ISLR Lab 10.4

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[1]:
```
states=row.names(USArrests )
print(states)
```

```
 [1] "Alabama"        "Alaska"         "Arizona"        "Arkansas"
 [5] "California"     "Colorado"       "Connecticut"    "Delaware"
 [9] "Florida"        "Georgia"        "Hawaii"         "Idaho"
[13] "Illinois"       "Indiana"        "Iowa"           "Kansas"
[17] "Kentucky"       "Louisiana"      "Maine"          "Maryland"
[21] "Massachusetts"  "Michigan"       "Minnesota"      "Mississippi"
[25] "Missouri"       "Montana"        "Nebraska"       "Nevada"
[29] "New Hampshire"  "New Jersey"     "New Mexico"     "New York"
[33] "North Carolina" "North Dakota"   "Ohio"           "Oklahoma"
[37] "Oregon"         "Pennsylvania"   "Rhode Island"   "South Carolina"
[41] "South Dakota"   "Tennessee"      "Texas"          "Utah"
[45] "Vermont"        "Virginia"       "Washington"     "West Virginia"
[49] "Wisconsin"      "Wyoming"
```

[2]:
```
print(names(USArrests ))
```

```
[1] "Murder"   "Assault"  "UrbanPop" "Rape"
```

[3]:
```
print(apply(USArrests , 2, mean))
```

```
  Murder  Assault UrbanPop     Rape
   7.788  170.760   65.540   21.232
```

[4]:
```
print(apply(USArrests , 2, var))
```

```
    Murder    Assault   UrbanPop       Rape
  18.97047 6945.16571  209.51878   87.72916
```

[5]:
```
pr.out=prcomp(USArrests , scale=TRUE)
print(names(pr.out))
```

```
[1] "sdev"     "rotation" "center"   "scale"    "x"
```

[6]:
```
print(pr.out$center)
```

```
  Murder  Assault UrbanPop     Rape
   7.788  170.760   65.540   21.232
```

[7]:
```
print(pr.out$scale)
```

```
   Murder   Assault  UrbanPop      Rape
 4.355510 83.337661 14.474763  9.366385
```

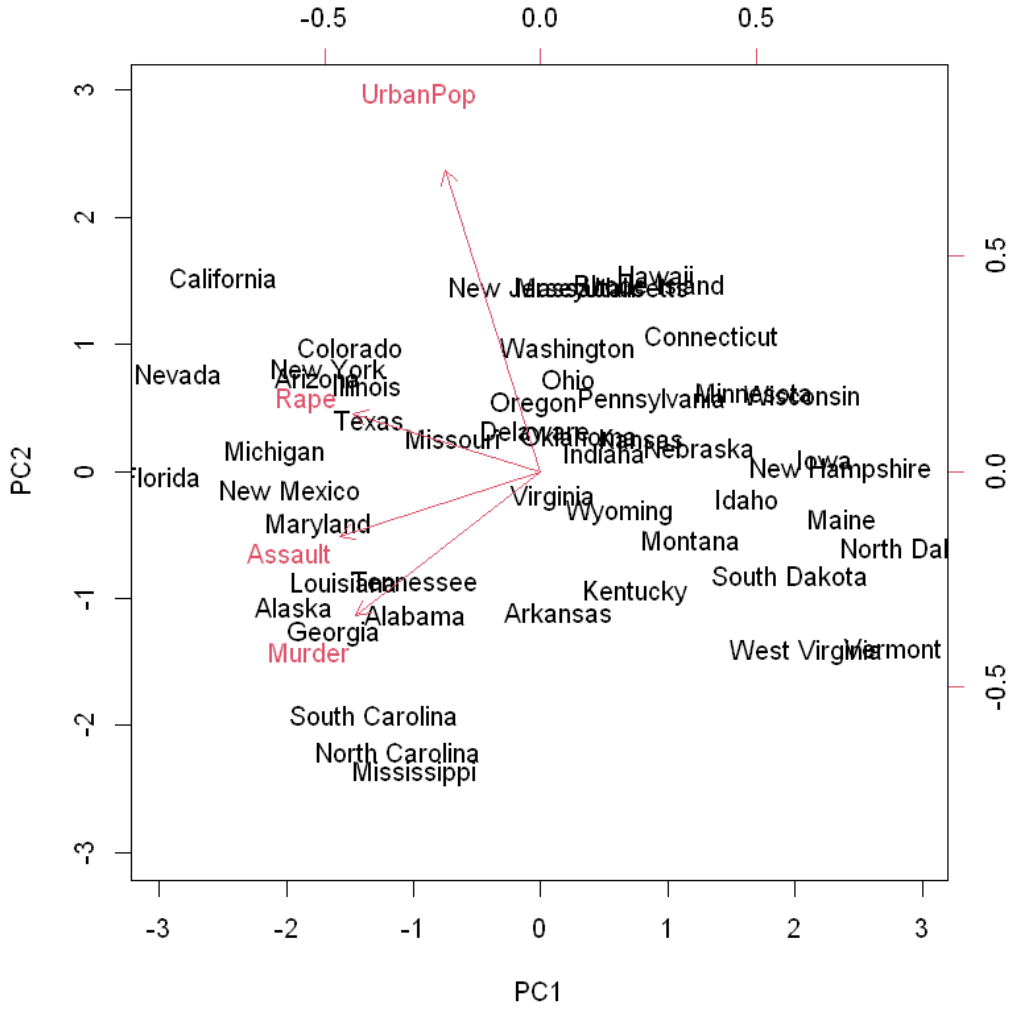
[8]:
```
print(pr.out$rotation)
```

```
                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
```

