```
> #"<-" je operator dodele
> #skalari
> n<-15
> n
[1] 15
> 5->n
> n
[1] 5
> mu<-180
> mu=180
> print(mu)
[1] 180
> mu/pi
[1] 57.29578
> n<-10+2
> n
[1] 12
> n<-3+rnorm(1) #rnorm()-f-ja koja generise sl. broj iz N(0,1) raspodele
> n
[1] 2.241249
> name<-"Carmen"; n1<-10; n2<-100; m<-0.5
> ls()
[1] "m"    "mu"    "n"     "n1"    "n2"    "name"
> ls.str()
m :   num 0.5
mu :   num 180
n :   num 2.24
n1 :   num 10
n2 :   num 100
name :   chr "Carmen"
> rm(n1)
> mode(name)
[1] "character"
> x<-5; y<-2
> (z<-(x+y)/2)
[1] 3.5
> x*y+2
[1] 12
```

```
> #vektori
> x<-c(-10,-8,-2,0,1,2,3,6,12)
> q<-x^3
> q
[1] -1000  -512    -8     0     1     8    27   216  1728
> r<-exp(x)
> r
[1] 4.539993e-05 3.354626e-04 1.353353e-01 1.000000e+00 2.718282e+00 7.389056e+00 2.008554e+01 4.034288e+02 1.627548e+05
> o<-c("yes","maybe","no")
> o
[1] "yes"   "maybe" "no"
> (o1<-c('yes','maybe','no'))
[1] "yes"   "maybe" "no"
> te<-c(T,T,F,T)
> te
[1]  TRUE  TRUE FALSE  TRUE
> y<-c(3,-8,5,7,2)
> y[3]
[1] 5
> z<-c(3,11,8,15,12)
> z[c(2,4)] #izdvajanje 2. i 4. el. vektora z
[1] 11 15
> z[-c(2,3)] #izdvajanje svih el. vektora z, osim 2. i 3. el.
[1]  3 15 12
> y>2
[1]  TRUE FALSE  TRUE  TRUE FALSE
> z[z>10]
[1] 11 15 12
> x+y
[1]  -7 -16   3   7   3   5  -5  11  19
Warning message:
In x + y : longer object length is not a multiple of shorter object length
> y+z
[1]  6  3 13 22 14
> y-5
[1]  -2 -13   0   2  -3
>
```
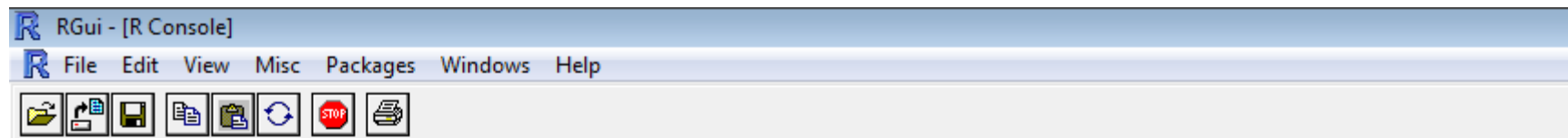
```
> x<-c(2,3,5,2,7,1)
> y<-c(10,15,12)
> z<-c(x,y) #c() concatenate - nadovezivanje; osim za vektore moze se koristiti i za liste
> z
 [1]  2  3  5  2  7  1 10 15 12
> (s<-seq(10))
 [1]  1  2  3  4  5  6  7  8  9 10
> seq(1,30)
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
> 1:30
 [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
