Experiment 6

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1. Aim: To Create a file with name 'test' using data frame having specified variables

```
data<-read.csv("test.csv")
attach(data)
data$sex[data$sex==1]<-"male"
data$sex[data$sex==2]<-"female"
data$mutation[data$mutation==1]<-"mutated"
data$mutation[data$mutation==0]<-"not mutated"
data$locality[data$locality==1]<-"rural"
data$locality[data$locality==2]<-"urban"
data$religion[data$religion==1]<-"hindu"
data$religion[data$religion==2]<-"muslim"
data$religion[data$religion==3]<-"sikh"
data$religion[data$religion==4]<-"chritian"
```

(a) To Use head and tail command to display the first 10 top and bottom observations along with variable name

```
head(data,10)
```

```
##       mutation age locality    sex religion
## 1      mutated  40    urban   male   muslim
## 2  not mutated  41    rural female     sikh
## 3      mutated  32    urban female   muslim
## 4      mutated  40    urban female     sikh
## 5  not mutated  45    urban   male   muslim
## 6      mutated  50    rural   male    hindu
## 7      mutated  51    rural   male     sikh
## 8      mutated  66    rural female   muslim
## 9  not mutated  53    rural female    hindu
## 10     mutated  57    urban   male   muslim
```

```
tail(data,10)
```

```
##       mutation age locality    sex religion
## 41 not mutated  53    rural   male     sikh
## 42     mutated  63    rural   male chritian
## 43     mutated  65    urban   male    hindu
## 44 not mutated  53    rural female   muslim
## 45 not mutated  54    rural female    hindu
## 46     mutated  42    urban female     sikh
## 47 not mutated  65    rural   male    hindu
## 48 not mutated  55    urban   male chritian
## 49 not mutated  58    rural female    hindu
## 50     mutated  52    rural   male    hindu
```

(b) To Extract each variable individually from data frame

```
data$mutation
```

```
##  [1] "mutated"     "not mutated" "mutated"     "mutated"     "not mutated"
##  [6] "mutated"     "mutated"     "mutated"     "not mutated" "mutated"
## [11] "mutated"     "mutated"     "mutated"     "not mutated" "mutated"
## [16] "mutated"     "mutated"     "mutated"     "mutated"     "not mutated"
## [21] "not mutated" "not mutated" "mutated"     "not mutated" "not mutated"
## [26] "not mutated" "not mutated" "mutated"     "mutated"     "not mutated"
## [31] "not mutated" "not mutated" "mutated"     "mutated"     "not mutated"
## [36] "not mutated" "not mutated" "mutated"     "mutated"     "not mutated"
## [41] "not mutated" "mutated"     "mutated"     "not mutated" "not mutated"
## [46] "mutated"     "not mutated" "not mutated" "not mutated" "mutated"
```

```
data$age
```

```
##  [1] 40 41 32 40 45 50 51 66 53 57 60 52 34 47 60 36 37 36 30 48 40 46 30 57 53
## [26] 50 46 57 58 66 52 58 57 52 65 56 49 45 29 33 53 63 65 53 54 42 65 55 58 52
```

```
data$locality
```

```
##  [1] "urban" "rural" "urban" "urban" "urban" "rural" "rural" "rural" "rural"
## [10] "urban" "rural" "urban" "urban" "urban" "rural" "urban" "rural" "urban"
## [19] "rural" "rural" "rural" "rural" "rural" "urban" "rural" "rural" "rural"
## [28] "rural" "rural" "rural" "rural" "rural" "rural" "rural" "rural" "rural"
## [37] "urban" "urban" "rural" "rural" "rural" "rural" "urban" "rural" "rural"
## [46] "urban" "rural" "urban" "rural" "rural"
```

```
data$sex
```

```
##  [1] "male"   "female" "female" "female" "male"   "male"   "male"   "female"
##  [9] "female" "male"   "male"   "female" "male"   "male"   "male"   "male"
## [17] "male"   "male"   "male"   "female" "male"   "female" "male"   "male"
## [25] "male"   "male"   "female" "female" "male"   "male"   "female" "female"
## [33] "male"   "female" "male"   "male"   "female" "male"   "female" "female"
## [41] "male"   "male"   "male"   "female" "female" "female" "male"   "male"
## [49] "female" "male"
```

```
data$religion
```

```
##  [1] "muslim"   "sikh"     "muslim"   "sikh"     "muslim"   "hindu"
##  [7] "sikh"     "muslim"   "hindu"    "muslim"   "hindu"    "hindu"
## [13] "chritian" "muslim"   "hindu"    "muslim"   "hindu"    "muslim"
## [19] "hindu"    "hindu"    "chritian" "hindu"    "muslim"   "muslim"
## [25] "hindu"    "hindu"    "sikh"     "hindu"    "muslim"   "hindu"
## [31] "hindu"    "hindu"    "muslim"   "hindu"    "hindu"    "hindu"
## [37] "muslim"   "chritian" "muslim"   "hindu"    "sikh"     "chritian"
## [43] "hindu"    "muslim"   "hindu"    "sikh"     "hindu"    "chritian"
## [49] "hindu"    "hindu"
```

c) Make a 2 x 2 table of gender and locality using ‘table’ command

```
table<-table(sex,locality)
table
```

```
##    locality
## sex  1  2
##   1 19 11
##   2 15  5
```

(d),(e) To find association between locality and gender using (i) Yule's coefficient Q_AB, (ii) Coefficient of Colligation Y_AB, (iii) Coefficient V_AB. Interpret your result.

```
#Yule's Coefficient
Q_AB = (19*5-11*15)/(19*5+11*15)
Q_AB
```

```
## [1] -0.2692308
```

```
#Coefficient of colligation
Y_AB = (sqrt(19*5)-sqrt(11*15))/(sqrt(19*5)+sqrt(11*15))
Y_AB
```

```
## [1] -0.1371474
```

```
#V_AB
V_AB = (19*5-11*15)/sqrt(30*20*34*16)
```

