2.3 virginica  
## 122 5.6 2.8 4.9 2.0 virginica  
## 123 7.7 2.8 6.7 2.0 virginica  
## 124 6.3 2.7 4.9 1.8 virginica  
## 125 6.7 3.3 5.7 2.1 virginica  
## 126 7.2 3.2 6.0 1.8 virginica  
## 127 6.2 2.8 4.8 1.8 virginica  
## 128 6.1 3.0 4.9 1.8 virginica  
## 129 6.4 2.8 5.6 2.1 virginica  
## 130 7.2 3.0 5.8 1.6 virginica  
## 131 7.4 2.8 6.1 1.9 virginica  
## 132 7.9 3.8 6.4 2.0 virginica  
## 133 6.4 2.8 5.6 2.2 virginica  
## 134 6.3 2.8 5.1 1.5 virginica  
## 135 6.1 2.6 5.6 1.4 virginica  
## 136 7.7 3.0 6.1 2.3 virginica  
## 137 6.3 3.4 5.6 2.4 virginica  
## 138 6.4 3.1 5.5 1.8 virginica  
## 139 6.0 3.0 4.8 1.8 virginica  
## 140 6.9 3.1 5.4 2.1 virginica  
## 141 6.7 3.1 5.6 2.4 virginica  
## 142 6.9 3.1 5.1 2.3 virginica  
## 143 5.8 2.7 5.1 1.9 virginica  
## 144 6.8 3.2 5.9 2.3 virginica  
## 145 6.7 3.3 5.7 2.5 virginica  
## 146 6.7 3.0 5.2 2.3 virginica  
## 147 6.3 2.5 5.0 1.9 virginica  
## 148 6.5 3.0 5.2 2.0 virginica  
## 149 6.2 3.4 5.4 2.3 virginica  
## 150 5.9 3.0 5.1 1.8 virginica

#page 24  
n<-28  
N<-20  
  
#page 25  
m=1973  
m

## [1] 1973

n

## [1] 28

N+n

## [1] 48

#page 26  
rm(m)  
rm(n,N)  
rm(list = ls())  
  
#page 27  
class(iris)

## [1] "data.frame"

mode(iris)

## [1] "list"

names(iris)

## [1] "Sepal.Length" "Sepal.Width" "Petal.Length" "Petal.Width"   
## [5] "Species"

length(iris)

## [1] 5

dim(iris)

## [1] 150 5

#page 29  
serie1<-c(1.2,36,5.33,-26.5)  
serie1

## [1] 1.20 36.00 5.33 -26.50

mode(serie1)

## [1] "numeric"

class(serie1)

## [1] "numeric"

c(1.2,36,5.33,-26.5)

## [1] 1.20 36.00 5.33 -26.50

(serie1<-c(1.2,36,5.33,-26.5))

## [1] 1.20 36.00 5.33 -26.50

#page 30  
serie2<-c("bleu","vert","marron")  
serie2

## [1] "bleu" "vert" "marron"

mode(serie2)

## [1] "character"

#serie2<-c(bleu,vert,marron)  
serie3<-c(T,T,F,F,T)  
serie3

## [1] TRUE TRUE FALSE FALSE TRUE

#page 31  
serie3<-c(TRUE,TRUE,FALSE,FALSE,TRUE)  
serie3

## [1] TRUE TRUE FALSE FALSE TRUE

mode(serie3)

## [1] "logical"

serie1[3]

## [1] 5.33

serie1[3:4]

## [1] 5.33 -26.50

#page 32  
head(serie1,n=2)

## [1] 1.2 36.0

tail(serie1,n=2)

## [1] 5.33 -26.50

v<-c(2.3,3.5,6,14,12)  
w<-c(3.2,5,0.7,1,3.5)  
  
#page 33  
x<-c(v,w)  
x

## [1] 2.3 3.5 6.0 14.0 12.0 3.2 5.0 0.7 1.0 3.5

y<-c(w,v)  
y

## [1] 3.2 5.0 0.7 1.0 3.5 2.3 3.5 6.0 14.0 12.0

v[c(2,5)]

## [1] 3.5 12.0

v[-c(2,3)]

