Лабораторная работа №3 «Знакомство с языком R и средой R-Studio».
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Основы: синтаксис

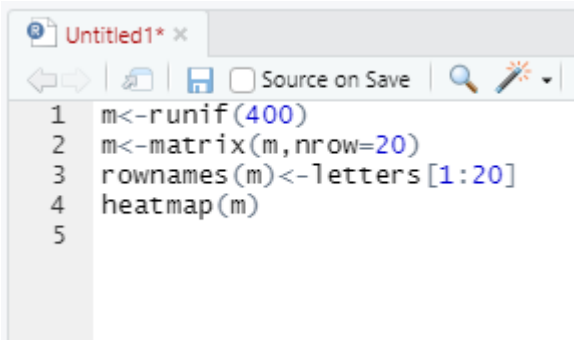
```
>
>
> "Hello R!"
[1] "Hello R!"
> date()
[1] "Sun Nov 22 17:42:34 2020"
> 1+2
[1] 3
> 1/(2+3)==5
[1] FALSE
> 1:3
[1] 1 2 3
> as.matrix(1:3)
     [,1]
[1,]    1
[2,]    2
[3,]    3
>
```

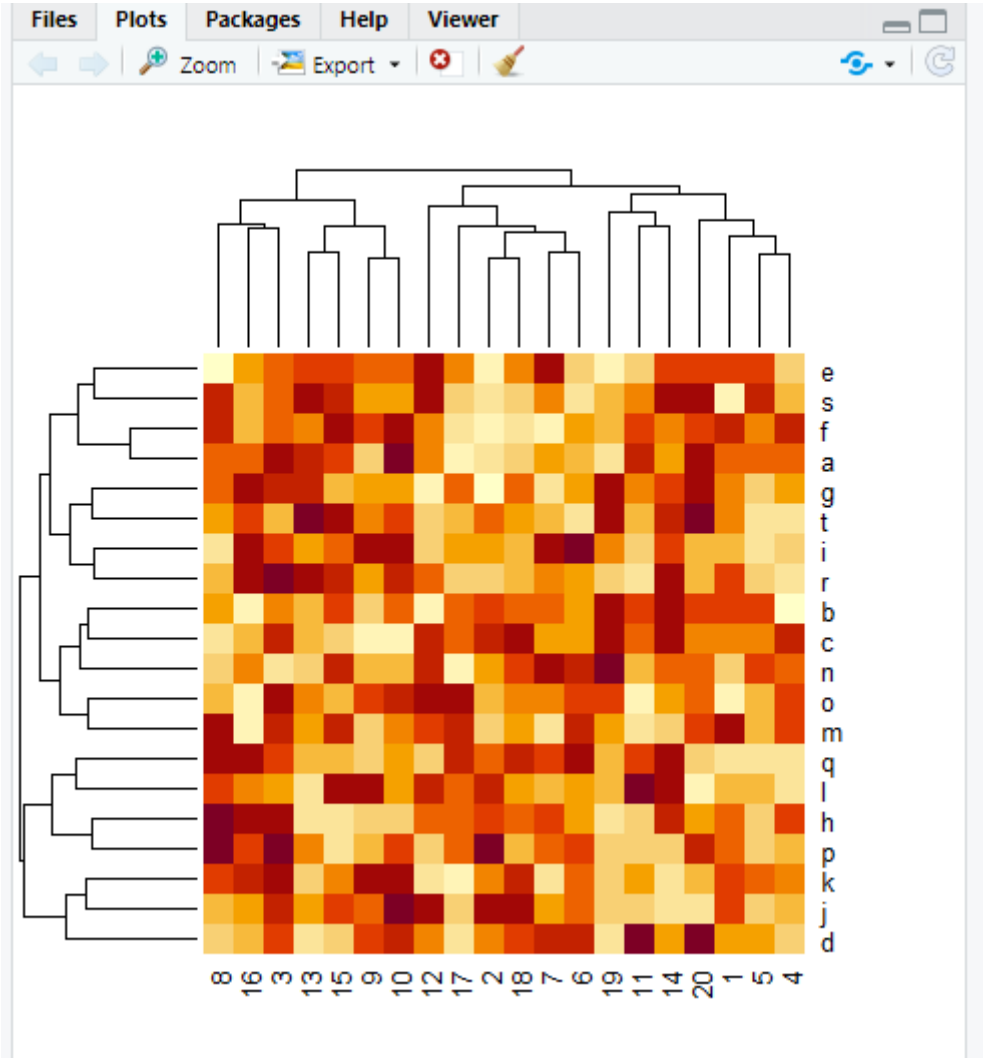
```
> x<-"Привет"
> y<-"Мир"
> z<-c(x,y)
> x
[1] "Привет"
> y
[1] "Мир"
> z
[1] "Привет" "Мир"
> print(z)
[1] "Привет" "Мир"
>
```

```
> seq(from =1, to =3, by = .5)
[1] 1.0 1.5 2.0 2.5 3.0
> order(1:3, decreasing = TRUE)
[1] 3 2 1
> rev(1:3)
[1] 3 2 1
```

```
> i<-sample(5)
> i
[1] 5 4 3 1 2
> j<-order(i)
> list(i,j)
[[1]]
[1] 5 4 3 1 2

[[2]]
[1] 4 5 3 2 1

> j
[1] 4 5 3 2 1


> i[order(i)]
[1] 1 2 3 4 5
>
```