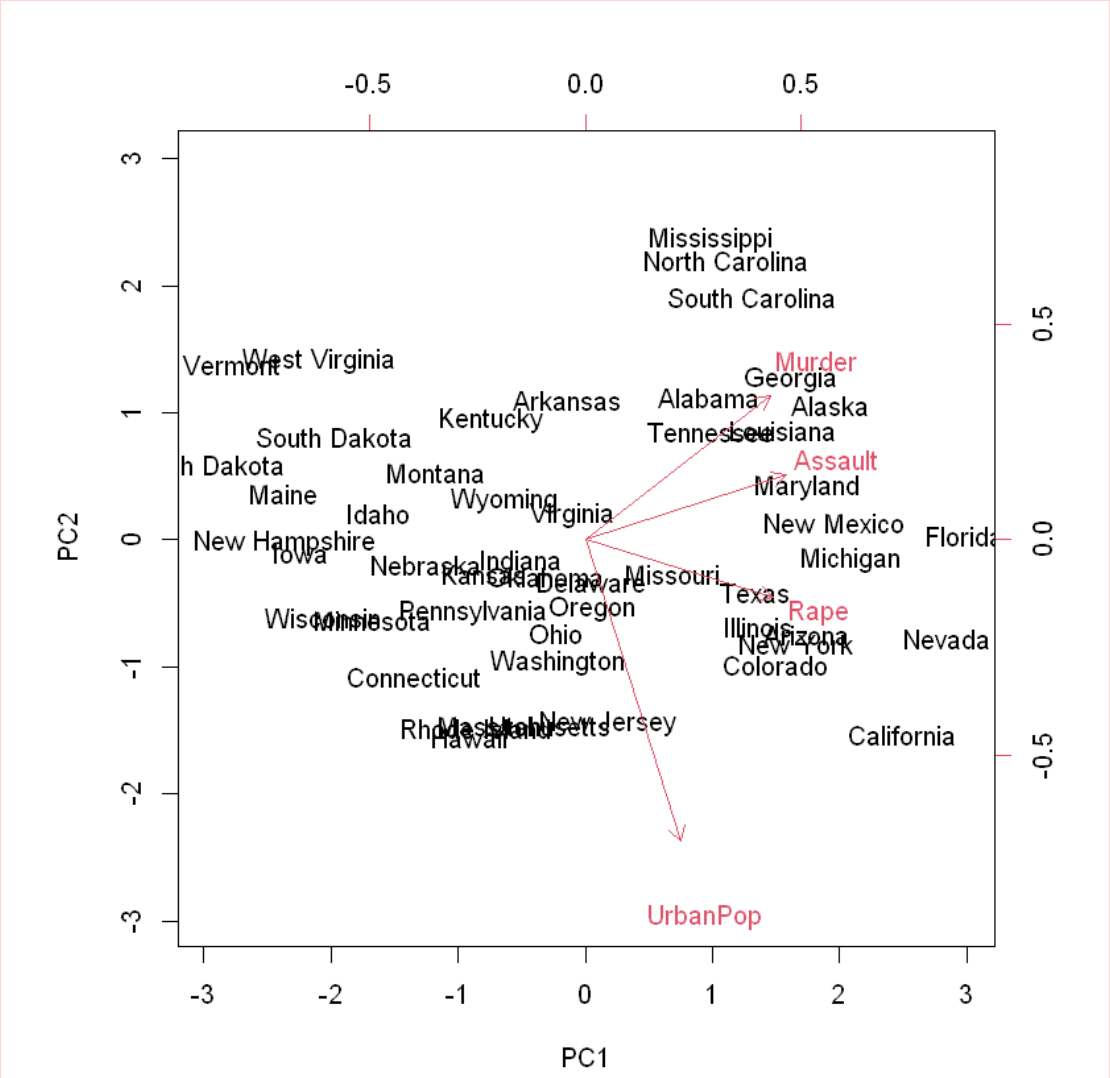
[9]:
```
print(dim(pr.out$x))
```

```
[1] 50  4
```