## [1] 2.3 14.0 12.0

#page 34  
v[v>4]

## [1] 6 14 12

w[v>4]

## [1] 0.7 1.0 3.5

(v+w)/2

## [1] 2.75 4.25 3.35 7.50 7.75

20+5\*v

## [1] 31.5 37.5 50.0 90.0 80.0

z<-c(2.8,3,19.73)  
z

## [1] 2.80 3.00 19.73

#page 35  
v+z

## Warning in v + z: longer object length is not a multiple of shorter object  
## length

## [1] 5.10 6.50 25.73 16.80 15.00

length(v)

## [1] 5

length(z)

## [1] 3

s<-1:10  
s

## [1] 1 2 3 4 5 6 7 8 9 10

#page 36  
s[3]<-35  
s

## [1] 1 2 35 4 5 6 7 8 9 10

s[s==1]<-25  
s

## [1] 25 2 35 4 5 6 7 8 9 10

s[s>=5]<-20  
s

## [1] 20 2 20 4 20 20 20 20 20 20

donnees<-c(1,2,3)  
donnees

## [1] 1 2 3

#page 37  
rep(x=donnees,times=2)

## [1] 1 2 3 1 2 3

rep(x=donnees,2)

## [1] 1 2 3 1 2 3

rep(1,50)

## [1] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  
## [36] 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

rep("chien",4)

## [1] "chien" "chien" "chien" "chien"

#page 38  
notes.Guillaume<-c(Anglais=12,Informatique=19.5,Biologie=14)  
notes.Guillaume

## Anglais Informatique Biologie   
## 12.0 19.5 14.0

matiere<-c("Anglais","Informatique","Biologie")  
matiere

## [1] "Anglais" "Informatique" "Biologie"

note<-c(12,19.5,14)  
note

## [1] 12.0 19.5 14.0

names(note)<-matiere  
note

## Anglais Informatique Biologie   
## 12.0 19.5 14.0

names(note)<-NULL  
note

## [1] 12.0 19.5 14.0

#page 39  
sort(note)

## [1] 12.0 14.0 19.5

rev(sort(note))

## [1] 19.5 14.0 12.0

rev(note)

## [1] 14.0 19.5 12.0

serie4<-c(1.2,36,NA,-26.5)  
serie4

## [1] 1.2 36.0 NA -26.5

#page 40  
mode(serie4)

## [1] "numeric"

is.na

## function (x) .Primitive("is.na")

is.na(serie4)

## [1] FALSE FALSE TRUE FALSE

matrice1<-matrix(1:12,ncol=3)  
matrice1

## [,1] [,2] [,3]  
## [1,] 1 5 9  
## [2,] 2 6 10  
## [3,] 3 7 11  
## [4,] 4 8 12

#page 41  
matrice2<-matrix(1:12,ncol=3,byrow=TRUE)  
matrice2

## [,1] [,2] [,3]  
## [1,] 1 2 3  
## [2,] 4 5 6  
## [3,] 7 8 9  
## [4,] 10 11 12

class(matrice2)

## [1] "matrix"

length(matrice2)

## [1] 12

#page 42  
dim(matrice2)

## [1] 4 3

matrice3<-matrix(1:12,nrow=4,ncol=4)  
matrice3

## [,1] [,2] [,3] [,4]  
## [1,] 1 5 9 1  
## [2,] 2 6 10 2  
## [3,] 3 7 11 3  
## [4,] 4 8 12 4

matrice3[3,3]

## [1] 11

#page 43  
matrice3[3,]

## [1] 3 7 11 3

matrice3[,3]

## [1] 9 10 11 12

matrice3[,3,drop=F]

## [,1]  
## [1,] 9  
## [2,] 10  
## [3,] 11  
## [4,] 12

#page 44  
(matrice4<-matrice3[,c(2,4)])

## [,1] [,2]  
## [1,] 5 1  
## [2,] 6 2  
## [3,] 7 3  
## [4,] 8 4

(matrice5<-matrice3[,-1])

## [,1] [,2] [,3]  
## [1,] 5 9 1  
## [2,] 6 10 2  
## [3,] 7 11 3  
## [4,] 8 12 4

nrow(matrice5)

