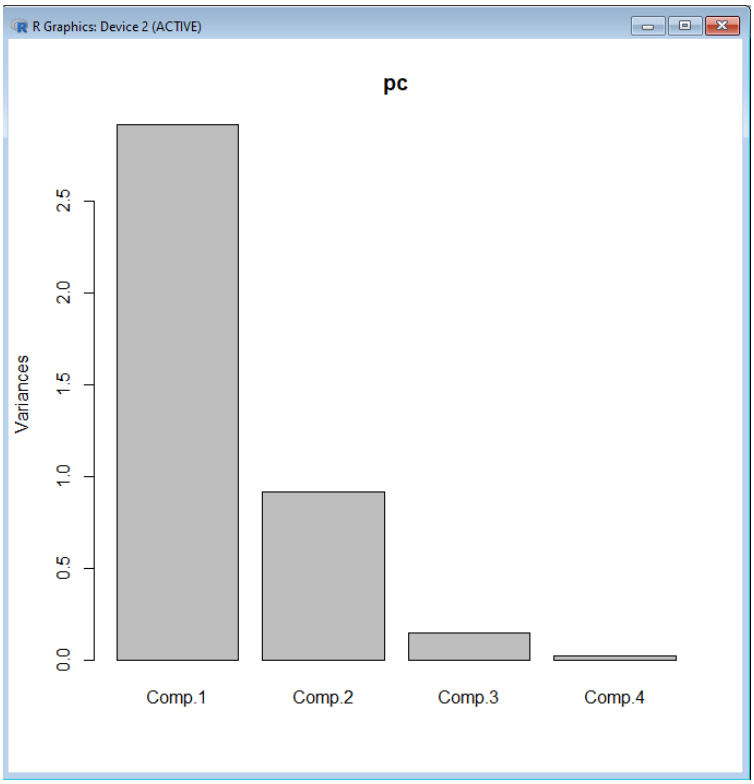
Practical No:7 Date: 04 /04/2023

AIM : Write a program to explain different function of Principal components

```
> head(iris)
  Sepal.Length Sepal.Width Petal.Length Petal.Width Species
1          5.1         3.5          1.4         0.2  setosa
2          4.9         3.0          1.4         0.2  setosa
3          4.7         3.2          1.3         0.2  setosa
4          4.6         3.1          1.5         0.2  setosa
5          5.0         3.6          1.4         0.2  setosa
6          5.4         3.9          1.7         0.4  setosa
> d<-iris[,1:4]
> d<-iris[,-5]
> head(d)
  Sepal.Length Sepal.Width Petal.Length Petal.Width
1          5.1         3.5          1.4         0.2
2          4.9         3.0          1.4         0.2
3          4.7         3.2          1.3         0.2
4          4.6         3.1          1.5         0.2
5          5.0         3.6          1.4         0.2
6          5.4         3.9          1.7         0.4
> pc <- princomp(d,cor=TRUE,score=TRUE)
> summary(pc)
Importance of components:
                          Comp.1    Comp.2     Comp.3      Comp.4
Standard deviation     1.7083611 0.9560494 0.38308860 0.143926497
Proportion of Variance 0.7296245 0.2285076 0.03668922 0.005178709
Cumulative Proportion  0.7296245 0.9581321 0.99482129 1.000000000
> plot(pc)
```



install.packages("FactoMineR")

library(FactoMineR)

install.packages("ade4")

library(ade4)

install.packages("amap")

library(amap)

```
> pc=acp(USArrests)
> pc$eig
[1] 11.024148  6.964086  4.179904  2.915146
> pc$loadings
           Comp 1     Comp 2     Comp 3      Comp 4
Murder   0.5358995  0.4181809 -0.3412327  0.64922780
Assault  0.5831836  0.1879856 -0.2681484 -0.74340748
UrbanPop 0.2781909 -0.8728062 -0.3780158  0.13387773
Rape     0.5434321 -0.1673186  0.8177779  0.08902432
> head(pc$scores)
               Comp 1     Comp 2      Comp 3       Comp 4
Alabama     0.9756604  1.1220012 -0.43980366  0.154696581
Alaska      1.9305379  1.0624269  2.01950027 -0.434175454
Arizona     1.7454429 -0.7384595  0.05423025 -0.826264240
Arkansas   -0.1399989  1.1085423  0.11342217 -0.180973554
California  2.4986128 -1.5274267  0.59254100 -0.338559240
Colorado    1.4993407 -0.9776297  1.08400162  0.001450164
> pc=PCA(USArrests,graph=FALSE)
> pc$eig
       eigenvalue percentage of variance cumulative percentage of variance
comp 1  2.4802416              62.006039                          62.00604
comp 2  0.9897652              24.744129                          86.75017
comp 3  0.3565632               8.914080                          95.66425
comp 4  0.1734301               4.335752                         100.00000
>  pc$var$coord
             Dim.1      Dim.2      Dim.3       Dim.4
Murder   0.8439764 -0.4160354  0.2037600  0.27037052
Assault  0.9184432 -0.1870211  0.1601192 -0.30959159
UrbanPop 0.4381168  0.8683282  0.2257242  0.05575330
Rape     0.8558394  0.1664602 -0.4883190  0.03707412
> pc=dudi.pca(USArrests,nf=5,scannf=FALSE)
> pc$eig
[1] 2.4802416 0.9897652 0.3565632 0.1734301
> pc=prcomp() pc=prcomp(USArrests,scale.=TRUE)
Error: unexpected symbol in "pc=prcomp() pc"
> pc=prcomp(USArrests,scale.=TRUE)
> pc$sdev
[1] 1.5748783 0.9948694 0.5971291 0.4164494
> head(pc$rotation)
                PC1        PC2        PC3         PC4
Murder   -0.5358995  0.4181809 -0.3412327  0.64922780
Assault  -0.5831836  0.1879856 -0.2681484 -0.74340748
UrbanPop -0.2781909 -0.8728062 -0.3780158  0.13387773
Rape     -0.5434321 -0.1673186  0.8177779  0.08902432
> head(pc$x)
                 PC1        PC2         PC3          PC4
Alabama    -0.9756604  1.1220012 -0.43980366  0.154696581
Alaska     -1.9305379  1.0624269  2.01950027 -0.434175454
Arizona    -1.7454429 -0.7384595  0.05423025 -0.826264240
Arkansas    0.1399989  1.1085423  0.11342217 -0.180973554
California -2.4986128 -1.5274267  0.59254100 -0.338559240
Colorado   -1.4993407 -0.9776297  1.08400162  0.001450164
```