

# MVA3.r

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```
wisc_bc_df <- read.csv("C://Users//Yshah//Downloads//Rutgers Sem 2//MVA//wisc_bc_data.csv")
head(wisc_bc_df)
```

```
##      id diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1 87139402      B      12.32      12.39      78.85      464.1
## 2 8910251      B      10.60      18.95      69.28      346.4
## 3 905520      B      11.04      16.83      70.92      373.2
## 4 868871      B      11.28      13.39      73.00      384.8
## 5 9012568      B      15.19      13.21      97.65      711.8
## 6 906539      B      11.57      19.04      74.20      409.7
## smoothness_mean compactness_mean concavity_mean points_mean
## 1      0.10280      0.06981      0.03987      0.03700
## 2      0.09688      0.11470      0.06387      0.02642
## 3      0.10770      0.07804      0.03046      0.02480
## 4      0.11640      0.11360      0.04635      0.04796
## 5      0.07963      0.06934      0.03393      0.02657
## 6      0.08546      0.07722      0.05485      0.01428
## symmetry_mean dimension_mean radius_se texture_se perimeter_se area_se
## 1      0.1959      0.05955      0.2360      0.6656      1.670      17.43
## 2      0.1922      0.06491      0.4505      1.1970      3.430      27.10
## 3      0.1714      0.06340      0.1967      1.3870      1.342      13.54
## 4      0.1771      0.06072      0.3384      1.3430      1.851      26.33
## 5      0.1721      0.05544      0.1783      0.4125      1.338      17.72
## 6      0.2031      0.06267      0.2864      1.4400      2.206      20.30
## smoothness_se compactness_se concavity_se points_se symmetry_se
## 1      0.008045      0.011800      0.01683      0.012410      0.01924
## 2      0.007470      0.035810      0.03354      0.013650      0.03504
## 3      0.005158      0.009355      0.01056      0.007483      0.01718
## 4      0.011270      0.034980      0.02187      0.019650      0.01580
## 5      0.005012      0.014850      0.01551      0.009155      0.01647
## 6      0.007278      0.020470      0.04447      0.008799      0.01868
## dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1      0.002248      13.50      15.64      86.97      549.1
## 2      0.003318      11.88      22.94      78.28      424.8
## 3      0.002198      12.41      26.44      79.93      471.4
## 4      0.003442      11.92      15.77      76.53      434.0
## 5      0.001767      16.20      15.73      104.50      819.1
## 6      0.003339      13.07      26.98      86.43      520.5
## smoothness_worst compactness_worst concavity_worst points_worst
## 1      0.1385      0.1266      0.12420      0.09391
## 2      0.1213      0.2515      0.19160      0.07926
## 3      0.1369      0.1482      0.10670      0.07431
## 4      0.1367      0.1822      0.08669      0.08611
## 5      0.1126      0.1737      0.13620      0.08178
## 6      0.1249      0.1937      0.25600      0.06664
## symmetry_worst dimension_worst
## 1      0.2827      0.06771
## 2      0.2940      0.07587
## 3      0.2998      0.07881
## 4      0.2102      0.06784
## 5      0.2487      0.06766
## 6      0.3035      0.08284
```

```
#Renmaing the dataset
cancer<-wisc_bc_df
library("ggplot2")
library("corrplot")
```

