

# 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
## [36] 1 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: 0x7fea7f556390>
## <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()

## pdf
## 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()

## pdf
## 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 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 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

```