## [1] 4

#page 45  
ncol(matrice5)

## [1] 3

dim(matrice5)

## [1] 4 3

rbind(matrice5,c(13:15))

## [,1] [,2] [,3]  
## [1,] 5 9 1  
## [2,] 6 10 2  
## [3,] 7 11 3  
## [4,] 8 12 4  
## [5,] 13 14 15

cbind(matrice5,c(13:16))

## [,1] [,2] [,3] [,4]  
## [1,] 5 9 1 13  
## [2,] 6 10 2 14  
## [3,] 7 11 3 15  
## [4,] 8 12 4 16

#page 46  
matrice6<-matrix(1:6,ncol=3)  
matrice6

## [,1] [,2] [,3]  
## [1,] 1 3 5  
## [2,] 2 4 6

matrice7<-matrix(1:12,ncol=4)  
matrice7

## [,1] [,2] [,3] [,4]  
## [1,] 1 4 7 10  
## [2,] 2 5 8 11  
## [3,] 3 6 9 12

matrice8<-matrice6 %\*% matrice7  
matrice8

## [,1] [,2] [,3] [,4]  
## [1,] 22 49 76 103  
## [2,] 28 64 100 136

#page 47  
#matrice6 \* matrice7  
matrice9<-matrix(7:12,ncol=3)  
matrice9

## [,1] [,2] [,3]  
## [1,] 7 9 11  
## [2,] 8 10 12

matrice10<-matrice6 \* matrice9  
matrice10

## [,1] [,2] [,3]  
## [1,] 7 27 55  
## [2,] 16 40 72

matrice11<-matrice9 \* matrice6  
  
#page 48  
matrice11<-matrice9 \* matrice6  
matrice11

## [,1] [,2] [,3]  
## [1,] 7 27 55  
## [2,] 16 40 72

#matrice12<-matrice7 %\*% matrice6  
  
#page 49  
mode

## function (x)   
## {  
## if (is.expression(x))   
## return("expression")  
## if (is.call(x))   
## return(switch(deparse(x[[1L]])[1L], `(` = "(", "call"))  
## if (is.name(x))   
## "name"  
## else switch(tx <- typeof(x), double = , integer = "numeric",   
## closure = , builtin = , special = "function", tx)  
## }  
## <bytecode: 0x7fc9126a3d90>  
## <environment: namespace:base>

#page 50  
args(matrix)

## function (data = NA, nrow = 1, ncol = 1, byrow = FALSE, dimnames = NULL)   
## NULL

#page 51  
aov(Sepal.Length~Species,data=iris)

## Call:  
## aov(formula = Sepal.Length ~ Species, data = iris)  
##   
## Terms:  
## Species Residuals  
## Sum of Squares 63.21213 38.95620  
## Deg. of Freedom 2 147  
##   
## Residual standard error: 0.5147894  
## Estimated effects may be unbalanced

#jeu1<-scan()  
#1.2  
#36  
#5.33

#page 52  
#jeu1  
  
#matrix(scan(),nrow=2,byrow=T)  
#1 3 4  
#5 2 1  
  
mat<-c(19.6,17.6,18.2,16.0)  
phy<-c(19.1,17.8,18.7,16.1)  
  
#page 53  
res<-data.frame(mat,phy)  
res

## mat phy  
## 1 19.6 19.1  
## 2 17.6 17.8  
## 3 18.2 18.7  
## 4 16.0 16.1

res2<-data.frame(mat,phy,row.names=c("Guillaume","Valérie","Thomas","Julie"))  
res2

## mat phy  
## Guillaume 19.6 19.1  
## Valérie 17.6 17.8  
## Thomas 18.2 18.7  
## Julie 16.0 16.1

#page 54  
getwd()

## [1] "/Users/fbertran/git/R3ed\_complements"

#setwd("C:\\Data")  
#setwd("C:/Data")  
#page 55  
Chemin<-"/Users/fbertran/git/R3ed\_complements/"  
Chemin

## [1] "/Users/fbertran/git/R3ed\_complements/"

pH<-c(1.2,3.5,11.0,7.1,8.2)  
  