```
## corrplot 0.84 loaded
```

```
library("reshape")
```

```
#number of observations and data type  
str(cancer)
```

```
## 'data.frame': 569 obs. of 32 variables:  
## $ id : int 87139402 8910251 905520 868871 9012568 906539 925291 87880 862989 89827 ...  
## $ diagnosis : Factor w/ 2 levels "B","M": 1 1 1 1 1 1 1 2 1 1 ...  
## $ radius_mean : num 12.3 10.6 11 11.3 15.2 ...  
## $ texture_mean : num 12.4 18.9 16.8 13.4 13.2 ...  
## $ perimeter_mean : num 78.8 69.3 70.9 73 97.7 ...  
## $ area_mean : num 464 346 373 385 712 ...  
## $ smoothness_mean : num 0.1028 0.0969 0.1077 0.1164 0.0796 ...  
## $ compactness_mean : num 0.0698 0.1147 0.078 0.1136 0.0693 ...  
## $ concavity_mean : num 0.0399 0.0639 0.0305 0.0464 0.0339 ...  
## $ points_mean : num 0.037 0.0264 0.0248 0.048 0.0266 ...  
## $ symmetry_mean : num 0.196 0.192 0.171 0.177 0.172 ...  
## $ dimension_mean : num 0.0595 0.0649 0.0634 0.0607 0.0554 ...  
## $ radius_se : num 0.236 0.451 0.197 0.338 0.178 ...  
## $ texture_se : num 0.666 1.197 1.387 1.343 0.412 ...  
## $ perimeter_se : num 1.67 3.43 1.34 1.85 1.34 ...  
## $ area_se : num 17.4 27.1 13.5 26.3 17.7 ...  
## $ smoothness_se : num 0.00805 0.00747 0.00516 0.01127 0.00501 ...  
## $ compactness_se : num 0.0118 0.03581 0.00936 0.03498 0.01485 ...  
## $ concavity_se : num 0.0168 0.0335 0.0106 0.0219 0.0155 ...  
## $ points_se : num 0.01241 0.01365 0.00748 0.01965 0.00915 ...  
## $ symmetry_se : num 0.0192 0.035 0.0172 0.0158 0.0165 ...  
## $ dimension_se : num 0.00225 0.00332 0.0022 0.00344 0.00177 ...  
## $ radius_worst : num 13.5 11.9 12.4 11.9 16.2 ...  
## $ texture_worst : num 15.6 22.9 26.4 15.8 15.7 ...  
## $ perimeter_worst : num 87 78.3 79.9 76.5 104.5 ...  
## $ area_worst : num 549 425 471 434 819 ...  
## $ smoothness_worst : num 0.139 0.121 0.137 0.137 0.113 ...  
## $ compactness_worst : num 0.127 0.252 0.148 0.182 0.174 ...  
## $ concavity_worst : num 0.1242 0.1916 0.1067 0.0867 0.1362 ...  
## $ points_worst : num 0.0939 0.0793 0.0743 0.0861 0.0818 ...  
## $ symmetry_worst : num 0.283 0.294 0.3 0.21 0.249 ...  
## $ dimension_worst : num 0.0677 0.0759 0.0788 0.0678 0.0677 ...
```

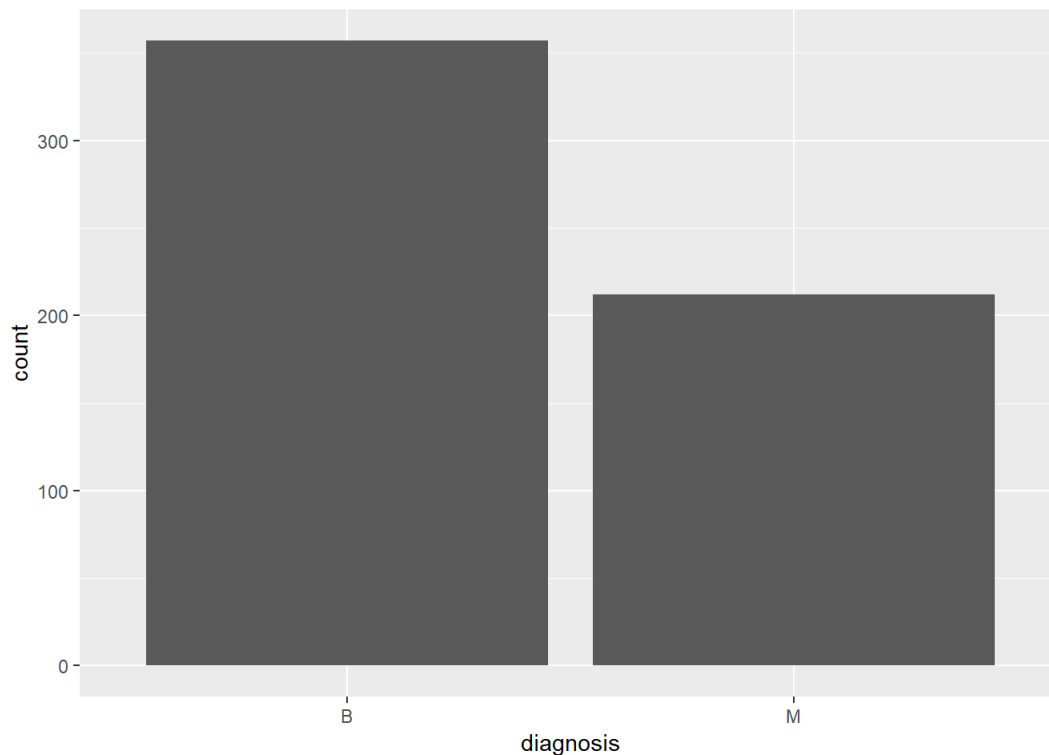
```
#gives you the summary of the dataset  
summary(cancer)
```

