

# R 语言入门 100 题

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## 1 100 题带你上手 R 语言基本操作

<https://www.heywhale.com/mw/project/6131fb0bbc40120017e9cec7>

### 1.1 第一部分: R 的数据结构

参考配套知识点的第一章, 想了解更全面的知识点, 可以看这 **【R 语言知识点详细总结】** 中的第一章 R 的数据结构;

1. 定义值为 4 的一个向量

```
x <- 4 # 也可用 = 赋值  
print(x)
```

```
## [1] 4
```

2. 查看向量 x 的数据类型

```
typeof(x)
```

```
## [1] "double"
```

3. 判断 x 是否是一个向量

```
is.vector(x)
```

```
## [1] TRUE
```

4. 定义多个元素向量: 包含 88,5,12,13

```
y <- c(88,5,12,13)  
print(y)
```

```
## [1] 88  5 12 13
```

```
print(typeof(y))
```

```
## [1] "double"
```

```
print(is.vector(y))
```

```
## [1] TRUE
```

5. 创建一个包含从 1 到 5 的向量

- 方法一: c() 函数

```
x1 <- c(1,2,3,4,5)
x1
```

```
## [1] 1 2 3 4 5
```

print(x1) - 方法二：运算符创建向量

```
x2 <- 1:5
print(x2)
```

```
## [1] 1 2 3 4 5
```

6. 创建一个从 12 到 30 步长为 3 的向量

```
seq(from = 12, to = 30, by = 3)
```

```
## [1] 12 15 18 21 24 27 30
```

7. 创建一个从 1.1 到 2 长度为 10 的向量

```
seq(from=1.1, to=2, length=10)
```

```
## [1] 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0
```

8. 创建包含 4 个 8 的向量

# 方法一：rep() 函数

```
rep(8,4)
```

```
## [1] 8 8 8 8
```

# 方法二：c() 函数

```
c(8,8,8,8)
```

```
## [1] 8 8 8 8
```

9. 在索引为 4 的位置上对 y 向量添加元素 168

```
y <- c(y[1:3], 168, y[4])  
print(y)
```

```
## [1] 88 5 12 168 13
```

10. 从索引为 4 的位置上对 y 向量添加多个元素 (56,24,35,10,5,7)

```
y <- c(y[1:3], c(56,24,35,10,5,7), y[4])  
print(y)
```

```
## [1] 88 5 12 56 24 35 10 5 7 168
```

11. 获取 y 向量的长度

```
length(y)
```

```
## [1] 10
```

12. 计算 c(1,2,4) 和 c(5,0,-1) 的加减乘除后的结果

```
c(1,2,4) + c(5,0,-1)
```

```
## [1] 6 2 3
```

```
c(1,2,4) - c(5,0,-1)
```

```
## [1] -4 2 5
```

```
c(1,2,4) * c(5,0,-1)
```

```
## [1] 5 0 -4
```

```
c(1,2,4) / c(5,0,-1)
```

```
## [1] 0.2 Inf -4.0
```

13. 访问 y 向量的第 2 个元素

```
y[2]
```

```
## [1] 5
```

14. 访问 y 向量的第 2 个到第 4 个元素

```
y[2:4]
```

```
## [1] 5 12 56
```

15. 将 y 向量的第 2 个到第 4 个元素修改为 (8,14,67)

```
print(y)
```

```
## [1] 88 5 12 56 24 35 10 5 7 168
```

```
y[2:4] = c(8,14,67)
```

```
print(y)
```

```
## [1] 88 8 14 67 24 35 10 5 7 168
```

16. 访问 y 向量除了前 3 个元素外的其他元素

```
print(y)

## [1] 88 8 14 67 24 35 10 5 7 168
```

```
print(y[-c(1:3)])

## [1] 67 24 35 10 5 7 168
```

```
# 或者
b=(1:3)
y[-b]

## [1] 67 24 35 10 5 7 168
```

17. 如下列，创建一个矩阵

```
X = c(1,1,1)
Y = c(2,2,2)
temp = c(14.7,18.5,25.9)
RH = c(66,73,41)
wind = c(2.7,8.5,3.6)
rain = c(0,0,0)
area = c(0,0,0)
rank = c(1,2,3)
ForeData = cbind(X,Y,temp,RH,wind,rain,area,rank)
print(ForeData)
```

```
##      X Y temp RH wind rain area rank
## [1,] 1 2 14.7 66 2.7 0 0 1
## [2,] 1 2 18.5 73 8.5 0 0 2
## [3,] 1 2 25.9 41 3.6 0 0 3
```

```
print(is.matrix(ForeData)) # 判断是否为矩阵
```

```
## [1] TRUE
```

18. 给出向量 `c(1,2,3,11,12,13)`，创建 2 行 3 列的矩阵，行命名为 (row1, row2)，列命名为 (C.1, C.2, C.3)

```
mdat <- matrix(c(1,2,3,11,12,13), nrow = 2, ncol = 3, byrow = TRUE, dimnames = list(c("row1", "row2"), c("C.1", "C.2", "C.3")))
print(mdat)
```

```
##      C.1 C.2 C.3
## row1   1   2   3
## row2  11  12  13
```

19. 先创建 2 行 2 列的空矩阵，然后按照列的方式依次给每个位置赋值 1,2,3,4

```
x = matrix(nrow = 2, ncol = 2) # 注意：不能写成 matrix(2,3)
x[,1] = 1:2
x[,2] = 3:4
print(x)
```

```
##      [,1] [,2]
## [1,]    1    3
## [2,]    2    4
```

20. 对上述创建的 `x` 矩阵的行列进行重命名，行命名为 ('1', '2')，列命名为 ('a', 'b')

```
colnames(x) = c('a', 'b')
rownames(x) = c('R1', 'R2')
print(x)
```

```
##      a b
## R1  1 3
## R2  2 4
```

21. 访问 ForeData 矩阵的第 2 行第 3 列的元素

```
print(ForeData[2,3])
```

```
## temp
## 18.5
```

22. 访问 ForeData 矩阵的第 1 到 2 行, 第 1 到 3 列的元素

```
print(ForeData[1:2, 1:3])
```

```
##      X Y temp
## [1,] 1 2 14.7
## [2,] 1 2 18.5
```

23. 访问 ForeData 矩阵的第 1 到 2 行, 第 1 列和第 3 列的元素 (注意与 22 题的区别)

```
print(ForeData[1:2, c(1,3)])
```

```
##      X temp
## [1,] 1 14.7
## [2,] 1 18.5
```

24. 定义一个 4 行 5 列的三维数组, 数值为 1:60, 行命名为 c('R1','R2','R3','R4'), 列命名为 c('C1','C2','C3','C4','C5'), 维度命名为 c('T1','T2','T3')

```
a = c(1:60)
dim1 = c('R1', 'R2', 'R3', 'R4')
dim2 = c('C1', 'C2', 'C3', 'C4', 'C5')
```



```
dim3 = c('T1','T2','T3')
f = array(a,c(4,5,3),dimnames = list(dim1,dim2,dim3))
print(f)
```

```
## , , T1
##
##   C1 C2 C3 C4 C5
## R1  1  5  9 13 17
## R2  2  6 10 14 18
## R3  3  7 11 15 19
## R4  4  8 12 16 20
##
## , , T2
##
##   C1 C2 C3 C4 C5
## R1 21 25 29 33 37
## R2 22 26 30 34 38
## R3 23 27 31 35 39
## R4 24 28 32 36 40
##
## , , T3
##
##   C1 C2 C3 C4 C5
## R1 41 45 49 53 57
## R2 42 46 50 54 58
## R3 43 47 51 55 59
## R4 44 48 52 56 60
```

25. 根据下面给定的列，创建一个数据框

```
X = c(1,1,1)
Y = c(2,2,2)
temp = c(14.7,18.5,25.9)
```

```
RH = c(66,73,41)
wind = c(2.7,8.5,3.6)
rain = c(0,0,0)
area = c(0,0,0)
month = c('aug','aug','aug')
day = c('fri','fri','fri')
ForeDataFrm = data.frame(FX = X,FY = Y, Fmonth = month,Fday = day, Ftemp = temp,FRH = R
print(ForeDataFrm)
```

```
##   FX FY Fmonth Fday Ftemp FRH Fwind Frain Farea
## 1  1  2   aug  fri  14.7  66   2.7    0    0
## 2  1  2   aug  fri  18.5  73   8.5    0    0
## 3  1  2   aug  fri  25.9  41   3.6    0    0
```

26. 查看 ForeDataFrm 数据框的列名

```
names(ForeDataFrm)

## [1] "FX"      "FY"      "Fmonth" "Fday"    "Ftemp"  "FRH"    "Fwind"  "Frain"
## [9] "Farea"
```

27. 判断 ForeDataFrm 是否是数据框类型

```
is.data.frame(ForeDataFrm)
```

```
## [1] TRUE
```

28. 访问 ForeDataFrm 数据框的第 1 列和第 3 列

# 方法一:

```
print(ForeDataFrm[,c(1,3)])
```

```
##   FX Fmonth
```

```
## 1 1 aug
## 2 1 aug
## 3 1 aug
```

# 方法二:

```
print(ForeDataFrm[,c('FX','Fmonth')])
```

```
## FX Fmonth
## 1 1 aug
## 2 1 aug
## 3 1 aug
```

29. 访问 ForeDataFrm 中 Fwind 这一列

# 方法一:

```
ForeDataFrm$Fwind
```

```
## [1] 2.7 8.5 3.6
```

# 方法二:

```
ForeDataFrm[['Fwind']]
```

```
## [1] 2.7 8.5 3.6
```

# 方法三:

```
ForeDataFrm[[7]]
```

```
## [1] 2.7 8.5 3.6
```

30. 判断 a=123.4 和 b='123.4' 是否为数值型, 整数型, 字符串型, 布尔型

```
a <- 123.4  
is.numeric(a)
```

```
## [1] TRUE
```

```
is.integer(a)
```

```
## [1] FALSE
```

```
is.character(a)
```

```
## [1] FALSE
```

```
is.logical(a)
```

```
## [1] FALSE
```

```
b <- "123.4"  
is.numeric(b)
```

```
## [1] FALSE
```

```
is.integer(b)
```

```
## [1] FALSE
```

```
is.character(b)
```

```
## [1] TRUE
```

```
is.logical(b)
```

```
## [1] FALSE
```

31. 查看向量 a 和 b 的数据类型

```
typeof(a)
```

```
## [1] "double"
```

```
typeof(b)
```

```
## [1] "character"
```

32. 将 a 转换为字符串类型，将 b 转换为浮点型

```
a <- as.character(a)
b <- as.double(b)
typeof(a)
```

```
## [1] "character"
```

```
typeof(b)
```

```
## [1] "double"
```