#page 56  
pH

## [1] 1.2 3.5 11.0 7.1 8.2

setwd(Chemin)  
save(pH,file="FichierpH.RData")  
#page 55  
rm(pH)  
#pH  
load("FichierpH.RData")  
pH

## [1] 1.2 3.5 11.0 7.1 8.2

#page 57  
read.table(paste(Chemin,"table1.txt",sep=""))

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

read.table("table1.txt")

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

#read.table(file.choose())  
  
#page 58  
read.table("http://www-irma.u-strasbg.fr/~fbertran/BioStatR/table1.txt")

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

table1<-read.table("table1.txt")  
table1

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

table1$V1

## [1] 53.5 74.4 52.6 88.6 49.2

#page 59  
table1[1,1]

## [1] 53.5

table1[c(1),c(1)]

## [1] 53.5

table1[1:2,1]

## [1] 53.5 74.4

table1[1:2,1:2]

## V1 V2  
## 1 53.5 160  
## 2 74.4 172

masse<-table1$V1  
taille<-table1$V2  
masse

## [1] 53.5 74.4 52.6 88.6 49.2

#page 60  
taille

## [1] 160 172 151 163 169

read.table("table2.txt",header=TRUE)

## Masse Taille  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

read.table("table3.txt",dec=",")

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

read.table("table4.txt",sep=";")

## V1 V2  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

#page 61  
#write.table(table1,file=file.choose())  
read.csv("table6.csv")

## Masse Taille  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

read.csv2("table5.csv")

## Masse Taille  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

#write.csv(table1,file=file.choose())  
#write.csv2(table1,file=file.choose())  
  
#page 63  
if(!("xlsx" %in% rownames(installed.packages()))){install.packages("xlsx")}  
library(xlsx)  
(data<-read.xlsx("table7.xls",1))

## Masse Taille BMI  
## 1 53.5 160 20.89844  
## 2 74.4 172 25.14873  
## 3 52.6 151 23.06916  
## 4 88.6 163 33.34713  
## 5 49.2 169 17.22629

args(read.xlsx)

## function (file, sheetIndex, sheetName = NULL, rowIndex = NULL,   
## startRow = NULL, endRow = NULL, colIndex = NULL, as.data.frame = TRUE,   
## header = TRUE, colClasses = NA, keepFormulas = FALSE, encoding = "unknown",   
## password = NULL, ...)   
## NULL

#page 65  
data$BMI<-data$Masse/(data$Taille/100)^2  
write.xlsx(x=data,file="table10.xlsx",sheetName="FeuilleTest",row.names=FALSE)  
write.xlsx(x=data,file="table10.xlsx",sheetName="AutreFeuilleTest",row.names=FALSE,  
 append=TRUE)  
  
#page 66  
args(write.xlsx)

## function (x, file, sheetName = "Sheet1", col.names = TRUE, row.names = TRUE,   
## append = FALSE, showNA = TRUE, password = NULL)   
## NULL

wb<-loadWorkbook("table10.xlsx")  
feuilles <- getSheets(wb)  
feuille <- feuilles[[1]]  
  
#page 67  
feuille <- createSheet(wb, sheetName="ajout1")  
addDataFrame(x=data,sheet=feuille,row.names = FALSE, startRow = 1, startColumn = 5)  
feuille2 <- createSheet(wb, sheetName="graphique")  
png(filename = "matplotdata.png", width=6, height=6, units= "in", pointsize=12, res=120)  
plot(data)  
dev.off()

## quartz\_off\_screen   
## 2

addPicture("matplotdata.png", feuille2, scale=1, startRow =2, startColumn=2)  
  
png(filename = "matplotdata2.png", width=6, height=8, units= "in", pointsize=12, res=300)  
plot(data)  
dev.off()

## quartz\_off\_screen   
## 2

addPicture("matplotdata2.png", feuille2, scale=.4, startRow =62, startColumn=1)  
addPicture("matplotdata2.png", feuille2, scale=1, startRow =62, startColumn=14)  
  
#page 68  
saveWorkbook(wb,"table8bis.xlsx")  
  