> s<-seq(from=20,to=0,by=-2)
> s
 [1] 20 18 16 14 12 10  8  6  4  2  0
> seq(length=11,to=0, by=-2)
 [1] 20 18 16 14 12 10  8  6  4  2  0
> seq(along=y)
[1] 1 2 3
> rep(x,times=3)
 [1] 2 3 5 2 7 1 2 3 5 2 7 1 2 3 5 2 7 1
> rep(x,each=3)
 [1] 2 2 2 3 3 3 5 5 5 2 2 2 7 7 7 1 1 1
> rep(y,1:length(y))
[1] 10 15 15 12 12 12
> ?rep
starting httpd help server ... done
> skenirani_v<-scan()
1: 2
2: 4
3: 5
4: 12
5:
Read 4 items
> skenirani_v
[1]  2  4  5 12
>
```
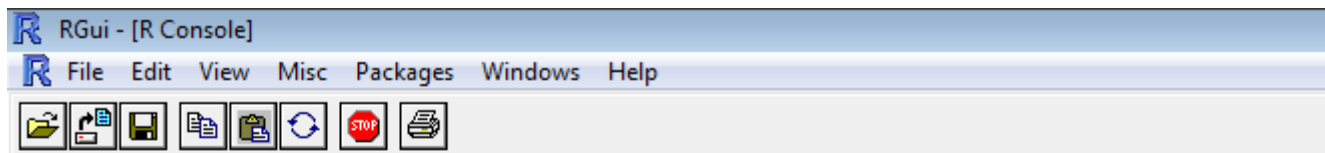
```
> y<-1:12
> dim(y)<-c(3,4)  #po kolonama
> y
     [,1] [,2] [,3] [,4]
[1,]    1    4    7   10
[2,]    2    5    8   11
[3,]    3    6    9   12
> y1<-matrix(1:12,nrow=3,byrow=F)
> y1
     [,1] [,2] [,3] [,4]
[1,]    1    4    7   10
[2,]    2    5    8   11
[3,]    3    6    9   12
> y2<-matrix(1:12,ncol=4,byrow=T)
> y2
     [,1] [,2] [,3] [,4]
[1,]    1    2    3    4
[2,]    5    6    7    8
[3,]    9   10   11   12
> rownames(y2)<-c('prva','druga','treca')
> y2
      [,1] [,2] [,3] [,4]
prva     1    2    3    4
druga    5    6    7    8
treca    9   10   11   12
> NROW(y)
[1] 3
> t(y)
     [,1] [,2] [,3]
[1,]    1    2    3
[2,]    4    5    6
[3,]    7    8    9
[4,]   10   11   12
> y1*y2
      [,1] [,2] [,3] [,4]
prva     1    8   21   40
druga   10   30   56   88
treca   27   60   99  144
```
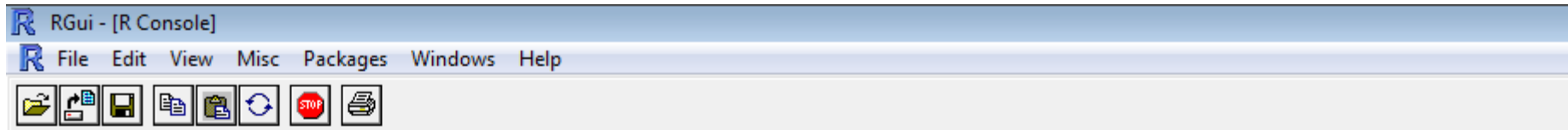
```
> samp<-seq(10)+rnorm(5)
> samp
 [1] 0.1982171 1.8835727 2.5574106 4.8547904 3.8148911 5.1982171 6.8835727 7.5574106 9.8547904 8.8148911
> ss<-sort(samp,index=T)
> ss
$x
 [1] 0.1982171 1.8835727 2.5574106 3.8148911 4.8547904 5.1982171 6.8835727 7.5574106 8.8148911 9.8547904

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

> str(ss) #prikazuje strukturu odredjenog objekta
List of 2
 $ x : num [1:10] 0.198 1.884 2.557 3.815 4.855 ...