33. 将  $e = c(1:10)$  向量转换为矩阵

```
e <- c(1:10,11:20)
f <- matrix(e,nrow = 5,ncol= 4,byrow = TRUE)
print(f)
```

```
##      [,1] [,2] [,3] [,4]
## [1,]   1   2   3   4
## [2,]   5   6   7   8
## [3,]   9  10  11  12
## [4,]  13  14  15  16
## [5,]  17  18  19  20
```

```
x <- c(33:42)
y <- c("A", "B")
m <- data.frame(x,y)
print(m)
```

```
##      x y
## 1  33 A
## 2  34 B
## 3  35 A
## 4  36 B
## 5  37 A
## 6  38 B
## 7  39 A
## 8  40 B
## 9  41 A
## 10 42 B
```

## 1.2 第二部分：数据的导入

参考配套知识点的第二章，想了解更全面的知识点，可以看这【R 语言知识点详细总结】中的第二章数据的导入；这里只是以 txt 的导入为例，如果想看更多的文件导入方式，可以看下配套知识点的第二章，里面有更多格式的文件导入方式；

34. 读取 ReportCard1.txt 和 ReportCard2.txt 文件到数据框

```
ReportCard1 = read.table(file='ReportCard1.txt', header=TRUE)
ReportCard2 = read.table(file='ReportCard2.txt', header=TRUE)
names(ReportCard1)
```

```
## [1] "xh" "sex" "poli" "chi" "math"
```

```
names(ReportCard2)

## [1] "xh" "fore" "phy" "che" "geo" "his"

'xh' 'sex' 'poli' 'chi' 'math' 'xh' 'fore' 'phy' 'che' 'geo' 'his'
```

### 1.3 第三部分：R 的数据管理

参考配套知识点的第三章，想了解更全面的知识点，可以看这【R 语言知识点详细总结】中的第三章 R 的数据管理；

35. 按照学号 xh 字段合并 ReportCard1 和 ReportCard2

```
ReportCard = merge(ReportCard1, ReportCard2, by = 'xh')
print(head(ReportCard))
```

```
##   xh sex poli chi math fore phy che geo his
## 1  1  1   84  85   95  69  54  75  85  57
## 2  2  2   84  85   95  69  84  95  65  66
## 3  3  2   81  85   93  67  81  95  93  96
## 4  4  2   86  84   95  84  86  84  95  87
## 5  5  1   76  85   95  66  76  65  95  75
## 6  6  1   52  94   56  78  92  94  56  68
```

36. ReportCard 按照 math 字段进行降序排列

```
Ord = order(ReportCard$math, na.last = TRUE, decreasing = TRUE)
print(Ord) # Ord 为位置向量，1 号学生的数学成绩最高，3 号学生的数学成绩最低或者为缺失值
```

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

```
# 如果想在数据框中按照这种顺序排列
a = ReportCard[Ord,]
print(head(a))
```

```
##   xh sex poli chi math fore phy che geo his
## 1  1   1   84 85   95  69 54  75 85  57
## 2  2   2   84 85   95  69 84  95 65  66
## 4  4   2   86 84   95  84 86  84 95  87
## 5  5   1   76 85   95  66 76  65 95  75
## 3  3   2   81 85   93  67 81  95 93  96
## 6  6   1   52 94   56  78 92  94 56  68
```

37. 查询 ReportCard 中 math 字段存在缺失值的行

```
a = is.na(ReportCard$math)
print(ReportCard[a,])
```

```
## [1] xh   sex  poli chi  math fore phy  che  geo  his
## <0 rows> (or 0-length row.names)
```

38. 查询 ReportCard 中存在缺失值的行

```
a = complete.cases(ReportCard)
print(ReportCard[!a,])
```

```
## [1] xh   sex  poli chi  math fore phy  che  geo  his
## <0 rows> (or 0-length row.names)
```

39. 对于 ReportCard 数据框生成缺失数据报告

```
#install.packages("mice")
library(mice)
```

```
##
## Attaching package: 'mice'

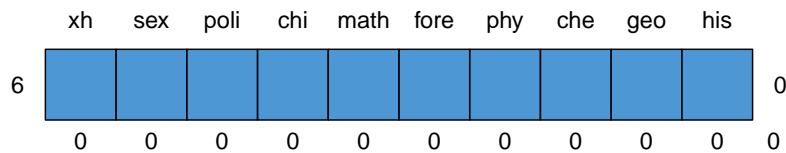
## The following object is masked from 'package:stats':
##
##   filter
```



```
## The following objects are masked from 'package:base':
##
##   cbind, rbind
```

```
print(md.pattern(ReportCard))
```

```
##  /\      /\
## {  `---'  }
## {  0   0  }
## ==> V <== No need for mice. This data set is completely observed.
## \  \|\ /  /
##  `-----'
```



```
##   xh sex poli chi math fore phy che geo his
## 6  1   1   1   1   1   1   1   1   1   1  0
##   0   0   0   0   0   0   0   0   0   0  0
```

40. 计算以 2 为底 10 的对数的平方根，并保留 3 位小数位数

```
round(sqrt(log(10,2)),digits=3)
```

```
## [1] 1.823
```

41. 计算向量  $y$  的平均值，中位数，标准差，方差，最大最小值

```
y <- c(20:100)  
mean(y) # 中位数
```

```
## [1] 60
```

```
median(y)
```

```
## [1] 60
```

```
sd(y)
```

```
## [1] 23.52658
```

```
sum(y)
```

```
## [1] 4860
```

```
var(y)
```

```
## [1] 553.5
```

```
max(y)
```

```
## [1] 100
```

```
min(y)
```

```
## [1] 20
```

42. 根据 ReportCard 中学生的各门成绩计算每个学生的总分和平均分

```
attach(ReportCard) # 访问数据框中域访问
SumScore = poli + chi + math + fore + phy + che + geo + his
detach(ReportCard)
AvScore = SumScore/8 # 计算平均值
ReportCard$sumScore = SumScore
ReportCard$avScore = AvScore
sum(is.na(ReportCard$sumScore)) # 计算总分为缺失值的观测值的观测样本数
```

```
## [1] 0
```

```
mean(complete.cases(ReportCard)) # 计算完整观测样本的比率
```

```
## [1] 1
```

43. 计算向量 y 的和, 累计和, 连乘积

```
sum(y)
```

```
## [1] 4860
```

```
cumsum(y)
```

```
## [1] 20 41 63 86 110 135 161 188 216 245 275 306 338 371 405
## [16] 440 476 513 551 590 630 671 713 756 800 845 891 938 986 1035
## [31] 1085 1136 1188 1241 1295 1350 1406 1463 1521 1580 1640 1701 1763 1826 1890
## [46] 1955 2021 2088 2156 2225 2295 2366 2438 2511 2585 2660 2736 2813 2891 2970
## [61] 3050 3131 3213 3296 3380 3465 3551 3638 3726 3815 3905 3996 4088 4181 4275
## [76] 4370 4466 4563 4661 4760 4860
```

```
prod(y)
```

```
## [1] 7.672008e+140
```

44. 以 ReportCard 中的 math 字段值、均值、标准差生成标准正态分布-密度函数

```
a = is.na(ReportCard$math)
math = ReportCard$math
math = math[!a]
dnorm(math,mean(math),sd(math))
```

```
## [1] 0.023020399 0.023020399 0.024124818 0.023020399 0.023020399 0.003165083
```

45. "You like R. So do I": 去掉 So do I, 空格换成 \_, 所有字母大写

```
str = "You like R. So do I"
str_1 = strsplit(str,'S')[[1]] # 注: 列表名 $ 域名 或者 列表名 [[ '域名' ]] 或者 列表框
str_2 = sub(' ', '_', sub(' ', '_', str_1[1])) # 为什么嵌套: sub 好像只能替换第一个
str_3 = toupper(str_2)
print(str_3)
```

```
## [1] "YOU_LIKE_R. "
```

46. 生成一个 4 行 4 列的单位矩阵

```
print(diag(4))
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    0    0    0
## [2,]    0    1    0    0
## [3,]    0    0    1    0
## [4,]    0    0    0    1
```

47. 生成 2 个 2 行 2 列的矩阵 m 和 n, 一个值全是 1, 一个值全是 2

```
m = matrix(1, nrow=2, ncol=2)
n = matrix(2, nrow=2, ncol=2)
print(m)
```

```
##      [,1] [,2]
## [1,]    1    1
## [2,]    1    1
```

```
print(n)
```

```
##      [,1] [,2]
## [1,]    2    2
## [2,]    2    2
```

48. 计算矩阵 m 和矩阵 n 相乘后的结果 mn, 并输出正对角元素值

```
mn = m %*% n
print(mn)
```

```
##      [,1] [,2]
## [1,]    4    4
## [2,]    4    4
```

```
print(diag(mn))
```

```
## [1] 4 4
```

49. 以 1:9 按照列优先方式生成 3 行 3 列的矩阵 mm, 并求该矩阵的转置矩阵

```
mm = matrix(1:9, nrow=3, ncol=3, byrow=TRUE)
print(mm)
```

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

```
print('转置后的矩阵：')
```

```
## [1] "转置后的矩阵："
```

```
print(t(mm))
```

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

50. 求上一步生成的 mm 矩阵的特征值和特征向量

```
eigen(mm)
```

```
## eigen() decomposition
## $values
## [1]  1.611684e+01 -1.116844e+00 -1.303678e-15
##
## $vectors
##      [,1]      [,2]      [,3]
## [1,] -0.2319707 -0.78583024  0.4082483
## [2,] -0.5253221 -0.08675134 -0.8164966
## [3,] -0.8186735  0.61232756  0.4082483
```

51. 将 ReportCard 中学生成绩的平均成绩分为 A,B,C,D,E 5 个等级 A : 大于等于 90 分; B: 大于等于 80 分, 小于 90 分; C: 大于等于 70 分, 小于 80 分; D: 大于等于 60 分, 小于 70 分; E: 小于 60 分;

```
ReportCard1 = read.table(file='ReportCard1.txt', header=TRUE)
ReportCard2 = read.table(file='ReportCard2.txt', header=TRUE)
ReportCard = merge(ReportCard1, ReportCard2, by = 'xh')
```

```
attach(ReportCard) # 访问数据框中域访问
```

```
## The following object is masked _by_ .GlobalEnv:
```

```
##
```

```
##      math
```

```
SumScore = poli + chi + math + fore + phy + che + geo + his
detach(ReportCard)
```

```
AvScore = SumScore/8 # 计算平均值
```

```
ReportCard$sumScore = SumScore
```

```
ReportCard$avScore = AvScore
```

```
ReportCard$avScore
```

```
## [1] 75.500 80.375 86.375 87.625 79.125 73.750
```

```
# 通过使用 within 和逻辑运算符将学生平均成绩分为 5 个级别
```

```
ReportCard = within(ReportCard, {
```

```
  avScore[avScore >= 90] = 'A'
```

```
  avScore[avScore >= 80 & avScore < 90] = 'B'
```

```
  avScore[avScore >= 70 & avScore < 80] = 'C'
```

```
  avScore[avScore >= 60 & avScore < 70] = 'D'
```

```
  avScore[avScore < 60] = 'E'
```

```
})
```

```
# 下面通过 %in% 包含函数, 找出非正常项
```

```
flag = ReportCard$avScore %in% c('A', 'B', 'C', 'D', 'E')
```

```
# 通过使用 flag 标记, 将非正常的标记为缺失值
```

```
ReportCard$avScore[!flag] = NA
# 输出平均成绩等级
print(ReportCard$avScore)
```

```
## [1] "C" "B" "B" "B" "C" "C"
```