#if(!("RODBC" %in% rownames(installed.packages()))){install.packages("RODBC")}  
#library(RODBC)  
#connexion<-odbcConnectExcel()  
# sqlTables(connexion)  
#data<-sqlFetch(connexion,"Feuil1")  
#close(connexion)  
#data  
  
#page 69  
#connexion<-odbcConnectExcel(,readOnly=FALSE)  
#data<-sqlFetch(connexion,"Feuil1")  
#data$BMI<-data$Masse/(data$Taille/100)^2  
#sqlSave(connexion,data,rownames=FALSE)  
#close(connexion)  
  
#connexion<-odbcConnectExcel(,readOnly=FALSE)  
#data<-sqlFetch(connexion,"Feuil2")  
#data$BMI<-data$Masse/(data$Taille/100)^2  
#sqlUpdate(connexion,data,"Feuil2",index="F1")  
#close(connexion)  
  
#page 70  
if(!("gdata" %in% rownames(installed.packages()))){install.packages("gdata")}  
library(gdata)

## gdata: read.xls support for 'XLS' (Excel 97-2004) files ENABLED.

##

## gdata: read.xls support for 'XLSX' (Excel 2007+) files ENABLED.

##   
## Attaching package: 'gdata'

## The following object is masked from 'package:stats':  
##   
## nobs

## The following object is masked from 'package:utils':  
##   
## object.size

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

read.xls("table7.xls")

## Masse Taille BMI  
## 1 53.5 160 20.89844  
## 2 74.4 172 25.14873  
## 3 52.6 151 23.06916  
## 4 88.6 163 33.34713  
## 5 49.2 169 17.22629

#Pas de données dans la feuille 2 donc erreur lors de la lecture  
#read.xls("table7.xls",sheet=2)  
  
#page 71  
read.xls("http://www-irma.u-strasbg.fr/~fbertran/BioStatR/table7.xls",sheet=1)

## Masse Taille  
## 1 53.5 160  
## 2 74.4 172  
## 3 52.6 151  
## 4 88.6 163  
## 5 49.2 169

if(!("XLConnect" %in% rownames(installed.packages()))){install.packages("XLConnect")}  
#vignette("XLConnect")  
#vignette("XLConnectImpatient")  
  
#page 77  
u<-1:10  
v<-1:8  
outer(u,v,"\*")

## [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]  
## [1,] 1 2 3 4 5 6 7 8  
## [2,] 2 4 6 8 10 12 14 16  
## [3,] 3 6 9 12 15 18 21 24  
## [4,] 4 8 12 16 20 24 28 32  
## [5,] 5 10 15 20 25 30 35 40  
## [6,] 6 12 18 24 30 36 42 48  
## [7,] 7 14 21 28 35 42 49 56  
## [8,] 8 16 24 32 40 48 56 64  
## [9,] 9 18 27 36 45 54 63 72  
## [10,] 10 20 30 40 50 60 70 80

x<-c(NA,FALSE,TRUE)  
names(x)<-as.character(x)  
!x

## <NA> FALSE TRUE   
## NA TRUE FALSE

outer(x,x,"&")

## <NA> FALSE TRUE  
## <NA> NA FALSE NA  
## FALSE FALSE FALSE FALSE  
## TRUE NA FALSE TRUE

#page 78  
outer(x,x,"|")

## <NA> FALSE TRUE  
## <NA> NA NA TRUE  
## FALSE NA FALSE TRUE  
## TRUE TRUE TRUE TRUE

outer(x,x,"xor")

## <NA> FALSE TRUE  
## <NA> NA NA NA  
## FALSE NA FALSE TRUE  
## TRUE NA TRUE FALSE

#page 79  
#Exercice 2.1  
v<-101:112  
v

## [1] 101 102 103 104 105 106 107 108 109 110 111 112

#page 80  
v<-seq(101,112)  
v

## [1] 101 102 103 104 105 106 107 108 109 110 111 112

w<-rep(c(4,6,3),4)  
w

## [1] 4 6 3 4 6 3 4 6 3 4 6 3

length(w)

## [1] 12

x<-c(rep(4,8),rep(6,7),rep(3,5))  
x

## [1] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 3 3 3 3 3

length(x)