 $ ix: int [1:10] 1 2 3 5 4 6 7 8 10 9
> ss$ix
 [1]  1  2  3  5  4  6  7  8 10  9
> ss$ix[length(ss$ix))
Error: unexpected ')' in "ss$ix[length(ss$ix))"
> ss$ix[length(ss$ix)]
[1] 9
> samp[ss$ix[length(ss$ix)]]
[1] 9.85479
> max(samp)
[1] 9.85479
> my.list<-list("sest",5,matrix(4:1,ncol=2))
> my.list
[[1]]
[1] "sest"

[[2]]
[1] 5

[[3]]
     [,1] [,2]
[1,]    4    2
[2,]    3    1

```
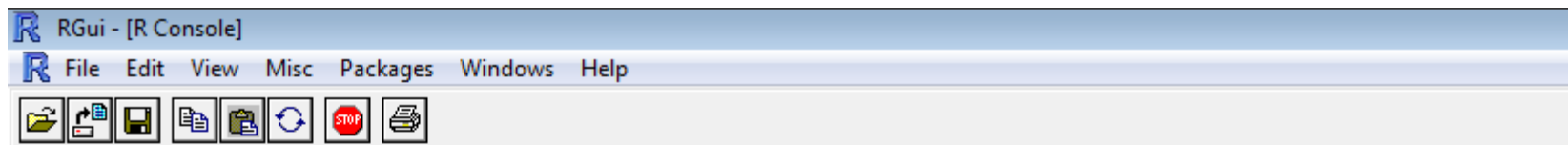
```
> my.list<-list("sest",5,matrix(4:1,ncol=2))
> my.list[[2]]
[1] 5
> my.list[[3]][,2] #ispisuje se 2. kolona matrice koja predstavlja 3. komponentu liste
[1] 2 1
> my.list[[3]][2,1] #ispisuje se element u 2. vrsti i 1. koloni matrice
[1] 3
> my.list1<-list(Lana="sest",Kosta=5,ostali=matrix(4:1,ncol=2)) #lista sa imenovanim komponentama
> my.list1
$Lana
[1] "sest"

$Kosta
[1] 5

$ostali
     [,1] [,2]
[1,]    4    2
[2,]    3    1

> my.list1$Lana
[1] "sest"
> my.list1["ostali"]
$ostali
     [,1] [,2]
[1,]    4    2
[2,]    3    1

> my.list1[[3]]
     [,1] [,2]
[1,]    4    2
[2,]    3    1
>
```
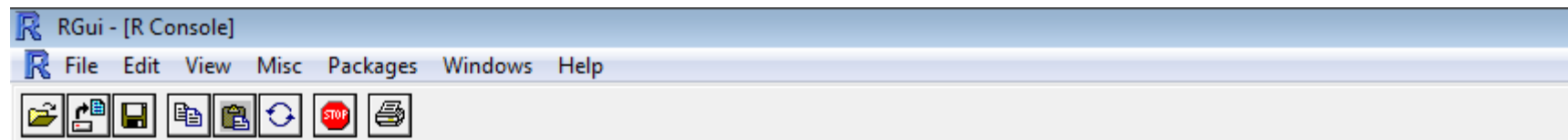
```
> x<-c(1,3,2,1)
> y<-c(2,3,4,1)
> xy<-data.frame(x,y)
> xy
  x y
1 1 2
2 3 3
3 2 4
4 1 1
> xy[3,]
  x y
3 2 4
> xy[xy$x>1,]
  x y
2 3 3
3 2 4
> xy[xy$x>1 & xy$y<4,][2]
  y
2 3
> xy[,2]
[1] 2 3 4 1
> xy[,"y"]
[1] 2 3 4 1
> z<-c(2,1,4,7)
> xyz<-cbind(xy,z)
> xyz
  x y z
1 1 2 2
2 3 3 1
3 2 4 4
4 1 1 7
> w<-c(3,4,7)
> xyzw<-rbind(w,xyz)
> xyzw
  x y z
1 3 4 7
2 1 2 2
3 3 3 1
```

```
>  data(trees)
> str(trees)
'data.frame':    31 obs.  of   3 variables:
 $ Girth : num   8.3 8.6 8.8 10.5 10.7 10.8 11 11 11.1 11.2 ...