52. 将 ReportCard 中 sex 字段值 1 和 2，替换成'M' 和'F' 'M' 表示男性；'F' 表示女性；

```
ReportCard$sex = factor(ReportCard$sex, levels = c(1,2), labels = c("M","F"))
str(ReportCard$sex)
```

```
## Factor w/ 2 levels "M","F": 1 2 2 2 1 1
```

```
print(head(ReportCard))
```

```
##   xh sex poli chi math fore phy che geo his sumScore avScore
## 1  1  M   84  85   95   69  54  75  85  57         604      C
## 2  2  F   84  85   95   69  84  95  65  66         643      B
## 3  3  F   81  85   93   67  81  95  93  96         691      B
## 4  4  F   86  84   95   84  86  84  95  87         701      B
## 5  5  M   76  85   95   66  76  65  95  75         633      C
## 6  6  M   52  94   56   78  92  94  56  68         590      C
```

53. 对于 ReportCard，筛选出性别为 M，平均等级为 E 的样本

```
MaleScore = subset(ReportCard, ReportCard$sex == 'M' & ReportCard$avScore == 'C')
print(MaleScore)
```

```
##   xh sex poli chi math fore phy che geo his sumScore avScore
## 1  1  M   84  85   95   69  54  75  85  57         604      C
## 5  5  M   76  85   95   66  76  65  95  75         633      C
## 6  6  M   52  94   56   78  92  94  56  68         590      C
```



54. 从 ReportCard 中随机抽取 3 位同学的数据

```
xh = sample(ReportCard$xh, size = 3, replace = FALSE)
sample_s = ReportCard[ReportCard$xh %in% xh,]
print(sample_s)
```

```
##   xh sex poli chi math fore phy che geo his sumScore avScore
## 1  1  M   84  85   95   69  54  75  85  57      604      C
## 3  3  F   81  85   93   67  81  95  93  96      691      B
## 4  4  F   86  84   95   84  86  84  95  87      701      B
```

55. 分别使用 repeat 和 for 循环依次打印 50 以内的 6 的倍数

### 1.3.1 repeat 循环

```
i = 6
repeat{
  if(i > 50)
    break
  else {
    print(i);
    i = i + 6}
}
```

```
## [1] 6
## [1] 12
## [1] 18
## [1] 24
## [1] 30
## [1] 36
## [1] 42
## [1] 48
```

### 1.3.2 for 循环

```
for(i in seq(from = 6, to = 50, by = 6))  
print(i)
```

```
## [1] 6  
## [1] 12  
## [1] 18  
## [1] 24  
## [1] 30  
## [1] 36  
## [1] 42  
## [1] 48
```

## 1.4 第四部分：R 的基本数据分析

参考配套知识点的第四章，想了解更全面的知识点，可以看这【R 语言知识点详细总结】中的第四章 R 的基本数据分析；

56. 计算 ReportCard 中所有字段的基本描述统计量

```
Av.Course = sapply(ReportCard[,3:10], FUN = mean, na.rm = TRUE) # 均值  
Sd.Course = sapply(ReportCard[,3:10], FUN = sd, na.rm = TRUE) # 方差  
print(Av.Course)
```

```
##      poli      chi      math      fore      phy      che      geo      his  
## 77.16667 86.33333 88.16667 72.16667 78.83333 84.66667 81.50000 74.83333
```

```
print(Sd.Course)
```

```
##      poli      chi      math      fore      phy      che      geo      his  
## 12.812754 3.777124 15.778678 7.194906 13.272779 12.500667 16.920402 14.414113
```

57. 计算 ReportCard 中学生所有课程考试成绩的均值和标准差

```
summary(ReportCard)
```

```
##           xh           sex           poli           chi           math
## Min.      :1.00    M:3    Min.      :52.00    Min.      :84.00    Min.      :56.00
## 1st Qu.:2.25    F:3    1st Qu.:77.25    1st Qu.:85.00    1st Qu.:93.50
## Median :3.50                Median :82.50    Median :85.00    Median :95.00
## Mean   :3.50                Mean   :77.17    Mean   :86.33    Mean   :88.17
## 3rd Qu.:4.75                3rd Qu.:84.00    3rd Qu.:85.00    3rd Qu.:95.00
## Max.   :6.00                Max.   :86.00    Max.   :94.00    Max.   :95.00
##           fore           phy           che           geo           his
## Min.      :66.00    Min.      :54.00    Min.      :65.00    Min.      :56.0    Min.      :57.00
## 1st Qu.:67.50    1st Qu.:77.25    1st Qu.:77.25    1st Qu.:70.0    1st Qu.:66.50
## Median :69.00    Median :82.50    Median :89.00    Median :89.0    Median :71.50
## Mean   :72.17    Mean   :78.83    Mean   :84.67    Mean   :81.5    Mean   :74.83
## 3rd Qu.:75.75    3rd Qu.:85.50    3rd Qu.:94.75    3rd Qu.:94.5    3rd Qu.:84.00
## Max.   :84.00    Max.   :92.00    Max.   :95.00    Max.   :95.0    Max.   :96.00
##           sumScore       avScore
## Min.      :590.0    Length:6
## 1st Qu.:611.2    Class :character
## Median :638.0    Mode  :character
## Mean   :643.7
## 3rd Qu.:679.0
## Max.   :701.0
```

```
Av.Course = sapply(ReportCard[,3:10], FUN = mean, na.rm = TRUE) # 均值
Sd.Course = sapply(ReportCard[,3:10], FUN = sd, na.rm = TRUE) # 标准差
print(Av.Course)
```

```
##           poli           chi           math           fore           phy           che           geo           his
## 77.16667 86.33333 88.16667 72.16667 78.83333 84.66667 81.50000 74.83333
```

```
print(Sd.Course)
```

```
##      poli      chi      math      fore      phy      che      geo      his
## 12.812754  3.777124 15.778678  7.194906 13.272779 12.500667 16.920402 14.414113
```

58. 计算 ReportCard 中各科的平均分和总分

```
Av.Course = colMeans(ReportCard[,3:10],na.rm = TRUE) # 各科平均分
Sums.Course = colSums(ReportCard[,3:10],na.rm = TRUE) # 各科总分
print(Av.Course)
```

```
##      poli      chi      math      fore      phy      che      geo      his
## 77.16667 86.33333 88.16667 72.16667 78.83333 84.66667 81.50000 74.83333
```

```
print(Sums.Course)
```

```
## poli  chi math fore  phy  che  geo  his
## 463  518  529  433  473  508  489  449
```

59. 计算 ReportCard 中每名学生所有科目的平均分和总分

```
Av.Person = rowMeans(ReportCard[,3:10],na.rm = TRUE)
Sum.Person = rowSums(ReportCard[,3:10],na.rm = TRUE)
print(Av.Person)
```

```
## [1] 75.500 80.375 86.375 87.625 79.125 73.750
```

```
print(Sum.Person)
```

```
## [1] 604 643 691 701 633 590
```

60. 计算 ReportCard 中女生各科成绩的平均值

```
# 抽取女生的数据
FeMaleCard = subset(ReportCard,ReportCard$sex == "F")
# 求女生各科成绩的平均值
Des.FeMale = sapply(FeMaleCard[3:10],FUN = mean,na.rm = TRUE)
print(Des.FeMale)
```

```
##      poli      chi      math      fore      phy      che      geo      his
## 83.66667 84.66667 94.33333 73.33333 83.66667 91.33333 84.33333 83.00000
```

61. 分性别计算学生政治课考试成绩的基本描述

```
Des.Gender = tapply(ReportCardpoli,INDEX = ReportCardsex,FUN =
summary,na.rm = TRUE) print(Des.Gender)
```

62. 计算学生数学、物理、化学的简单相关矩阵

```
Tmp = ReportCard[complete.cases(ReportCard),]
CorMatrix = cor(Tmp[,c(5,7,8)],use = "everything",method = "pearson")
print(CorMatrix)
```

```
##          math          phy          che
## math  1.0000000 -0.4945242 -0.3900415
## phy  -0.4945242  1.0000000  0.5902493
## che  -0.3900415  0.5902493  1.0000000
```

63. 基于学生的数学、物理成绩的简单相关系数进行相关系数检验

```
Tmp = ReportCard[complete.cases(ReportCard),]
cor.test(Tmp[,5],Tmp[,7],alternative = "two.side",method = "pearson")
```

```
##
## Pearson's product-moment correlation
##
## data:  Tmp[, 5] and Tmp[, 7]
## t = -1.1379, df = 4, p-value = 0.3187
```

```
## alternative hypothesis: true correlation is not equal to 0
## 95 percent confidence interval:
## -0.9320283  0.5295750
## sample estimates:
##          cor
## -0.4945242
```

64. 在性别和平均成绩等级列联表的基础上，分析学生性别和平均成绩等级两个变量之间是否独立

```
CrossTable = table(ReportCard[,c(2,12)])
chisq.test(CrossTable)
```

```
## Warning in chisq.test(CrossTable): Chi-squared approximation may be incorrect

##
## Pearson's Chi-squared test with Yates' continuity correction
##
## data:  CrossTable
## X-squared = 2.6667, df = 1, p-value = 0.1025
```

## 1.5 第五部分：R 的数据可视化

参考配套知识点的第五章，想了解更全面的知识点，可以看这【R 语言知识点详细总结】中的第五章 R 的数据可视化；

65. 读取 ForestData.txt 文件到 Forest 数据框

```
Forest = read.table(file='ForestData.txt', header = TRUE, sep = "")
print(head(Forest))
```

```
##   X Y month day temp RH wind rain area
## 1 1 2   aug fri 14.7 66  2.7   0   0
## 2 1 2   aug fri 18.5 73  8.5   0   0
```

```
## 3 1 2   aug fri 25.9 41  3.6    0    0
## 4 1 2   aug sat 25.9 32  3.1    0    0
## 5 1 2   aug sun 19.5 39  6.3    0    0
## 6 1 2   aug sun 17.9 44  2.2    0    0
```