## [1] 20

x<-rep(c(4,6,3),c(8,7,5))  
x

## [1] 4 4 4 4 4 4 4 4 6 6 6 6 6 6 6 3 3 3 3 3

#page 81  
#Exercice 2.2  
masse<-c(28,27.5,27,28,30.5,30,31,29.5,30,31,31,31.5,32,30,30.5)  
masse

## [1] 28.0 27.5 27.0 28.0 30.5 30.0 31.0 29.5 30.0 31.0 31.0 31.5 32.0 30.0  
## [15] 30.5

masse1<-c(40,39,41,37.5,43)  
masse1

## [1] 40.0 39.0 41.0 37.5 43.0

nouveau.masse<-c(rep(masse1,2),masse[6:15])  
nouveau.masse

## [1] 40.0 39.0 41.0 37.5 43.0 40.0 39.0 41.0 37.5 43.0 30.0 31.0 29.5 30.0  
## [15] 31.0 31.0 31.5 32.0 30.0 30.5

length(nouveau.masse)

## [1] 20

#page 82  
(nouveau.masse<-c(rep(masse1,2),tail(masse,n=10)))

## [1] 40.0 39.0 41.0 37.5 43.0 40.0 39.0 41.0 37.5 43.0 30.0 31.0 29.5 30.0  
## [15] 31.0 31.0 31.5 32.0 30.0 30.5

nouveau.masse

## [1] 40.0 39.0 41.0 37.5 43.0 40.0 39.0 41.0 37.5 43.0 30.0 31.0 29.5 30.0  
## [15] 31.0 31.0 31.5 32.0 30.0 30.5

library(xlsx)  
write.xlsx(nouveau.masse,file="test.xlsx")  
#write.xls(data.frame(masse=nouveau.masse),file=file.choose())  
#massedf<-data.frame(nouveau.masse)  
#library(RODBC)  
#connexion<-odbcConnectExcel("Resultat.xls",readOnly = FALSE)  
#sqlSave(connexion,massedf)  
#close(connexion)  
  
#page 83  
#Exercice 2.3  
nom<-c("Guillaume","Valérie","Thomas","Julie","Sébastien","Stéphanie","Grégory","Ambre",  
 "Jean-Sébastien","Camille")  
nom

## [1] "Guillaume" "Valérie" "Thomas" "Julie"   
## [5] "Sébastien" "Stéphanie" "Grégory" "Ambre"   
## [9] "Jean-Sébastien" "Camille"

age<-c(25,24,23,22,41,40,59,58,47,56)  
names(age)<-nom  
age

## Guillaume Valérie Thomas Julie Sébastien   
## 25 24 23 22 41   
## Stéphanie Grégory Ambre Jean-Sébastien Camille   
## 40 59 58 47 56

str(age)

## Named num [1:10] 25 24 23 22 41 40 59 58 47 56  
## - attr(\*, "names")= chr [1:10] "Guillaume" "Valérie" "Thomas" "Julie" ...

c("Guillaume"=66.5,"Valérie"=50.5,"Thomas"=67.5,"Julie"=52.0,"Sébastien"=83.0,  
 "Stéphanie"=65.0,"Grégory"=79.0,"Ambre"=64.0,"Jean-Sébastien"=81.0,"Camille"=53.0)

## Guillaume Valérie Thomas Julie Sébastien   
## 66.5 50.5 67.5 52.0 83.0   
## Stéphanie Grégory Ambre Jean-Sébastien Camille   
## 65.0 79.0 64.0 81.0 53.0

#page 84  
age<-data.frame(age,row.names=nom)  
age

## age  
## Guillaume 25  
## Valérie 24  
## Thomas 23  
## Julie 22  
## Sébastien 41  
## Stéphanie 40  
## Grégory 59  
## Ambre 58  
## Jean-Sébastien 47  
## Camille 56

masse<-c(66.5,50.5,67.5,52,83,65,79,64,81,53)  
names(masse)<-nom  
masse

## Guillaume Valérie Thomas Julie Sébastien   
## 66.5 50.5 67.5 52.0 83.0   
## Stéphanie Grégory Ambre Jean-Sébastien Camille   
## 65.0 79.0 64.0 81.0 53.0

