Applied Multivarate Analysis lab 3

1 Finding mean vector, variance-covariance matrix, correlation matrix

1.1 Read data from a file

```
> # Import data from a excel file with .csv which separted by comma
> data<-read.csv(file="D:/chilo/indust1.csv", header=T)
> data

   assets income equity
1    26.7    3.3   15.8
2    38.4    2.4   19.5
3    19.2    1.7    8.4
4    20.6    1.0    8.2
5    18.9    0.9    9.4
6    14.8    1.0    7.6
7    19.0    2.7   12.6
8    14.2    0.8    7.3
9    13.7    1.1    5.9
10    7.7    0.2    2.9

> # Import data from a txt file which separted by tab
> data1<-read.table(file="D:/chilo/indust.txt", header=F)
> data1

     V1  V2   V3
1  26.7 3.3 15.8
2  38.4 2.4 19.5
3  19.2 1.7  8.4
4  20.6 1.0  8.2
5  18.9 0.9  9.4
6  14.8 1.0  7.6
7  19.0 2.7 12.6
8  14.2 0.8  7.3
9  13.7 1.1  5.9
10  7.7 0.2  2.9

> head(data)  # print the 1st part of a data frame

  assets income equity
1   26.7    3.3   15.8
2   38.4    2.4   19.5
3   19.2    1.7    8.4
4   20.6    1.0    8.2
```

```
5   18.9    0.9    9.4
6   14.8    1.0    7.6
```

```
> names(data) # print variable names
```

```
[1] "assets" "income" "equity"
```

```
> str(data)  # display the internal structure of an R object
```

```
'data.frame':        10 obs. of  3 variables:
 $ assets: num  26.7 38.4 19.2 20.6 18.9 14.8 19 14.2 13.7 7.7
 $ income: num  3.3 2.4 1.7 1 0.9 1 2.7 0.8 1.1 0.2
 $ equity: num  15.8 19.5 8.4 8.2 9.4 7.6 12.6 7.3 5.9 2.9
```

```
> # need to attch the data frame to the variables you use
> total<-data$assets+data$income
> total
```

```
 [1] 30.0 40.8 20.9 21.6 19.8 15.8 21.7 15.0 14.8  7.9
```

1.2 compute mean vector

```
> names(data)<-c("x1","x2","x3")
> names(data)
```

```
[1] "x1" "x2" "x3"
```

```
> apply(data,2,mean)  # compute mean vector
```

```
   x1    x2    x3
19.32  1.51  9.76
```

1.3 compute variance-covariance matrix S

```
> S<-var(data,y=data)  # compute variance-covariance matrix
> S
```

```
          x1        x2        x3
x1 70.410667 5.8731111 39.065333
x2  5.873111 0.9698889  4.114889
x3 39.065333 4.1148889 24.056000
```

1.4 compute correlation matrix R

```
> R<-cor(data,y=data)  # compute correlation matrix
> R
```

```
          x1        x2        x3
x1 1.0000000 0.7107028 0.9492063
x2 0.7107028 1.0000000 0.8518937
x3 0.9492063 0.8518937 1.0000000
```

1.5 Measures of overall variablity

```
> prod(eigen(S)$values)  # compute generalized sample variance

[1] 28.85923

> sum(diag(S))  # compute total sample variance

[1] 95.43656
```