66. 对 Forest 中的 temp 字段值绘制茎叶图

```
stem(Forest$temp)
```

```
##
## The decimal point is 1 digit(s) to the right of the |
##
##  1 |
##  1 | 555888999
##  2 | 000
##  2 | 666666
```

67. 对 Forest 中的 temp 和 month 字段，绘制各月温度的箱线图

```
Forest$month = factor(Forest$month, levels = c("jan", "feb", "mar", "apr", "may", "jun", "jul", "aug", "sep", "oct", "nov", "dec"))
boxplot(temp~month, data = Forest, main = "森林地区各月温度箱线图")
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbsToSbcs': dot substituted
## for <e6>
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbsToSbcs': dot substituted
## for <a3>
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbsToSbcs': dot substituted
## for <ae>
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e6>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <9e>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <97>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e5>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <9c>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <b0>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e5>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <8c>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <ba>
```



```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <e5>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <90>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <84>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <e6>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <9c>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <88>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <e6>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <b8>

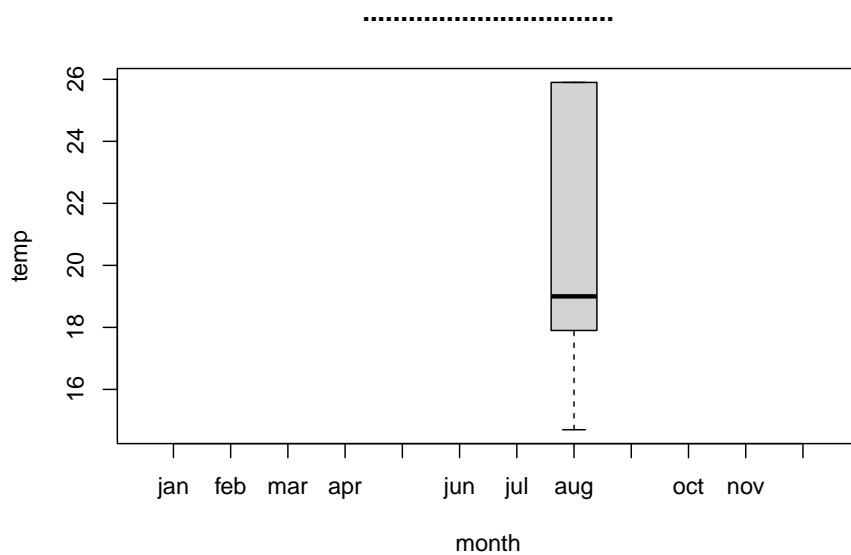
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbc': dot substituted
## for <a9>
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e5>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <ba>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <a6>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e7>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <ae>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <b1>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <e7>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <ba>  
  
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :  
## conversion failure on '森林地区各月温度箱线图' in 'mbcToSbcs': dot substituted  
## for <bf>
```

```
## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbscsToSbcs': dot substituted
## for <e5>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbscsToSbcs': dot substituted
## for <9b>

## Warning in (function (main = NULL, sub = NULL, xlab = NULL, ylab = NULL, :
## conversion failure on '森林地区各月温度箱线图' in 'mbscsToSbcs': dot substituted
## for <be>
```



68. 对 Forest 中的 temp 字段，绘制森林地区温度直方图

```
hist(Forest$temp,xlab = " 森林地区温度",ylab = " 频率",main = " 森林地区温度直方图",cex.l
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for
## <e6>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <a3>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <ae>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <9e>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <97>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <9c>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <b0>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e5>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <8c>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <b8>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <a9>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <a6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbcToSbc': dot substituted for  
## <e7>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <9b>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <b4>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <e6>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <96>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <b9>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <e5>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <9b>
```

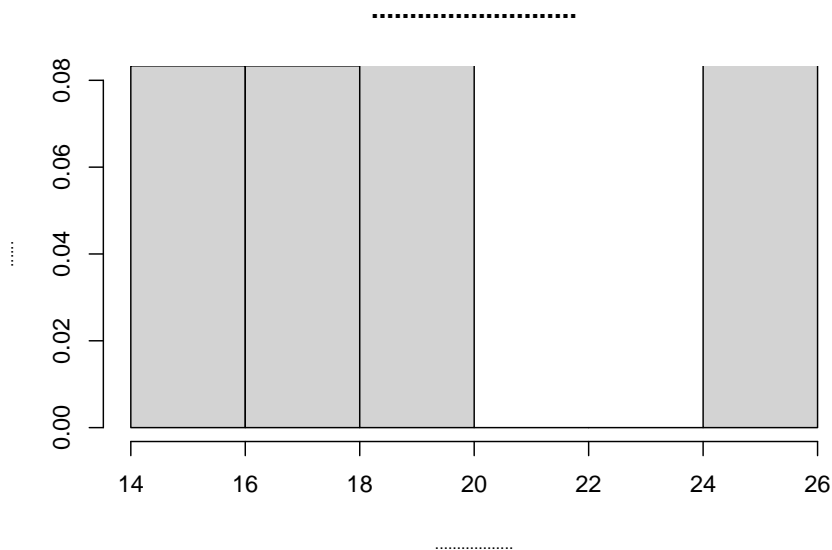
```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度直方图' in 'mbscsToSbcs': dot substituted for  
## <be>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbscsToSbcs': dot substituted for <e6>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <a3>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <ae>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <e6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <9e>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <97>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <9c>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <b0>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <8c>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <e6>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <b8>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <a9>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '森林地区温度' in 'mbcToSbc': dot substituted for <a6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <e9>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <a2>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <91>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <e7>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <8e>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '频率' in 'mbcToSbc': dot substituted for <87>
```





69. 对 ReportCard 中平均成绩等级 (ABCDE) 和人数绘制条形图

```
NumGrade = tapply(ReportCard$avScore, INDEX = ReportCard$avScore, FUN = length)
barplot(NumGrade, xlab = " 平均分等级", ylab = " 人数", ylim = c(0,25))
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <e5>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <b9>
```

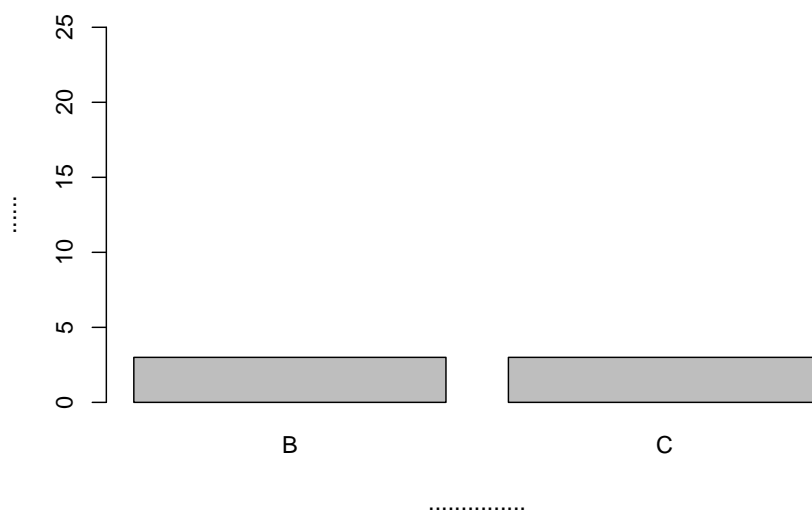
```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <b3>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <e5>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <9d>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <87>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <88>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <86>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <e7>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <ad>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <89>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <e7>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '平均分等级' in 'mbsToSbcs': dot substituted for <a7>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <e4>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <e6>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <95>  
  
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):  
## conversion failure on '人数' in 'mbsToSbcs': dot substituted for <b0>
```



70. 对 ReportCard 中平均成绩等级 (ABCDE) 和人数绘制饼图

```
Pct = round(NumGrade/length(ReportCard$avScore)*100,2)
GLabs = paste(c("B","C","D","E"),Pct,"%",sep = "")
pie(NumGrade,labels = GLabs,cex = 0.8,main = " 平均分等级饼图",cex.main = 0.8)

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e5>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <b9>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <b3>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e5>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <9d>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <87>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e5>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <88>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <86>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e7>
```

```
## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <ad>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <89>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e7>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <ba>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <a7>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e9>

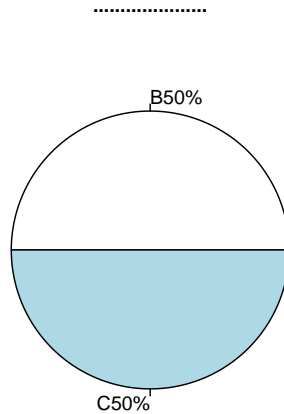
## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <a5>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <bc>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <e5>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <9b>

## Warning in title(main = main, ...): conversion failure on '平均分等级饼图' in
## 'mbscsToSbcs': dot substituted for <be>
```



71. 对 Forest 中温度 temp 和湿度 RH 两个字段，以 temp 为 x 轴以 RH 为 y 轴绘制散点图

```
plot(Forest$temp,Forest$RH,main = " 森林地区温度和相对湿度的散点图",xlab = " 温度",ylab =
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <a3>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <ae>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <9e>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <97>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <9c>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b0>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <8c>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b8>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <a9>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <ba>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <a6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <92>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <8c>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e7>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <9b>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b8>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <af>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b9>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b9>
```



```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <bf>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <a6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e7>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <9a>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <84>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <95>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <a3>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e7>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <82>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b9>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <9b>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <be>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <e6>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <b8>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <a9>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <e5>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <ba>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <a6>  
  
## Warning in title(...): conversion failure on '相对湿度' in 'mbsToSbcs': dot  
## substituted for <e7>  
  
## Warning in title(...): conversion failure on '相对湿度' in 'mbsToSbcs': dot  
## substituted for <9b>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <b8>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <e5>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <af>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <b9>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <e6>
```