#page 85  
masse<-data.frame(masse,row.names=nom)  
masse

## masse  
## Guillaume 66.5  
## Valérie 50.5  
## Thomas 67.5  
## Julie 52.0  
## Sébastien 83.0  
## Stéphanie 65.0  
## Grégory 79.0  
## Ambre 64.0  
## Jean-Sébastien 81.0  
## Camille 53.0

taille<-c(1.86,1.62,1.72,1.67,1.98,1.77,1.83,1.68,1.92,1.71)  
names(taille)<-nom  
taille

## Guillaume Valérie Thomas Julie Sébastien   
## 1.86 1.62 1.72 1.67 1.98   
## Stéphanie Grégory Ambre Jean-Sébastien Camille   
## 1.77 1.83 1.68 1.92 1.71

taille<-data.frame(taille,row.names=nom)  
taille

## taille  
## Guillaume 1.86  
## Valérie 1.62  
## Thomas 1.72  
## Julie 1.67  
## Sébastien 1.98  
## Stéphanie 1.77  
## Grégory 1.83  
## Ambre 1.68  
## Jean-Sébastien 1.92  
## Camille 1.71

#page 86  
masse.lourde<-masse[masse>80]  
masse.lourde

## [1] 83 81

masse<-data.frame(masse,row.names=nom)  
masse.lourde<-masse[masse>80]  
masse.lourde

## [1] 83 81

str(masse.lourde)

## num [1:2] 83 81

#page 87  
masse.lourde<-masse[masse>80,,drop=FALSE]  
masse.lourde

## masse  
## Sébastien 83  
## Jean-Sébastien 81

masse.lourde<-masse[masse>80,drop=FALSE]

## Warning in `[.data.frame`(masse, masse > 80, drop = FALSE): 'drop' argument  
## will be ignored

taille.masse.lourde<-taille[masse>=80]  
taille.masse.lourde

## [1] 1.98 1.92

taille.masse.lourde<-taille[masse>=80,,drop=FALSE]  
taille.masse.lourde

## taille  
## Sébastien 1.98  
## Jean-Sébastien 1.92

#page 88  
taille.vieux.masse.lourde<-taille[masse>=80 & age>=30]  
taille.vieux.masse.lourde

## [1] 1.98 1.92

taille.vieux.masse.lourde<-taille[masse>=80 & age>=30,,drop=FALSE]  
taille.vieux.masse.lourde

## taille  
## Sébastien 1.98  
## Jean-Sébastien 1.92

ensemble<-cbind(age,masse,taille)  
ensemble

## age masse taille  
## Guillaume 25 66.5 1.86  
## Valérie 24 50.5 1.62  
## Thomas 23 67.5 1.72  
## Julie 22 52.0 1.67  
## Sébastien 41 83.0 1.98  
## Stéphanie 40 65.0 1.77  
## Grégory 59 79.0 1.83  
## Ambre 58 64.0 1.68  
## Jean-Sébastien 47 81.0 1.92  
## Camille 56 53.0 1.71

#page 89  
suite<-1:12  
suite

## [1] 1 2 3 4 5 6 7 8 9 10 11 12

suite>6

## [1] FALSE FALSE FALSE FALSE FALSE FALSE TRUE TRUE TRUE TRUE TRUE  
## [12] TRUE

suite<6

## [1] TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE  
## [12] FALSE

!(suite>=6)

## [1] TRUE TRUE TRUE TRUE TRUE FALSE FALSE FALSE FALSE FALSE FALSE  
## [12] FALSE

suite==6

## [1] FALSE FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE  
## [12] FALSE

#page 90  
suite<=6&suite>=6

## [1] FALSE FALSE FALSE FALSE FALSE TRUE FALSE FALSE FALSE FALSE FALSE  
## [12] FALSE

suite<=8&&suite>=4

## [1] FALSE

suite<=4|suite>=8

## [1] TRUE TRUE TRUE TRUE FALSE FALSE FALSE TRUE TRUE TRUE TRUE  
## [12] TRUE

suite<=4||suite>=8

## [1] TRUE