assignment 1

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Exercise 1

a) Form three separate vectors from scalars 4,5 and 33; -48, 0 and 45; 7, 3 and 1

b) Combine vectors into one 3x3 matrix

c) Name rows of the matrix as r1, r2 and r3. Name columns of the matrix as A, B and C

```
a<-c(4, 5, 33)
b<-c(-48, 0, 45)
c<-c(7, 3, 1)

m=matrix(c(a,b,c), ncol=3, nrow = 3, byrow = TRUE)
rownames(m) <- c("r1","r2","r3")
colnames(m) <- c("A", "B", "C")
m
```

```
##      A B  C
## r1   4 5 33
## r2 -48 0 45
## r3   7 3  1
```

Exercise 2

- Generate the following vectors with functions rep() and seq()

a) [0 0 0 0 0 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4]

```
rep(0:4, rep(5,5))
```

```
##  [1] 0 0 0 0 0 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4
```

```
rep(0:4, each=5)
```

```
##  [1] 0 0 0 0 0 1 1 1 1 1 2 2 2 2 2 3 3 3 3 3 4 4 4 4 4
```

b) [1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5]

```
#y <- seq(0:4)
#y
rep(1:5, rep(5,5), length.out=25)
```

```
##  [1] 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5
```

```
##or
rep(seq(0:4), rep(5,5), length.out=25)
```

```
##  [1] 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5 1 2 3 4 5
```

Exercise 3

- Solar radiation was measured in a greenhouse at eight different times. Observations were 11.1, 10.6, 6.3, 8.8, 10.7, 11.2, 8.9 and 12.2 units.

a) Save measurements as variable solar.radiation (set value with a vector containing all measurements)
b) Define mean, median and variance of variable solar.radiation (with pre-determined R-functions)

```
solar.radiation <- c(11.1, 10.6, 6.3, 8.8, 10.7, 11.2, 8.9, 12.2)


mean(solar.radiation)

## [1] 9.975

median(solar.radiation)

## [1] 10.65

var(solar.radiation)

## [1] 3.525
```

c) Add value 10 to every observation and name the new vector as sr10. Define mean, median and variance of modified vector. Which of the determined values changed from the previous and how much?

```
sr10 = solar.radiation + 10
sr10

## [1] 21.1 20.6 16.3 18.8 20.7 21.2 18.9 22.2

mean(sr10)

## [1] 19.975

median(sr10)

## [1] 20.65

var(sr10)

## [1] 3.525
```

the mean and the median changed and increased by 10 from the previous values while the variance remained the same at 3.525

- **d) Multiply the original observations by -2 and name the resulting vector as srm2. What happened to mean, median and variance?**

```
srm2=solar.radiation * -2
srm2

## [1] -22.2 -21.2 -12.6 -17.6 -21.4 -22.4 -17.8 -24.4

mean(srm2)

## [1] -19.95

median(srm2)

## [1] -21.3

var(srm2)
```

```
## [1] 14.1
```

the mean became a negative value of -19.95, the median also became a negative value of -21.3 while the variance remained positive value but higher at 14.1

- **e) Variance is generally determined with following formulas:**
- **Which of the two is used in R-function var()?**

$\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$ and $\frac{1}{n-1}\sum_{i=1}^{n}(x_i - \bar{x})^2$

variance formula.

The second is being used in R-function variance i.e b.

Exercise 4

- Generate 25 random integers from interval [1,100] and place them in row-wise in 5x5 matrice.

```
rand=ceiling(runif(25, 1, 100))
rand
```

```
##  [1] 25 45 16 31 69 46 69 29 72 41 98 75 31 66 85 86 69 90 90 82 28 93 83
## [24] 98 36
```

```
mat=matrix(rand, ncol=5, nrow=5, byrow=T)
mat
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]   25   45   16   31   69
## [2,]   46   69   29   72   41
## [3,]   98   75   31   66   85
## [4,]   86   69   90   90   82
## [5,]   28   93   83   98   36
```

```
#a) Name the rows as r1-r5 and the columns as c1-c5
rownames(mat) <- c("r1","r2","r3","r4","r5")
colnames(mat) <- c("c1","c2","c3","c4","c5")
mat
```

```
##    c1 c2 c3 c4 c5
## r1 25 45 16 31 69
## r2 46 69 29 72 41
## r3 98 75 31 66 85
## r4 86 69 90 90 82
## r5 28 93 83 98 36
```

- **b) Determine the sum of numbers in the matrice'**
- **c) Substract the minimum of the matrice from every other figure in the Matrix**
- **d) Print the figure that is in column 3 of row 4**

```
sum(mat)
```

```
## [1] 1553
```

```
mat2=mat - min(mat)
mat2
```

```
##    c1 c2 c3 c4 c5
## r1  9 29  0 15 53
## r2 30 53 13 56 25
## r3 82 59 15 50 69
## r4 70 53 74 74 66
## r5 12 77 67 82 20
```

```
mat2[4,3]
```

```
## [1] 74
```