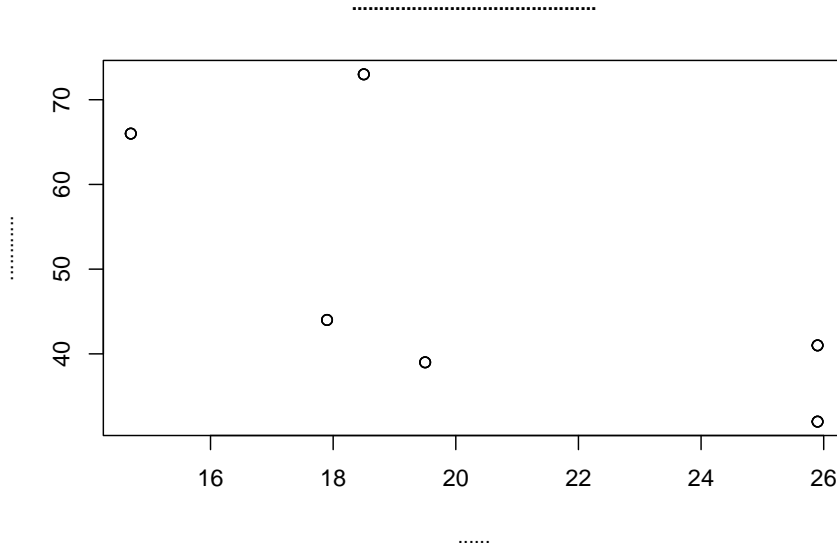
```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <b9>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <bf>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <e5>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <ba>
```

```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcstosbcs': dot
## substituted for <a6>
```



72. 对于 Forest 森林数据，温度和相对湿度的简单散点图，以及添加方法求解回归线的散点图

```
plot(Forest$temp,Forest$RH,main = " 森林地区温度和相对湿度的散点图",xlab = " 温度",ylab =
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <a3>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <ae>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'
## in 'mbscsToSbcs': dot substituted for <9e>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <97>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <9c>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b0>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <8c>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b8>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <a9>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <ba>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <a6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e5>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <92>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <8c>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e7>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <9b>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b8>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e5>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <af>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b9>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <b9>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <bf>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <ba>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <a6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e7>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <9a>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <84>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e6>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <95>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <a3>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <e7>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbcToSbc': dot substituted for <82>
```

```
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <b9>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <9b>  
  
## Warning in title(...): conversion failure on '森林地区温度和相对湿度的散点图'  
## in 'mbsToSbcs': dot substituted for <be>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <e6>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <b8>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <a9>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <e5>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <ba>  
  
## Warning in title(...): conversion failure on '温度' in 'mbsToSbcs': dot  
## substituted for <a6>  
  
## Warning in title(...): conversion failure on '相对湿度' in 'mbsToSbcs': dot  
## substituted for <e7>  
  
## Warning in title(...): conversion failure on '相对湿度' in 'mbsToSbcs': dot  
## substituted for <9b>
```



```
## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <b8>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <e5>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <af>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <b9>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <e6>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <b9>

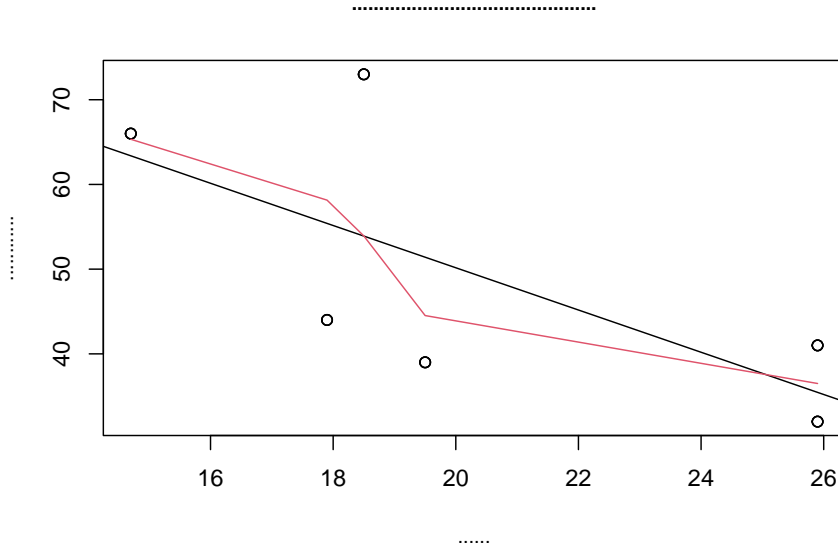
## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <bf>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <e5>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <ba>

## Warning in title(...): conversion failure on '相对湿度' in 'mbcToSbc': dot
## substituted for <a6>
```

```
M0 = lm(RH~temp,data = Forest)
abline(M0$coefficients)
M.Loess = loess(RH~temp,data = Forest)
Ord = order(Forest$temp)
lines(Forest$temp[Ord],M.Loess$fitted[Ord],lwd = 1,lty = 1,col = 2)
```



73. 对 Forest 森林数据，绘制温度和相对湿度以及风力的三维散点图

```
#install.packages("scatterplot3d")
library("scatterplot3d")
with(Forest,scatterplot3d(temp,RH,wind,main=" 森林地区温度、相对湿度和风力的三维散点图",xl

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstoSbcs': dot substituted for
## <e6>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstoSbcs': dot substituted for
## <a3>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstoSbcs': dot substituted for
## <ae>

## Warning in title(main, sub, ...): conversion failure on
```

```
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e6>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <9e>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <97>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e5>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <9c>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <b0>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e5>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <8c>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <ba>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e6>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <b8>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <a9>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e5>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <ba>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <a6>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <e3>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <80>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbcstosbcs': dot substituted for
## <81>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e7>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <9b>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b8>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e5>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <af>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b9>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e6>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b9>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <bf>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e5>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <ba>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <a6>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e5>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <92>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <8c>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e9>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <a3>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <8e>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e5>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <8a>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <9b>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e7>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <9a>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <84>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e4>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b8>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <89>
```

```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e7>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <bb>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b4>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e6>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <95>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <a3>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <e7>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <82>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbs': dot substituted for
## <b9>
```



```
## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbcs': dot substituted for
## <e5>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbcs': dot substituted for
## <9b>

## Warning in title(main, sub, ...): conversion failure on
## '森林地区温度、相对湿度和风力的三维散点图' in 'mbsToSbcs': dot substituted for
## <be>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <e6>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <b8>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <a9>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <e5>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <ba>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '温度' in 'mbsToSbcs': dot substituted for <a6>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <e7>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <9b>
```

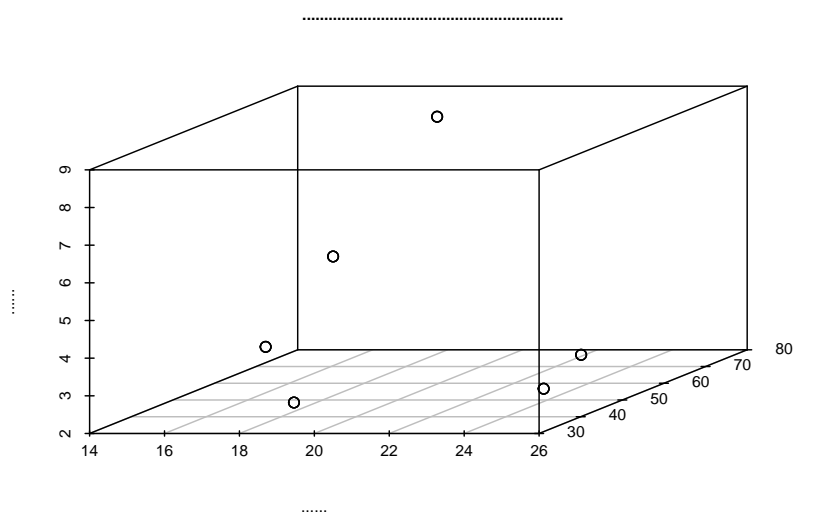
```
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <b8>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <af>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <b9>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <e6>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <b9>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <bf>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <e5>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <ba>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '相对湿度' in 'mbsToSbcs': dot substituted for <a6>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <e9>  
  
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :  
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <a3>
```

```
## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <8e>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <e5>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <8a>

## Warning in mtext(lab, side = side, line = line, at = at, col = col.lab, :
## conversion failure on '风力' in 'mbsToSbcs': dot substituted for <9b>
```



74. 对 ReportCard 数据，绘制学生各门课程考试成绩的相关系数图 (install.packages("corrgram") library("corrgram") corrgram(ReportCard[,3:10],lower.panel=panel.shade,upper.panel=panel.cor))

## 1.6 第六部分：R 的统计分析

参考配套知识点的第六章，想了解更全面的知识点，可以看这【R 语言知识点详细总结】中的第六章 R 的统计分析；

75. 下表给出了 28 位学生某门课程的成绩数据，问 80 分是否可以作为学生成绩的 3/4 分位数？显著性水平  $=0.01$

### 采用非参数检验中的符号检验

```
x <- c(95,89,68,90,88,60,81,67,60,60,60,63,60,92,60,88,88,87,60,73,60,97,91,60,83,87,8
binom.test(min(sum(x>80),sum(x<80)),sum(x!=80), 0.75)
```

```
##
## Exact binomial test
##
## data:  min(sum(x > 80), sum(x < 80)) and sum(x != 80)
## number of successes = 13, number of trials = 28, p-value = 0.001436
## alternative hypothesis: true probability of success is not equal to 0.75
## 95 percent confidence interval:
##  0.2751086 0.6613009
## sample estimates:
## probability of success
##                0.4642857
```

76. 某网站收集了 19 家大型公司 CEO 邮箱里每天收到的垃圾邮件件数，得到如下数据（单位：封），问：垃圾邮件数量的中心位置是否超过了 320 封？

310 350 370 377 389 400 415 425 440 295 325 296 250 340 298 365 375 360  
385

### 采用 Wilcoxon 符号秩检验

```
spamail <- c(310,350,370,377,380,400,415,425,440,295,325,296,250,340,298,365,375,360,38
wilcox.test(spamail,320,alt='great',conf.int=TRUE)
```

```
##
## Wilcoxon rank sum exact test
##
## data:  spamail and 320
## W = 14, p-value = 0.3
```

```
## alternative hypothesis: true location shift is greater than 0
## 95 percent confidence interval:
## -70 Inf
## sample estimates:
## difference in location
##                45
```

77. 今测得 10 名非铅作业工人和 7 名铅作业工人的血铅值如下表所示，试用 Wilcoxon 秩和检验分析两组工人血铅值有无差异。

```
### Wilcoxon 秩和检验
x <- c(24,26,29,34,43,58,63,72,87,101)
y <- c(82,87,97,121,164,208,213)
### 不采用连续性修正
wilcox.test(x,y,alternative="less",exact=FALSE,correct=FALSE)
```

```
##
## Wilcoxon rank sum test
##
## data: x and y
## W = 4.5, p-value = 0.001449
## alternative hypothesis: true location shift is less than 0
```

78. 为研究血型与肝病之间的关系，调查 295 名肝病患者及 638 名非肝病患者（对照组）不同血型的得病情况，如下表所示，问血型与肝病之间是否存在关联？

```
### 卡方独立性检验
x <- c(98,67,13,18,38,41,8,12,289,262,57,30)
dim(x)<- c(4,3)
chisq.test(x)
```

```
##
## Pearson's Chi-squared test
```

```
##  
## data:  x  
## X-squared = 15.073, df = 6, p-value = 0.01969
```