(f) Identifying the structure of your file using 'str' command and dimensional of file using 'dim' command

```
str(data)
```

```
## 'data.frame':    50 obs. of  5 variables:
##  $ mutation: chr  "mutated" "not mutated" "mutated" "mutated" ...
##  $ age     : int  40 41 32 40 45 50 51 66 53 57 ...
##  $ locality: chr  "urban" "rural" "urban" "urban" ...
##  $ sex     : chr  "male" "female" "female" "female" ...
##  $ religion: chr  "muslim" "sikh" "muslim" "sikh" ...
```

```
dim(data)
```

```
## [1] 50  5
```

2. Aim: To Generate given vectors a,b,c. Combine them in vector'd' using (i) data frame (ii) list, and observe the difference (iii) identify the class of 'd'

```
a<-c(34,35,36,39)
b<-c(15,14,37,45)
c<-c(1,2)
d<-data.frame(a,b,c)
d
```

```
##    a  b c
## 1 34 15 1
## 2 35 14 2
## 3 36 37 1
## 4 39 45 2
```

```
d1<-list(a,b,c)
d1
```

```
## [[1]]
## [1] 34 35 36 39
##
## [[2]]
## [1] 15 14 37 45
##
## [[3]]
## [1] 1 2
```

```
class(d)
```

```
## [1] "data.frame"
```

```
class(d1)
```

```
## [1] "list"
```

3. Aim: To generate matrices A and B and carry out matrix computations

```
A<-matrix(c(11,14,19,24,25,29,30,35,39),nrow=3,byrow=3)
A
```

```
##      [,1] [,2] [,3]
## [1,]   11   14   19
## [2,]   24   25   29
## [3,]   30   35   39
```

```
B<-matrix(c(8, 9, 10, 11,14,13, 20, 22, 28),nrow=3,ncol=3 )
B
```

```
##      [,1] [,2] [,3]
## [1,]    8   11   20
## [2,]    9   14   22
## [3,]   10   13   28
```

```
#(i)
A+B
```

```
##      [,1] [,2] [,3]
## [1,]   19   25   39
## [2,]   33   39   51
## [3,]   40   48   67
```

```
#(ii)
A%*%B
```

```
##      [,1] [,2] [,3]
## [1,]  404  564 1060
## [2,]  707  991 1842
## [3,]  945 1327 2462
```

```
#(iii)
A*B
```

```
##      [,1] [,2] [,3]
## [1,]   88  154  380
## [2,]  216  350  638
## [3,]  300  455 1092
```

```
#(iv)
det(A)
```

```
## [1] 346
```

```
#(v)
diag(B)
```

```
## [1]  8 14 28
```

```
#(vi) Transpose of A
A
```

```
##      [,1] [,2] [,3]
## [1,]   11   14   19
## [2,]   24   25   29
## [3,]   30   35   39
```

```
t(A)
```

```
##      [,1] [,2] [,3]
## [1,]   11   24   30
## [2,]   14   25   35
## [3,]   19   29   39
```

```
#(vii) Inverse of A and B matrices
A
```

```
##      [,1] [,2] [,3]
## [1,]   11   14   19
## [2,]   24   25   29
## [3,]   30   35   39
```

```
# inverse of A
solve(A)
```

```
##            [,1]       [,2]       [,3]
## [1,] -0.1156069  0.3439306 -0.1994220
## [2,] -0.1907514 -0.4075145  0.3959538
## [3,]  0.2601156  0.1011561 -0.1763006
```

```
B
```

```
##      [,1] [,2] [,3]
## [1,]    8   11   20
## [2,]    9   14   22
## [3,]   10   13   28
```

```
# inverse of B
solve(B)
```

```
##            [,1]       [,2]       [,3]
## [1,]  2.9444444 -1.3333333 -1.0555556
## [2,] -0.8888889  0.6666667  0.1111111
## [3,] -0.6388889  0.1666667  0.3611111
```

```
#(viii)
library(Matrix)
eigen(A)
```

```
## eigen() decomposition
## $values
## [1] 78.153133+0.000000i -1.576566+1.393429i -1.576566-1.393429i
##
## $vectors
##               [,1]                  [,2]                  [,3]
## [1,] -0.3315647+0i  0.6689540+0.0000000i  0.6689540+0.0000000i
## [2,] -0.5628158+0i -0.5076425-0.4089946i -0.5076425+0.4089946i
## [3,] -0.7571679+0i -0.0687447+0.3504244i -0.0687447-0.3504244i
```

```
#(ix)
rank(A)
```

```
## [1] 1 4 7 2 5 8 3 6 9
```

```
rankMatrix(A)
```

```
## [1] 3
## attr(,"method")
## [1] "tolNorm2"
## attr(,"useGrad")
## [1] FALSE
## attr(,"tol")
## [1] 6.661338e-16
```

4. Aim

(a) To Generate a 3 x 4 matrix 'C' with all elements 5.

```
C<-matrix(c(5),nrow=3,ncol=4)
C
```

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

(b) Generate 5 x 4 matrix 'D' with elements 1:20.

```
D<-matrix(1:20,nrow=5,ncol=4)
D
```

```
##      [,1] [,2] [,3] [,4]
## [1,]    1    6   11   16
## [2,]    2    7   12   17
## [3,]    3    8   13   18
## [4,]    4    9   14   19
## [5,]    5   10   15   20
```