Графики и экспорт





Функции

```
> fx<-function(x) x*x
> f<-function(a,b) fx(a)+fx(b)
> f(2,3)
[1] 13
>
```

Плавающая точка

```
> fx<-function(x) x*x
> f<-function(a,b) fx(a)+fx(b)
> f(2,3)
[1] 13
> is.integer(7)
[1] FALSE
> round(7)==7
[1] TRUE
> is.integer(as.integer(7))
[1] TRUE
>
```

```
> 0.33 == 3 * 0.11
[1] TRUE
> 0.45==3*0.15
[1] FALSE
> round(0.45,2)==round(3*0.15,2)
[1] TRUE
```

Векторы-арифметика

```
> x<-c(7,8,10,45)
> y<-c(-7,-8,-10,-45)
> x+y
[1] 0 0 0 0
```

```
> x<-c(7,8,10,45)
> x+c(-7,-8)
[1]  0  0  3 37
```

Массивы

```
> x.a<-array(x,dim=c(2,2))
> x.a
     [,1] [,2]
[1,]    1    3
[2,]    2    4
> dim(x.a)
[1] 2 2
> is.vector(x.a)
[1] FALSE
> is.array(x.a)
[1] TRUE
```

```
> x<-c(1,2,3,4)
```

```
> x.a<-array(x,dim = c(2,2))
> x.a[1.1]
[1] 1
> x.a[,1]
[1] 1 2
> which(x.a<=2)
[1] 1 2
> rowSums(x.a)
[1] 4 6
> x.b<-array(c(-1,-2,-3,-4),dim=c(2
```

```
> x.c<-x.a+x.b
> x.c
     [,1] [,2]
[1,]    0    0
[2,]    0    0
>
```

Матрицы

```
> m<-matrix(c(40,1,60,3), nrow=2)
> m
     [,1] [,2]
[1,]   40   60
[2,]    1    3
>
> is.array(m)
[1] TRUE
> is.matrix(m)
[1] TRUE
>
```

Матрицы. Специальные операции

```
> f<-matrix(c(40,1,60,3),nrow=2)
> f
     [,1] [,2]
[1,]   40   60
[2,]    1    3
> six.fives<-matrix(rep(5,6),ncol=3)
> six.fives
     [,1] [,2] [,3]
[1,]    5    5    5
[2,]    5    5    5
> f %*% six.fives
     [,1] [,2] [,3]
[1,]  500  500  500
[2,]   20   20   20
>
> f
     [,1] [,2]
[1,]   40   60
[2,]    1    3
> o<-c(10,20)
> o
[1] 10 20
> f %*% o
     [,1]
[1,] 1600
[2,]   70
>
```

Матрицы. Имена

```
> f<-matrix(c(40,1,60,3), nrow = 2)
> f
     [,1] [,2]
[1,]   40   60
[2,]    1    3
> rownames(f)<-c("трудодни","сталь")
> colnames(f)<-c("автомобили","грузовики")
> f
         автомобили грузовики
трудодни         40        60
сталь             1         3
> output<-c(20,10)
> names(output)<-c("грузовики","автомобили")
> available<-c(1600,70)
> names(available)<-c("трудодни","сталь")
> f %*% output[colnames(f)]
         [,1]
трудодни 1600
сталь      70
```

Списки

```
> my.lst<-list("exponential",7,FALSE)
> my.lst
[[1]]
[1] "exponential"

[[2]]
[1] 7

[[3]]
[1] FALSE

> names(my.lst)<-c("family","mean","is.symmetric")
> my.lst
$family
[1] "exponential"

$mean
[1] 7

$is.symmetric
[1] FALSE


> my.lst$family
[1] "exponential"
>
```

Датафреймы

```
> a.matrix<-matrix(c(35,8,10,4),nrow = 2)
> colnames(a.matrix)<-c("v1","v2")
> a.matrix
     v1 v2
[1,] 35 10
[2,]  8  4
> a.matrix$v1
Ошибка в a.matrix$v1 :$ operator is invalid for atomic vectors
> a.data.frame<-data.frame(a.matrix,logicals=c(TRUE,FALSE))
> a.data.frame
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
> a.data.frame$v1
[1] 35  8
> a.data.frame[,"v1"]
[1] 35  8
> a.data.frame[1,]
  v1 v2 logicals
1 35 10     TRUE
> colnames(a.data.frame)
[1] "v1"       "v2"       "logicals"
> colMeans(a.data.frame)
      v1       v2 logicals
    21.5      7.0      0.5
>
> rbind(a.data.frame, list(v1=-3,v2=-5,logicals=TRUE))
  v1 v2 logicals
1 35 10     TRUE
2  8  4    FALSE
3 -3 -5     TRUE
> rbind(a.data.frame,c(3,4,6))
  v1 v2 logicals
1 35 10        1
2  8  4        0
3  3  4        6
>
```