79. 为了解某种药物的治疗效果，采集药物 A 与 B 的疗效数据整理成二维列联表如下，检验药物与疗效的独立性。

```
### Fisher 精确性检验  
medicine<-matrix(c(8,7,2,23),2,2)  
fisher.test(medicine)
```

```
##  
## Fisher's Exact Test for Count Data  
##  
## data:  medicine  
## p-value = 0.002429  
## alternative hypothesis: true odds ratio is not equal to 1  
## 95 percent confidence interval:  
##  1.856547 143.340082  
## sample estimates:  
## odds ratio  
##  12.12648
```

```
fisher.test(matrix(c(8,7,2,23),2,2))
```

```
##  
## Fisher's Exact Test for Count Data  
##  
## data:  matrix(c(8, 7, 2, 23), 2, 2)  
## p-value = 0.002429  
## alternative hypothesis: true odds ratio is not equal to 1  
## 95 percent confidence interval:  
##  1.856547 143.340082  
## sample estimates:
```

```
## odds ratio
## 12.12648
```

80. 为研究 4 种不同药物对儿童咳嗽的治疗效果，将 25 个体质相似的病人随机分为 4 组，分别采用 A、B、C、D 4 种药物进行治疗，5 天后测量每个病人每天的咳嗽次数如下表所示，试比较这 4 种药物的治疗效果是否相同？

```
### 多组数据位置推断—Kruskal-wallis 检验
```

```
drug <- c(80,203,236,252,284,368,457,393,133,180,100,160,156,295,320,448,465,481,279,19)
gr.drug<-c(1,1,1,1,1,1,1,1,2,2,2,2,3,3,3,3,3,3,3,4,4,4,4,4,4)
kruskal.test(drug,gr.drug)
```

```
##
## Kruskal-Wallis rank sum test
##
## data: drug and gr.drug
## Kruskal-Wallis chi-squared = 8.0721, df = 3, p-value = 0.04455
```

81. 设有来自 A,B,C,D4 个地区的四名厨师制作京城水煮鱼，为了比较他们的品质是否相同，经四位美食评委评分结果如下表所示，试测试 4 个地区制作的水煮鱼这道菜的品质有无区别。

### 1.6.1 多组数据位置推断—Friedman 检验

```
beijingfish <- c(85,82,82,79,87,75,86,82,90,81,80,76,80,75,81,75) treat.BF <-
c(1,2,3,4,1,2,3,4,1,2,3,4,1,2,3,4) block.BF <- c(1,1,1,1,2,2,2,2,3,3,3,3,4,4,4,4)
friedman.test(beijingfish,treat.BF,block.BF)
```

82. 现收集了某大学部分学生一年级英语期末成绩，与其高考英语成绩进行比较，调查 12 位学生的结果如下表，试检验学生中学的学习成绩与大学学习成绩有相关关系。

```
x <- c(65,79,67,66,89,85,84,73,88,80,86,75)
y <- c(62,66,50,68,88,86,64,62,92,64,81,80)
cor.test(x,y) #pearson 相关性检验
```

```
##  
## Pearson's product-moment correlation  
##  
## data: x and y  
## t = 3.4403, df = 10, p-value = 0.006328  
## alternative hypothesis: true correlation is not equal to 0  
## 95 percent confidence interval:  
## 0.2811026 0.9209916  
## sample estimates:  
## cor  
## 0.7362315
```

```
cor.test(x,y,method='spearman') # spearman 相关系数
```

```
## Warning in cor.test.default(x, y, meth = "spearman"): Cannot compute exact  
## p-value with ties
```

```
##  
## Spearman's rank correlation rho  
##  
## data: x and y  
## S = 65.227, p-value = 0.003265  
## alternative hypothesis: true rho is not equal to 0  
## sample estimates:  
## rho  
## 0.7719346
```

```
cor.test(x,y,method='kendall') # kendall 相关系数
```

```
## Warning in cor.test.default(x, y, meth = "kendall"): Cannot compute exact  
## p-value with ties
```

```
##  
## Kendall's rank correlation tau
```

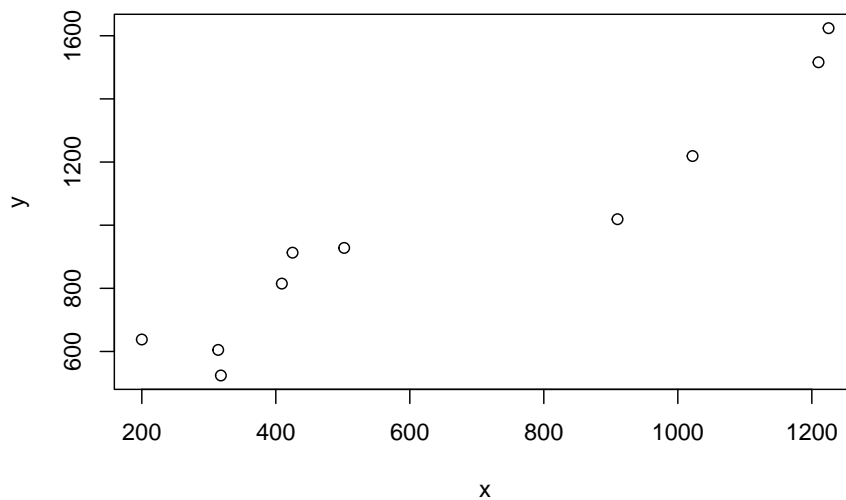


```
##  
## data: x and y  
## z = 2.6181, p-value = 0.008842  
## alternative hypothesis: true tau is not equal to 0  
## sample estimates:  
##      tau  
## 0.5846846
```

82. 给出两个向量 x 和 y 如下，做一元线性回归分析

x:318,910,200,409,425,502,314,1210,1022,1225 y:524,1019,638,815,913,928,605,1516,1219,1624

```
x<-c(318,910,200,409,425,502,314,1210,1022,1225)  
y<-c(524,1019,638,815,913,928,605,1516,1219,1624)  
plot(x,y)
```



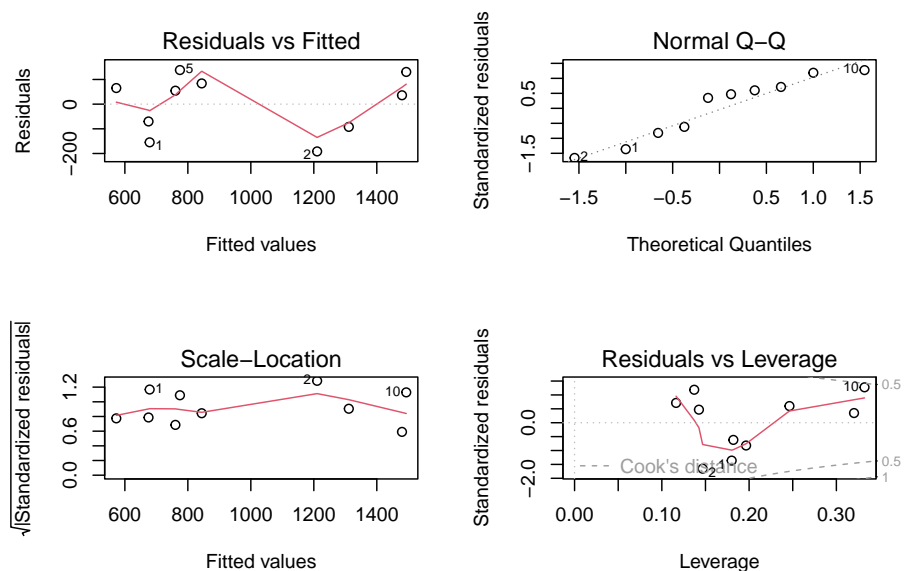
```
lm.reg<-lm(y~1+x)  
summary(lm.reg)
```

```
##
```

```
## Call:
## lm(formula = y ~ 1 + x)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -191.52  -86.63   45.26   79.32  138.17
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 393.0431    79.6510   4.935 0.00114 **
## x           0.8983     0.1057   8.498 2.82e-05 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 125.4 on 8 degrees of freedom
## Multiple R-squared:  0.9003, Adjusted R-squared:  0.8878
## F-statistic: 72.21 on 1 and 8 DF,  p-value: 2.821e-05
```

```
op=par(mfrow=c(2,2))
```

```
plot(lm.reg) # 产生四个图, 分别是: 1 residual vs fitted; 2 Normal QQ-plot; 3 scale-location
```



```
par(op)
### 求预测值和预测区间
point <- data.frame(x=425)
lm.pred <- predict(lm.reg,point,interval='prediction',level=0.95)
print(lm.pred)
```

```
##          fit          lwr          upr
## 1 774.8322 466.5557 1083.109
```

## 1.7 第七部分：随机考察题

83. 计算从 1 加到 100，至少采用 3 种不同的方法

# 从 1 加到 100 # 方法 1:for 循环

```
sum1=0
for(i in seq (from=1, to=100,by=1) ) sum1=sum1+i
print(sum1)
```

```
## [1] 5050
```

```
# 方法 2:repeat 循环
```

```
i=0
sum2=0
repeat{if(i>100) break else {sum2=sum2+i; i=i+1}}
print(sum2)
```

```
## [1] 5050
```

```
# 方法 3:while 循环
```

```
sum3=0
i=0
while(i<=100){ sum3=sum3+i; i=i+1}
print(sum3)
```

```
## [1] 5050
```

```
# 方法 4 : sum 函数
```

```
print(sum(c(1:100)))
```

```
## [1] 5050
```

84. 计算从 1 的平方加到 100 的平方，至少采用 3 种方法

```
# 从 1 的平方加到 100 的平方
# 方法 1:for 函数
sum4=0
for(i in seq (from=1, to=100, by=1) ) sum4=sum4+i^2
print(sum4)
```

```
## [1] 338350
```

```
# 方法 2:repeat 循环
i=0
sum5=0
repeat{if(i>100)break else { sum5=sum5+i^2; i=i+1}}
print(sum5)
```

```
## [1] 338350
```

```
# 方法 3:while 循环
sum6=0
i=0
while (i<=100){ sum6=sum6+i^2; i=i+1}
print(sum6)
```

```
## [1] 338350
```

```
# 方法 4: sum 函数
print(sum(c((1:100)^2)))
```

```
## [1] 338350
```

85. 创建 [1,100] 之间所有奇数组成的向量

```
t = seq(from=1, to=100, by=2) # 从 1 到 100, 间隔为 2, 输出数
print(t)
```

```
## [1] 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49
## [26] 51 53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99
```