 $ Height: num   70 65 63 72 81 83 66 75 80 75 ...
 $ Volume: num   10.3 10.3 10.2 16.4 18.8 19.7 15.6 18.2 22.6 19.9 ...
> (saved.names <- names(trees))
[1] "Girth"  "Height" "Volume"
> (names(trees) <- paste("Var", 1:dim(trees)[2], sep="."))
[1] "Var.1" "Var.2" "Var.3"
> str(trees)
'data.frame':    31 obs.  of   3 variables:
 $ Var.1: num   8.3 8.6 8.8 10.5 10.7 10.8 11 11 11.1 11.2 ...
 $ Var.2: num   70 65 63 72 81 83 66 75 80 75 ...
 $ Var.3: num   10.3 10.3 10.2 16.4 18.8 19.7 15.6 18.2 22.6 19.9 ...
> (names(trees) <- saved.names)
[1] "Girth"  "Height" "Volume"
> str(trees)
'data.frame':    31 obs.  of   3 variables:
 $ Girth : num   8.3 8.6 8.8 10.5 10.7 10.8 11 11 11.1 11.2 ...
 $ Height: num   70 65 63 72 81 83 66 75 80 75 ...
 $ Volume: num   10.3 10.3 10.2 16.4 18.8 19.7 15.6 18.2 22.6 19.9 ...
> dim(trees)
[1] 31   3
> trees$Height
 [1] 70 65 63 72 81 83 66 75 80 75 79 76 76 69 75 74 85 86 71 64 78 80 74 72 77 81 82 80 80 80 87
> trees$Height[1:5]
[1] 70 65 63 72 81
> trees[1,"Height"]
[1] 70
> trees[1,]$Height
[1] 70
>
```

The forms like $Height use the $ operator to select a *named field* within the frame. The forms like [1, 2] show that this is just a matrix with column names, leading to forms like trees[1,"Height"]. The forms like trees[1,]$Height show that each row (observation, case) can be considered a list with named items. The forms like trees[[2]] show that the data frame is also a list whose elements can be accessed with the [[ ]] operator.
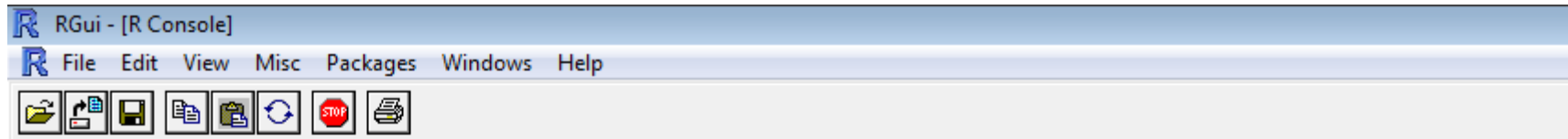
```
> trees[order(trees$Height, trees$Girth),]
   Girth Height Volume
3    8.8     63   10.2
20  13.8     64   24.9
2    8.6     65   10.3
7   11.0     66   15.6
14  11.7     69   21.3
1    8.3     70   10.3
19  13.7     71   25.7
4   10.5     72   16.4
24  16.0     72   38.3
16  12.9     74   22.2
23  14.5     74   36.3
8   11.0     75   18.2
10  11.2     75   19.9
15  12.0     75   19.1
12  11.4     76   21.0
13  11.4     76   21.4
25  16.3     77   42.6
21  14.0     78   34.5
11  11.3     79   24.2
9   11.1     80   22.6
22  14.2     80   31.7
28  17.9     80   58.3
29  18.0     80   51.5
30  18.0     80   51.0
5   10.7     81   18.8
26  17.3     81   55.4
27  17.5     82   55.7
6   10.8     83   19.7
17  12.9     85   33.8
18  13.3     86   27.4
31  20.6     87   77.0
> #sortiranje baze, prvo po Height, a ako ima jednakih el. oni su onda sortirani po Girth
>
>
>
> |
```