

课后作业四

1. `user.txt` 数据中有一些同学的性别、年龄、身高等数据：

- 读取数据，按性别分别计算平均身高，平均年龄

```
1 user <- read.table('user.txt', header = T)
2 user
3 cat('Female average age is', mean(user[which(user$Sex=='F'),]$Age), '\n')
4 cat('Female average height is', mean(user[which(user$Sex=='F'),]$Height),
5     '\n')
6 cat('Male average age is', mean(user[which(user$Sex=='M'),]$Age), '\n')
7 cat('Male average height is', mean(user[which(user$Sex=='M'),]$Height), '\n')
```

A data.frame: 19 × 4

Name	Sex	Age	Height
<chr>	<chr>	<int>	<dbl>
Alice	F	13	56.5
Becka	F	13	65.3
Gail	F	14	64.3
Karen	F	12	56.3
Kathy	F	12	59.8
Mary	F	15	66.5
Sandy	F	11	51.3
Sharon	F	15	62.5
Tammy	F	14	62.8
Alfred	M	14	69.0
Duke	M	14	63.5
Guido	M	15	67.0
James	M	12	57.3
Jeffrey	M	13	62.5
John	M	12	59.0
Philip	M	16	72.0
Robert	M	12	64.8
Thomas	M	11	57.5
William	M	15	66.5

```

1 Female average age is 13.22222
2 Female average height is 60.58889
3 Male average age is 13.4
4 Male average height is 63.91

```

- 转换成列表，并利用 `sapply` 函数计算平均年龄和身高

```

1 user <- read.table('user.txt', header = T)
2 data <- as.list(user[,3:4])
3 data
4 sapply(data, mean)

```

\$Age

13 · 13 · 14 · 12 · 12 · 15 · 11 · 15 · 14 · 14 · 14 · 15 · 12 · 13 · 12 · 16 · 12 · 11 · 15

\$Height

56.5 · 65.3 · 64.3 · 56.3 · 59.8 · 66.5 · 51.3 · 62.5 · 62.8 · 69 · 63.5 · 67 · 57.3 · 62.5 · 59 · 72 ·
64.8 · 57.5 · 66.5

Age: 13.3157894736842 Height: 62.3368421052632

- 按照身高分为两个等级 A, B, 并对其姓名进行排序

```

1 user <- read.table('user.txt', header = T)
2 A <- user[which(user$Height >= 60.0),]
3 A[order(A[,1]),]
4 B <- user[which(user$Height < 60.0),]
5 B[order(B[,1]),]

```

A data.frame: 12 × 4

	Name	Sex	Age	Height
	<chr>	<chr>	<int>	<dbl>
10	Alfred	M	14	69.0
2	Becka	F	13	65.3
11	Duke	M	14	63.5
3	Gail	F	14	64.3
12	Guido	M	15	67.0
14	Jeffrey	M	13	62.5
6	Mary	F	15	66.5
16	Philip	M	16	72.0
17	Robert	M	12	64.8
8	Sharon	F	15	62.5
9	Tammy	F	14	62.8
19	William	M	15	66.5

A data.frame: 7 × 4

	Name	Sex	Age	Height
	<chr>	<chr>	<int>	<dbl>
1	Alice	F	13	56.5
13	James	M	12	57.3
15	John	M	12	59.0
4	Karen	F	12	56.3
5	Kathy	F	12	59.8
7	Sandy	F	11	51.3
18	Thomas	M	11	57.5

2. 编写一个函数，提取输入矩阵的奇数行和偶数列构成的子矩阵

```
1 myMatrix <- function(matrix0){
2   a <- c()
3   for (i in 1:ncol(matrix0)) {
4     if (i %% 2 == 0) {
5       for (j in 1:nrow(matrix0)) {
6         if (j %% 2 == 1) {
7           a <- c(a, matrix0[j,i])
8         }
9       }
10    }
11  }
12  matrix1 <- matrix(a,nrow = floor(nrow(matrix0) / 2))
13  return (matrix1)
14 }
15 b <- matrix(c(1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16), nrow = 4)
16 b
17 b <- myMatrix(b)
18 b
```

A matrix: 4 × 4 of type dbl

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

A matrix: 2 × 2 of type dbl

5	13
7	15

3. π 的估计:

考虑服从 $(0, 1)$ 区间上均匀分布的独立随机变量 X, Y 因此, 二维随机变量 (X, Y) 的联合概率密度为

$$f(x, y) = \begin{cases} 1, & 0 < x < 1, 0 < y < 1 \\ 0, & otherwise \end{cases}$$

则 $P\{X^2 + Y^2 \leq 1\} = \frac{\pi}{4}$

提示: 产生均匀分布随机变量 `runif()`

```
1 x <- runif(10000, min = 0, max = 1)
2 y <- runif(10000, min = 0, max = 1)
3 result <- x ^ 2 + y ^ 2 <= 1
4 oneFourthPi <- length(result[which(result == TRUE)]) / 10000
5 print(oneFourthPi * 4)
```

```
1 [1] 3.1416
```

4. R 语言编程错误分析

- 函数的参数输入顺序错误, 输入的数量错误
 - 根据错误信息修改参数或查看帮助文档
- 调用函数时没有使用 `()`
- 使用包前没有加载(`library`)
- 引号使用不当