86. 将长度为 200 的数值型向量 t 中第 5 个元素删除, 并在此位置中添加元素 11 和 21;

```
t = c(1:200)
t = t[-5] # 删除第 5 个元素
t = c(t[1:4], 11, 21, t[5:199]) # 在第五个元素的位置上, 添加 11,21 两个数
print(t)
```

```
## [1] 1 2 3 4 11 21 6 7 8 9 10 11 12 13 14 15 16 17
## [19] 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
## [37] 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
## [55] 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
## [73] 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89
## [91] 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107
## [109] 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125
## [127] 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143
## [145] 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161
## [163] 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179
## [181] 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197
## [199] 198 199 200
```

87. 将 1 到 24 构成的自然数序列构建为行数为 3、列数为 4、组数为 2 的数组并访问第二组数据:

```
y = c(1:24)
t = array(y, c(3,4,2)) # 访问第二组数据
print(t)
```

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

```
##
##      [,1] [,2] [,3] [,4]
## [1,]  13  16  19  22
## [2,]  14  17  20  23
## [3,]  15  18  21  24
```

88. 使用以下向量作为数据框的列，创建一个数据框。并访问 `temp` 这一列；

```
X = c(1,1,1)
Y = c(2,2,2)
temp = c(14.7,18.5,25.9)
RH = c(66,73,41)
data = data.frame(X,Y,temp,RH) # 定义数据框
print(data)
```

```
##   X Y temp RH
## 1 1 2 14.7 66
## 2 1 2 18.5 73
## 3 1 2 25.9 41
```

```
print(data[, 'temp'] ) # 访问 temp 列，或者也可以写成 data[,3]
```

```
## [1] 14.7 18.5 25.9
```

89. 设置随机种子，随机生成服从标准正态分布函数的 100 个数字；

```
set.seed(100)
y = rnorm(100,0,1)# 生成 100 个标准正态分布的 100 个数
print(y)
```

```
##   [1] -0.50219235  0.13153117 -0.07891709  0.88678481  0.11697127  0.31863009
##   [7] -0.58179068  0.71453271 -0.82525943 -0.35986213  0.08988614  0.09627446
##  [13] -0.20163395  0.73984050  0.12337950 -0.02931671 -0.38885425  0.51085626
##  [19] -0.91381419  2.31029682 -0.43808998  0.76406062  0.26196129  0.77340460
```

```
## [25] -0.81437912 -0.43845057 -0.72022155  0.23094453 -1.15772946  0.24707599
## [31] -0.09111356  1.75737562 -0.13792961 -0.11119350 -0.69001432 -0.22179423
## [37]  0.18290768  0.41732329  1.06540233  0.97020202 -0.10162924  1.40320349
## [43] -1.77677563  0.62286739 -0.52228335  1.32223096 -0.36344033  1.31906574
## [49]  0.04377907 -1.87865588 -0.44706218 -1.73859795  0.17886485  1.89746570
## [55] -2.27192549  0.98046414 -1.39882562  1.82487242  1.38129873 -0.83885188
## [61] -0.26199577 -0.06884403 -0.37888356  2.58195893  0.12983414 -0.71302498
## [67]  0.63799424  0.20169159 -0.06991695 -0.09248988  0.44890327 -1.06435567
## [73] -1.16241932  1.64852175 -2.06209602  0.01274972 -1.08752835  0.27053949
## [79]  1.00845187 -2.07440475  0.89682227 -0.04999577 -1.34534931 -1.93121153
## [85]  0.70958158 -0.15790503  0.21636787  0.81736208  1.72717575 -0.10377029
## [91] -0.55712229  1.42830143 -0.89295740 -1.15757124 -0.53029645  2.44568276
## [97] -0.83249580  0.41351985 -1.17868314 -1.17403476
```

```
hist(y,main = " 直方图")
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <e7>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <9b>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <b4>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <e6>
```

```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <96>
```

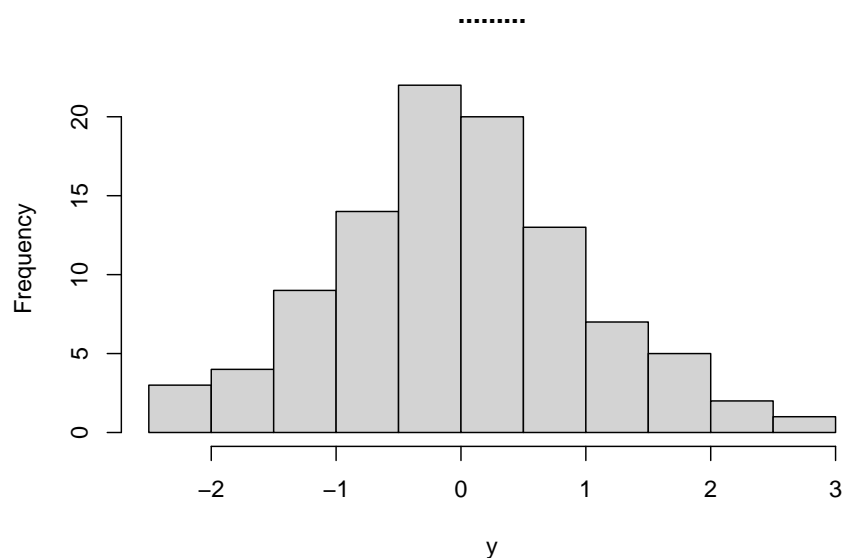
```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbcToSbcs': dot substituted for <b9>
```



```
## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbscsToSbcs': dot substituted for <e5>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbscsToSbcs': dot substituted for <9b>

## Warning in title(main = main, sub = sub, xlab = xlab, ylab = ylab, ...):
## conversion failure on '直方图' in 'mbscsToSbcs': dot substituted for <be>
```



90. 将  $y$  从小到大排序，然后用排好的值，做出其正态分布密度图；

```
y = sort(y) # 将 y 中的数值进行排序
print(y)
```

```
## [1] -2.27192549 -2.07440475 -2.06209602 -1.93121153 -1.87865588 -1.77677563
## [7] -1.73859795 -1.39882562 -1.34534931 -1.17868314 -1.17403476 -1.16241932
## [13] -1.15772946 -1.15757124 -1.08752835 -1.06435567 -0.91381419 -0.89295740
## [19] -0.83885188 -0.83249580 -0.82525943 -0.81437912 -0.72022155 -0.71302498
## [25] -0.69001432 -0.58179068 -0.55712229 -0.53029645 -0.52228335 -0.50219235
```

```
## [31] -0.44706218 -0.43845057 -0.43808998 -0.38885425 -0.37888356 -0.36344033
## [37] -0.35986213 -0.26199577 -0.22179423 -0.20163395 -0.15790503 -0.13792961
## [43] -0.11119350 -0.10377029 -0.10162924 -0.09248988 -0.09111356 -0.07891709
## [49] -0.06991695 -0.06884403 -0.04999577 -0.02931671 0.01274972 0.04377907
## [55] 0.08988614 0.09627446 0.11697127 0.12337950 0.12983414 0.13153117
## [61] 0.17886485 0.18290768 0.20169159 0.21636787 0.23094453 0.24707599
## [67] 0.26196129 0.27053949 0.31863009 0.41351985 0.41732329 0.44890327
## [73] 0.51085626 0.62286739 0.63799424 0.70958158 0.71453271 0.73984050
## [79] 0.76406062 0.77340460 0.81736208 0.88678481 0.89682227 0.97020202
## [85] 0.98046414 1.00845187 1.06540233 1.31906574 1.32223096 1.38129873
## [91] 1.40320349 1.42830143 1.64852175 1.72717575 1.75737562 1.82487242
## [97] 1.89746570 2.31029682 2.44568276 2.58195893
```

```
plot(y, dnorm(y, 0, 1), type="l", main=" 正态分布密度图") # 生成正态分布密度图
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <ad>
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <a3>
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <e6>
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <80>
```

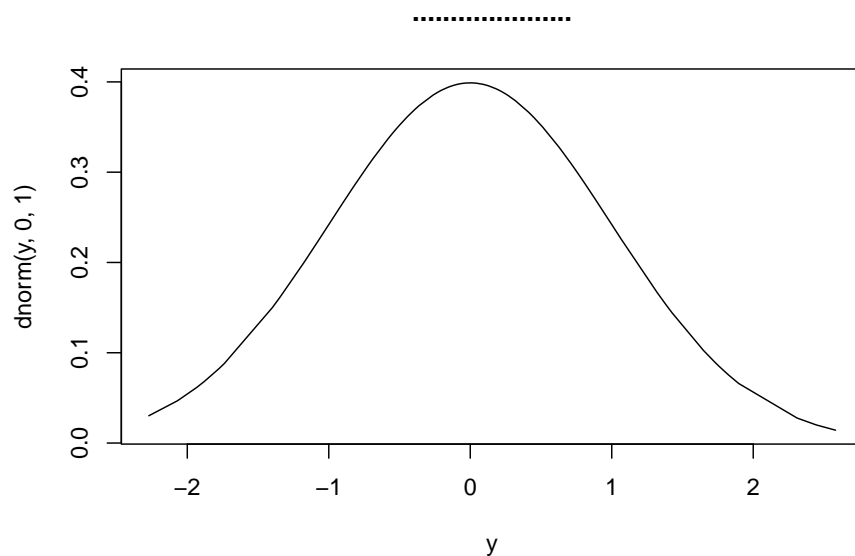
```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <81>
```

```
## Warning in title(...): conversion failure on ' 正态分布密度图' in 'mbcToSbc':
## dot substituted for <e5>
```

```
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <88>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <86>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <b8>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <83>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <af>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <86>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <e5>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <ba>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <a6>  
  
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbs':  
## dot substituted for <e5>
```

```
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbcs':
## dot substituted for <9b>
```

```
## Warning in title(...): conversion failure on '正态分布密度图' in 'mbsToSbcs':
## dot substituted for <be>
```



91. 请利用 R 代码编写一函数程序如下，并计算  $f(5)$

```
# 首先，定义一个 f 函数
f = function(n){
  sum = 0 # 定义一个 sum，存储总和
  for(i in 1:n) sum = sum + i^3 # 定义一个 for 循环，依次将 n 个数的立方求和
  return(sum) # 返回求和后的数
}
f(5) # 当 n 为 5 时，调用 f 函数，结果为 225
```

```
## [1] 225
```

92. 用 R 来计算以下公式，并保留两位小数；

```
round(abs(exp(1)-exp(2))^(1/3),2)
```

```
## [1] 1.67
```

93. 求向量  $x=c(3:95)$  的均值、中位数、标准差、方差、最大值、最小值、向量长度以及向量的各个元素的和；

```
x=c(3:95)  
mean(x)
```

```
## [1] 49
```

```
median(x)
```

```
## [1] 49
```

```
sd(x)
```

```
## [1] 26.99074
```

```
var(x)
```

```
## [1] 728.5
```

```
max(x)
```

```
## [1] 95
```

```
min(x)
```

```
## [1] 3
```

```
length(x)
```

```
## [1] 93
```

```
sum(x)
```

```
## [1] 4557
```