[10]:
```
biplot (pr.out , scale =0)
```



[11]:
```
pr.out$rotation=-pr.out$rotation
pr.out$x=-pr.out$x
biplot (pr.out , scale =0)
```



[12]:
```
print(pr.out$sdev)
```

```
[1] 1.5748783 0.9948694 0.5971291 0.4164494
```

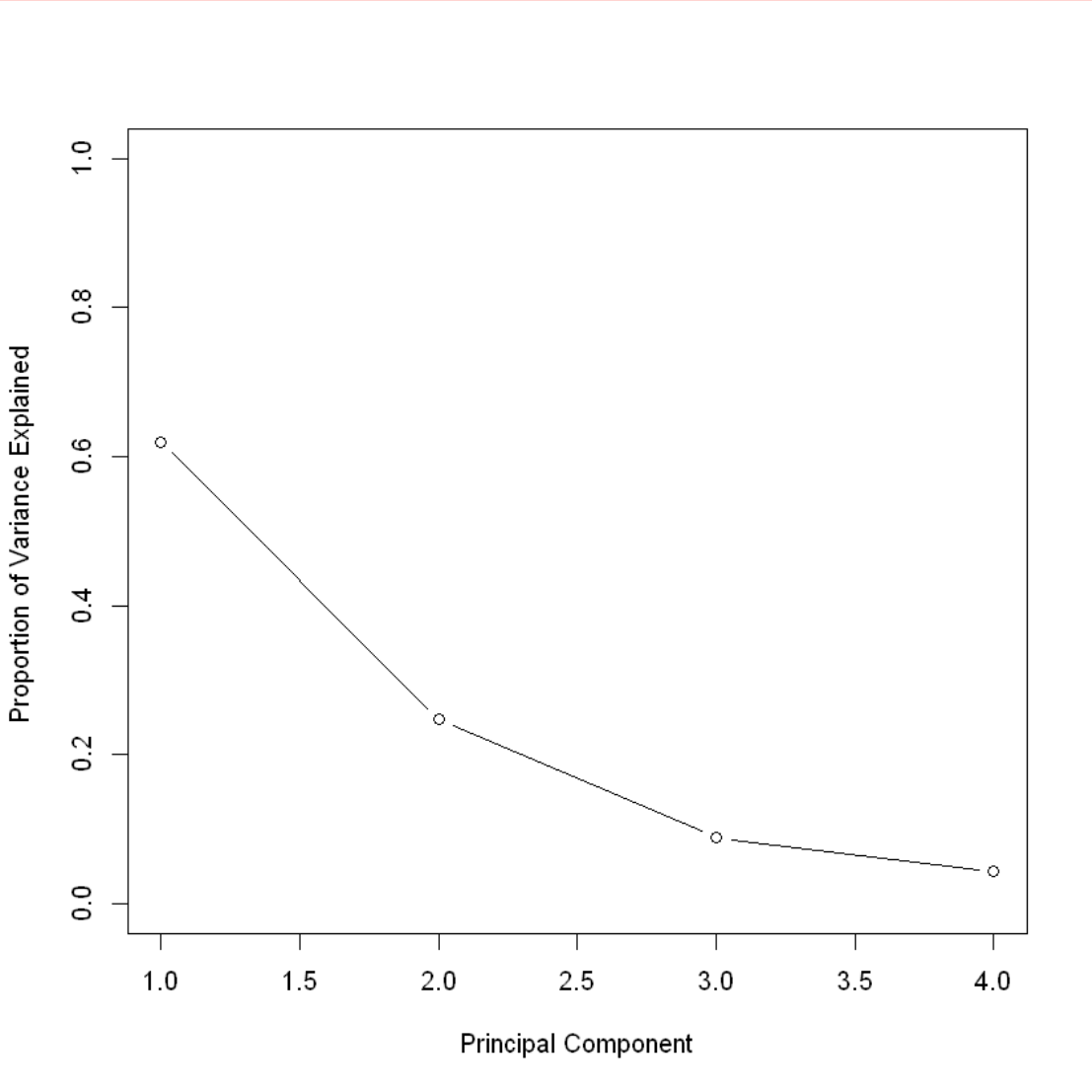
[13]:
```
pr.var=pr.out$sdev ^2
print(pr.var)
```

