Applied Multivarate Analysis lab 5

1 Checking Multivariate Normalit

1.1 read in and examine the data

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

```
     V1   V2
1  0.15 0.30
2  0.09 0.09
3  0.18 0.30
4  0.10 0.10
5  0.05 0.10
6  0.12 0.12
7  0.08 0.09
8  0.05 0.10
9  0.08 0.09
10 0.10 0.10
11 0.07 0.07
12 0.02 0.05
13 0.01 0.01
14 0.10 0.45
15 0.10 0.12
16 0.10 0.20
17 0.02 0.04
18 0.10 0.10
19 0.01 0.01
20 0.40 0.60
21 0.10 0.12
22 0.05 0.10
23 0.03 0.05
24 0.05 0.05
25 0.15 0.15
26 0.10 0.30
27 0.15 0.15
28 0.09 0.09
29 0.08 0.09
30 0.18 0.28
31 0.10 0.10
32 0.20 0.10
33 0.11 0.10
34 0.30 0.30
35 0.02 0.12
```

```
36 0.20 0.25
37 0.20 0.20
38 0.30 0.40
39 0.30 0.33
40 0.40 0.32
41 0.30 0.12
42 0.05 0.12
```

1.2 make the Q-Q plots

```
> qqnorm(rad[,1])   #  Produce a Q-Q plot for radiation data (door closed)
> qqline(rad[,1])
> qqnorm(rad[,2])   #  Produce a Q-Q plot for radiation data (door open)
> qqline(rad[,2])
```

1.3 compute the mean vector and variance-covariance matrix

```
> radmean<-apply(rad,2,mean)
> radmean

       V1        V2
0.1283333 0.1638095

> radvar<-var(rad)
> radvar

            V1          V2
V1 0.010053252 0.009535772
V2 0.009535772 0.016190012
```

1.4 Compute and plot the mahalanobis distances

```
> md<-mahalanobis(rad,radmean,radvar)
> plot(qchisq(((1:42)-0.5)/42,2),sort(md)) # chisq is quantile of chi-square distribution
```

1.5 try a square root transformation and redo the plots

```
> srad<-sqrt(rad)
> qqnorm(srad[,1])
> qqline(srad[,1])
> qqnorm(srad[,2])
> qqline(srad[,2])
```

1.6 recompute the mahalanobis plot

```
> sradmean<-apply(srad,2,mean)
> sradmean

       V1        V2
0.3323951 0.3777854

> sradvar<-var(srad)
> sradvar

           V1         V2
V1 0.01828212 0.01563156
V2 0.01563156 0.02160208

> smd<-mahalanobis(srad,sradmean,sradvar)
> plot(qchisq(((1:42)-.5)/42,2),sort(smd))
```