94. 将 ReportCard1.txt 和 ReportCard2.txt 这两个文件读取并保存在 Reportcard1 和 Reportcard2 两个变量中；使用 merge 函数以 “xh” 为关键字，将两个文件合并，并保存到 Reportcard 变量中。

```
Reportcard1 = read.table("ReportCard1.txt",header=T)
Reportcard2 = read.table("ReportCard2.txt",header=T)
Reportcard = merge(Reportcard1,Reportcard2,by='xh')
print(head(Reportcard))
```

```
##   xh sex poli chi math fore phy che geo his
## 1  1   1   84  85   95   69  54  75  85  57
## 2  2   2   84  85   95   69  84  95  65  66
## 3  3   2   81  85   93   67  81  95  93  96
## 4  4   2   86  84   95   84  86  84  95  87
## 5  5   1   76  85   95   66  76  65  95  75
## 6  6   1   52  94   56   78  92  94  56  68
```

95. 将 Reportcard 中的缺失值删除

```
Reportcard = na.omit(ReportCard)
print(head(Reportcard))
```

```
##   xh sex poli chi math fore phy che geo his sumScore avScore
## 1  1   M   84  85   95   69  54  75  85  57         604         C
## 2  2   F   84  85   95   69  84  95  65  66         643         B
```

```
## 3 3 F 81 85 93 67 81 95 93 96 691 B
## 4 4 F 86 84 95 84 86 84 95 87 701 B
## 5 5 M 76 85 95 66 76 65 95 75 633 C
## 6 6 M 52 94 56 78 92 94 56 68 590 C
```

96. 将 Reportcard 中的性别重新编码，将其中的 1 用 M 替代，2 由 F 替代

```
Reportcard$sex = factor(Reportcard$sex, levels=c(1,2),labels=c("M","F"))
Reportcard$sex
```

```
## [1] <NA> <NA> <NA> <NA> <NA> <NA>
## Levels: M F
```

97. 在数据框 Reportcard 中计算每条学生的总成绩和平均成绩。其中总成绩用变量 (SumScore)，平均成绩用 (AvScore)

```
SumScore = rowSums(Reportcard[, 3:10], na.rm=TRUE)
Reportcard$SumScore = SumScore
AvScore = rowMeans(Reportcard[, 3:10], na.rm=TRUE)
Reportcard$AvScore = AvScore
print(head(Reportcard))
```

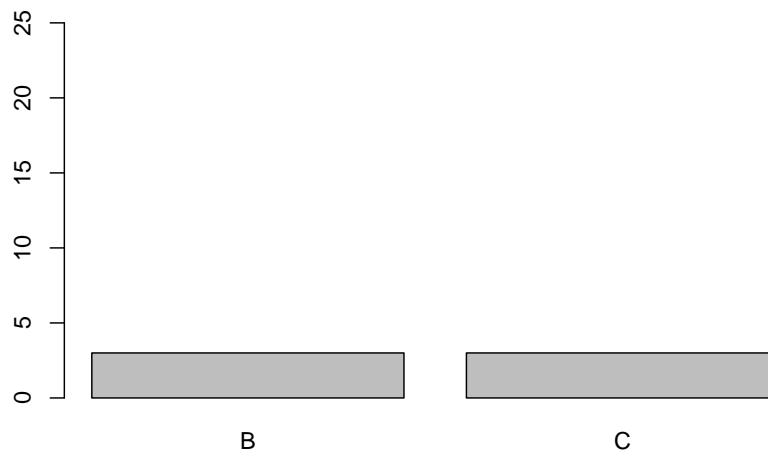
```
##   xh  sex poli chi math fore phy che geo his sumScore avScore SumScore AvScore
## 1  1 <NA>  84  85  95  69  54  75  85  57      604      C      604  75.500
## 2  2 <NA>  84  85  95  69  84  95  65  66      643      B      643  80.375
## 3  3 <NA>  81  85  93  67  81  95  93  96      691      B      691  86.375
## 4  4 <NA>  86  84  95  84  86  84  95  87      701      B      701  87.625
## 5  5 <NA>  76  85  95  66  76  65  95  75      633      C      633  79.125
## 6  6 <NA>  52  94  56  78  92  94  56  68      590      C      590  73.750
```

98. 以 AvScore 为标准将成绩划分称等级 (A, B, C, D, E)，并将重新编码的变量存储 avscore 变量中，然后用柱状图查看该班学生成绩等级的分布情况，其中 (大于等于 90 分为 A，大于等于 80 并小于 90 分为 B，大于等于 70 分并小于 80 分为 C，大于等于 60 分并小于 70 分为 D，小于 60 分为 E)

```
Reportcard = within(Reportcard,{  
  AvScore[AvScore>=90] = 'A'  
  AvScore[AvScore>=80 & AvScore<90] = 'B'  
  AvScore[AvScore>=70 & AvScore<80] = 'C'  
  AvScore[AvScore>=60 & AvScore<70] = 'D'  
  AvScore[AvScore<60] = 'E'  
})  
avScore = Reportcard[,12] # 将重新编码的数据保存到 avScore 中  
print(avScore)
```

```
## [1] "C" "B" "B" "B" "C" "C"
```

```
n=table(Reportcard$AvScore)  
barplot(n,ylim=c(0,25)) # 生成柱状图
```



99. 以 1:6 按照列的顺序生成 2 行 3 列的数据，并计算每行每列的最大最小值



```

data = matrix(c(1,2,3,4,5,6), nrow=2)
row_max = c()
row_min = c()
col_max = c()
col_min = c()
for(i in 1:nrow(data))
{
  row_max = c(row_max, max(data[i,]))
  row_min = c(row_min, min(data[i,]))
}
data = cbind(data, row_max, row_min)

for(j in 1:ncol(data))
{
  col_max = c(col_max, max(data[,j]))
  col_min = c(col_min, min(data[,j]))
}
data = rbind(data, col_max, col_min)
print(data)

```

```

##           row_max row_min
##      1 3 5         5      1
##      2 4 6         6      2
## col_max 2 4 6         6      2
## col_min 1 3 5         5      1

```

100. 用 R 爬取 58 同城石家庄在售新房首页

```

#install.packages("rvest")
library(rvest) # 包含爬虫函数的包
## 读取网页，获取石家庄在售新房
page_text <- read_html("https://sjz.58.com/xinfang/") # 加载第一页的数据
# 获取小区名称

```

```
estate_name <- page_text %>% html_nodes("span.items-name") %>% html_text()
# 获取小区所在位置
length(estate_name)
```

```
## [1] 60
```

```
estate_detail_address <- page_text %>% html_nodes("span.list-map") %>% html_text() # 详细地址
estate_brief_address <- substr(estate_detail_address,3,4) # 所在县区
print(length(estate_brief_address))
```

```
## [1] 60
```

```
# 均价
estate_price <- page_text %>% html_nodes("p.price") %>% html_nodes("span") %>% html_text()
print(length(estate_price))
```

```
## [1] 60
```

```
# 处理数据：翰林观天下售价显示的是周边均价（保留）
estate_price <- c(estate_price[1:16], "15990", estate_price[17:59])
# 将爬取到的数据存入数据框中
estate <- data.frame(name=estate_name,address=estate_brief_address,price=estate_price)
# 只输出前几行
print(head(estate))
```

```
##           name address price
## 1      幸福城     桥西 10500
## 2      鑫界9号院     桥西 13000
## 3 新兴花语原乡(新兴城) 鹿泉   8000
## 4      绿城诚园     新华 12500
## 5      盛紫中央公园     栾城 11000
## 6      同泰园     裕华 13000
```

```
estate
```

```
##           name address price
## 1         幸福城   桥西 10500
## 2         鑫界9号院   桥西 13000
## 3 新兴花语原乡(新兴城) 鹿泉  8000
## 4         绿城诚园   新华 12500
## 5         盛紫中央公园 栾城 11000
## 6         同泰园     裕华 13000
## 7         长安润江壹号 长安 16500
## 8         裕馨书院   裕华 15600
## 9         花海十二城   长安  8600
## 10        晶彩中心   裕华  8800
## 11        铂官后海   长安 16000
## 12        汀香郡     长安 12500
## 13        秀水名邸   鹿泉 10000
## 14        中冶德贤御府 桥西 16500
## 15        碧桂园凤凰城 元氏  6000
## 16        福熙郡     鹿泉 10500
## 17        华普城     桥西 15990
## 18        保利·阅云台   桥西  8800
## 19 石家庄 | 众人·翡丽湾 元氏 16000
## 20        龙溪城     长安  5400
## 21        润江新华壹号院 新华 11300
## 22        天润福庭   藁城 21500
## 23        宝晟蓝庭   鹿泉  9800
## 24        金悦花园   鹿泉  8600
## 25        熙悦园     新华  7000
## 26        三盛·璞悦长安 长安 15500
## 27        云杉溪谷   鹿泉 11000
## 28        万科翡翠书院 长安 16000
## 29        海龙湾     鹿泉 16500
## 30        东南智汇城   裕华 10000
```

## 31	恒新苑	桥西	23800
## 32	顺通紫辰院	新华	12000
## 33	中冶德贤华府	新华	21000
## 34	林荫商务广场	新华	19200
## 35	保利·天汇	桥西	12000
## 36	万科翡翠四季	裕华	22000
## 37	万科紫院	裕华	15000
## 38	国赫天著	长安	20000
## 39	壹品观湖·雅苑	鹿泉	20000
## 40	和西苑	新华	6980
## 41	保利珑堂里院	元氏	21500
## 42	巨科合园	新华	118
## 43	万科正定文化村	正定	17000
## 44	领南未来	栾城	12500
## 45	大尚盛世华府	鹿泉	8200
## 46	天地锦绣华庭	栾城	11000
## 47	檀香篱园	鹿泉	7300
## 48	茂润海棠苑	鹿泉	9000
## 49	东创悦城	藁城	11000
## 50	桂语澜庭	裕华	8500
## 51	碧桂园星荟	鹿泉	22000
## 52	望公府	桥西	7300
## 53	万科新都会·新街坊	藁城	1690
## 54	地铁·万科蓝湾	长安	14000
## 55	奥冠奥北公元	长安	15000
## 56	汇君城	新华	17000
## 57	启航小镇	鹿泉	16700
## 58	万合名著	鹿泉	11000
## 59	旭东广场	鹿泉	11000
## 60	金悦中心	鹿泉	5800

```
#subse(estate,estate$address=" 运河 ")
```