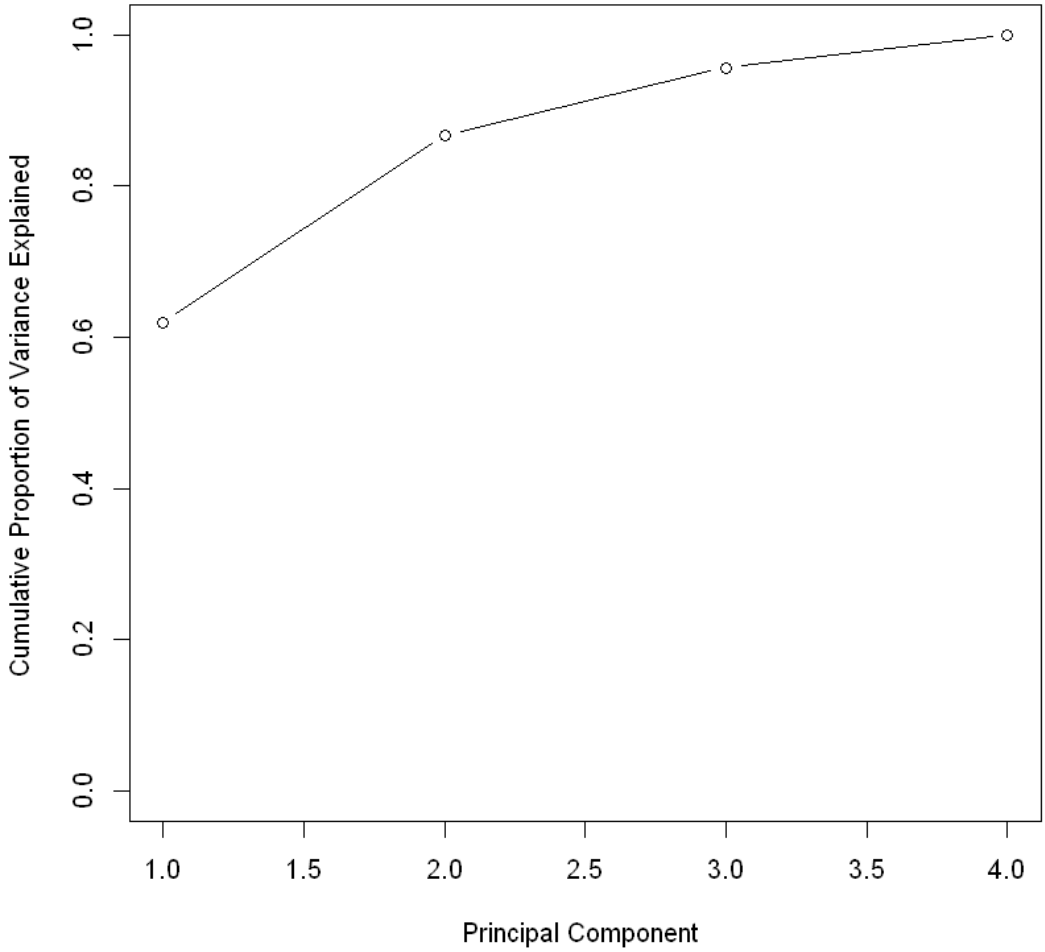
```
[1] 2.4802416 0.9897652 0.3565632 0.1734301
```

[14]:
```
pve=pr.var/sum(pr.var)
print(pve)
```

```
[1] 0.62006039 0.24744129 0.08914080 0.04335752
```

[16]:
```
plot(pve , xlab=" Principal Component ", ylab="Proportion of Variance Explained
", ylim=c(0,1),type='b')
plot(cumsum(pve), xlab="Principal Component ", ylab="Cumulative Proportion of
Variance Explained ", ylim=c(0,1), type='b')
```




Cumulative Proportion of Variance Explained
0.0
0.2
0.4
0.6
0.8
1.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Principal Component

[ ]: