Lab 1 - Intro to R

Anyi Guo

09/10/2018

# Vectors

1.Create a vector u that has values -10, -9, -8,. . . ,0. How many different ways can you use?

u<- -10:0  
u<-seq(-10,0)

2.Create another vector v that has values -0.1, 0.4, 0.9, 1.4, . . . , and there are 11 numbers (aka terms) in v. How many different ways can you use?

v<-seq(-0.1, by=0.5,length=11)

3.Calculate the vector of u+v and u∗v.

u+v

## [1] -10.1 -8.6 -7.1 -5.6 -4.1 -2.6 -1.1 0.4 1.9 3.4 4.9

u\*v

## [1] 1.0 -3.6 -7.2 -9.8 -11.4 -12.0 -11.6 -10.2 -7.8 -4.4 0.0

4.Increase all terms in u by 1, and then take away 20% from all terms in v.

u<-u+1  
v<-v\*0.8

5.Create a vector w that contains all the numbers from u and then v. Assign the length of w to a variable len.

w = c(u,v)

6.Use a command to return the 14th, 15th and 16th value of w. What about the 2nd, the 5th, 9th and 21st value of w? What is the 23rd value?

w[14:16]

## [1] 0.72 1.12 1.52

w[c(2,5,9,21)]

## [1] -8.00 -5.00 -1.00 3.52

w[23]

## [1] NA

7.Replace the 3rd term of w by 100. Then replace the 7th, 15th and 22nd terms by 200, 300 and 400 simultaneously.

w[3]<-100  
w[c(7,15,22)]<-c(200,300,400)

8.Remove u.

rm(u)

9.Remove all the objects in the environment.

rm(list=ls())

## Optional exercises

10.Create a vector p of the values of ex cos(x) at x = 3, 3.1, 3.2, …, 6.

n<-seq(3,6,by=0.1)  
p<-exp(n)\*cos(n)

11.Find the maximum/minimum value in p and the index (position) of that value in p.

max(p)

## [1] 387.3603

min(p)

## [1] -35.86283

mat<-matrix(p)

which(mat==max(p)) which(mat==min(p))

12.Sort p in the descending order.

sort(p,TRUE)

## [1] 387.360340 338.564378 292.486707 249.468441 209.733494 173.405776  
## [7] 140.525075 111.061586 84.929067 61.996630 42.099201 25.046705  
## [13] 10.632038 -1.362099 -11.157417 -18.975233 -19.884531 -22.178753  
## [19] -24.490697 -25.032529 -26.773182 -28.969238 -29.538816 -31.011186  
## [25] -32.693695 -32.819775 -34.303360 -34.685042 -35.357194 -35.687732  
## [31] -35.862834

13.Create(4,6,3,4,6,3,. . . ,4,6,3)wherethereare10occurrencesof4.

li<- c(4,6,3)  
l13<-rep(li,10)

14.Create(4,4,. . . ,4,6,6,. . . ,6,3,3,. . . ,3)wherethereare10occurrencesof4,20occurrences of 6 and 30 occurrences of 3.

l14<-c(rep(4,10),rep(6,20),rep(3,30))

# Matrics

First list is for rows, second list is for columns.

a\_matrix<-matrix(1:12,nrow=4,dimnames = list(c("one","two","three","four"),c("eins","zwei","drei")))

1.Create the following matrix and assign it to the variable b\_matrix.

b\_matrix<-matrix(1:40,nrow= 4,byrow=TRUE)  
b\_matrix<-b\_matrix[,c(1,3,5,7,9)]  
dimnames(b\_matrix)<-list(c("A","B","C","D"),c("a","b","c","d","e"))

2.Extract a sub-matrix from b\_matrix named subB as follows. Try to use as many possible ways as you can (positive and negative indices).

subB<-b\_matrix[c(1,2,4),c(2,3)]

3.In R, %*% is an operator for matrix multiplication. Compute a\_matrix %*% b\_matrix and a\_matrix %\*% subB. Discuss the results you get from R.

#a\_matrix %\*% b\_matrix  
a\_matrix %\*% subB

## b c  
## one 365 395  
## two 414 450  
## three 463 505  
## four 512 560

4.Create three vectors x,y,z with integers and each vector has 3 elements. Combine the three vectors to become a 3 × 3 matrix A where each column represents a vector. Change the row names to a,b,c.

x<-c(1,2,3)  
y<-c(4,5,6)  
z<-c(7,8,9)  
mat2<-matrix(c(x,y,z),nrow=3)  
dimnames(mat2)<-list(c("a","b","c"))

## R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see <http://rmarkdown.rstudio.com>.