Lab 1 - Intro to R

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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 times 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.

```r
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.

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

Matrics

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

```r
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.

```r
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).

```r
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.

```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.

```r
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"))
```