```
##      id      diagnosis radius_mean texture_mean
## Min.   :    8670    B:357   Min.    : 6.981   Min.    : 9.71
## 1st Qu.:   869218    M:212   1st Qu.:11.700   1st Qu.:16.17
## Median :    906024                Median :13.370   Median :18.84
## Mean   :   30371831                Mean   :14.127   Mean    :19.29
## 3rd Qu.:   8813129                3rd Qu.:15.780   3rd Qu.:21.80
## Max.   :  911320502                Max.    :28.110   Max.    :39.28
## perimeter_mean area_mean smoothness_mean compactness_mean
## Min.    : 43.79   Min.    : 143.5   Min.    :0.05263   Min.    :0.01938
## 1st Qu.: 75.17   1st Qu.: 420.3   1st Qu.:0.08637   1st Qu.:0.06492
## Median : 86.24   Median : 551.1   Median :0.09587   Median :0.09263
## Mean    : 91.97   Mean    : 654.9   Mean    :0.09636   Mean    :0.10434
## 3rd Qu.:104.10   3rd Qu.: 782.7   3rd Qu.:0.10530   3rd Qu.:0.13040
## Max.    :188.50   Max.    :2501.0   Max.    :0.16340   Max.    :0.34540
## concavity_mean points_mean symmetry_mean dimension_mean
## Min.    :0.00000   Min.    :0.00000   Min.    :0.1060   Min.    :0.04996
## 1st Qu.:0.02956   1st Qu.:0.02031   1st Qu.:0.1619   1st Qu.:0.05770
## Median :0.06154   Median :0.03350   Median :0.1792   Median :0.06154
## Mean    :0.08880   Mean    :0.04892   Mean    :0.1812   Mean    :0.06280
## 3rd Qu.:0.13070   3rd Qu.:0.07400   3rd Qu.:0.1957   3rd Qu.:0.06612
## Max.    :0.42680   Max.    :0.20120   Max.    :0.3040   Max.    :0.09744
## radius_se texture_se perimeter_se area_se
## Min.    :0.1115   Min.    :0.3602   Min.    : 0.757   Min.    : 6.802
## 1st Qu.:0.2324   1st Qu.:0.8339   1st Qu.: 1.606   1st Qu.:17.850
## Median :0.3242   Median :1.1080   Median : 2.287   Median :24.530
## Mean    :0.4052   Mean    :1.2169   Mean    : 2.866   Mean    :40.337
## 3rd Qu.:0.4789   3rd Qu.:1.4740   3rd Qu.: 3.357   3rd Qu.:45.190
## Max.    :2.8730   Max.    :4.8850   Max.    :21.980   Max.    :542.200
## smoothness_se compactness_se concavity_se
## Min.    :0.001713   Min.    :0.002252   Min.    :0.00000
## 1st Qu.:0.005169   1st Qu.:0.013080   1st Qu.:0.01509
## Median :0.006380   Median :0.020450   Median :0.02589
## Mean    :0.007041   Mean    :0.025478   Mean    :0.03189
## 3rd Qu.:0.008146   3rd Qu.:0.032450   3rd Qu.:0.04205
## Max.    :0.031130   Max.    :0.135400   Max.    :0.39600
## points_se symmetry_se dimension_se radius_worst
## Min.    :0.000000   Min.    :0.007882   Min.    :0.0008948   Min.    : 7.93
## 1st Qu.:0.007638   1st Qu.:0.015160   1st Qu.:0.0022480   1st Qu.:13.01
## Median :0.010930   Median :0.018730   Median :0.0031870   Median :14.97
## Mean    :0.011796   Mean    :0.020542   Mean    :0.0037949   Mean    :16.27
## 3rd Qu.:0.014710   3rd Qu.:0.023480   3rd Qu.:0.0045580   3rd Qu.:18.79
## Max.    :0.052790   Max.    :0.078950   Max.    :0.0298400   Max.    :36.04
## texture_worst perimeter_worst area_worst smoothness_worst
## Min.    :12.02   Min.    : 50.41   Min.    :185.2   Min.    :0.07117
## 1st Qu.:21.08   1st Qu.: 84.11   1st Qu.:515.3   1st Qu.:0.11660
## Median :25.41   Median : 97.66   Median :686.5   Median :0.13130
## Mean    :25.68   Mean    :107.26   Mean    :880.6   Mean    :0.13237
## 3rd Qu.:29.72   3rd Qu.:125.40   3rd Qu.:1084.0   3rd Qu.:0.14600
## Max.    :49.54   Max.    :251.20   Max.    :4254.0   Max.    :0.22260
## compactness_worst concavity_worst points_worst symmetry_worst
## Min.    :0.02729   Min.    :0.0000   Min.    :0.00000   Min.    :0.1565
## 1st Qu.:0.14720   1st Qu.:0.1145   1st Qu.:0.06493   1st Qu.:0.2504
## Median :0.21190   Median :0.2267   Median :0.09993   Median :0.2822
## Mean    :0.25427   Mean    :0.2722   Mean    :0.11461   Mean    :0.2901
## 3rd Qu.:0.33910   3rd Qu.:0.3829   3rd Qu.:0.16140   3rd Qu.:0.3179
## Max.    :1.05800   Max.    :1.2520   Max.    :0.29100   Max.    :0.6638
## dimension_worst
## Min.    :0.05504
## 1st Qu.:0.07146
## Median :0.08004
## Mean    :0.08395
## 3rd Qu.:0.09208
## Max.    :0.20750
```

```
#Gives you frequency table
diagnosis.table <- table(cancer$diagnosis)
diagnosis.table
```

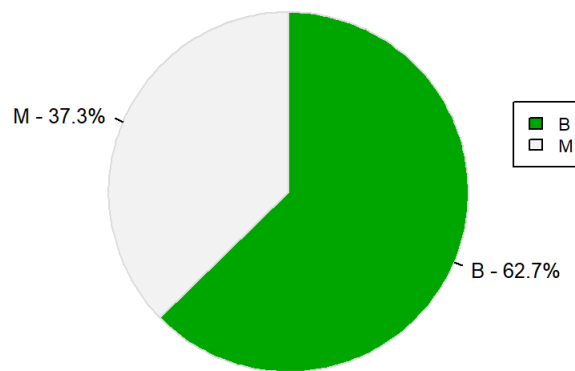
```
##  
##   B   M  
## 357 212
```

```
#Bar plot  
ggplot(data=cancer, aes(x=diagnosis)) + geom_bar(stat = "count")
```



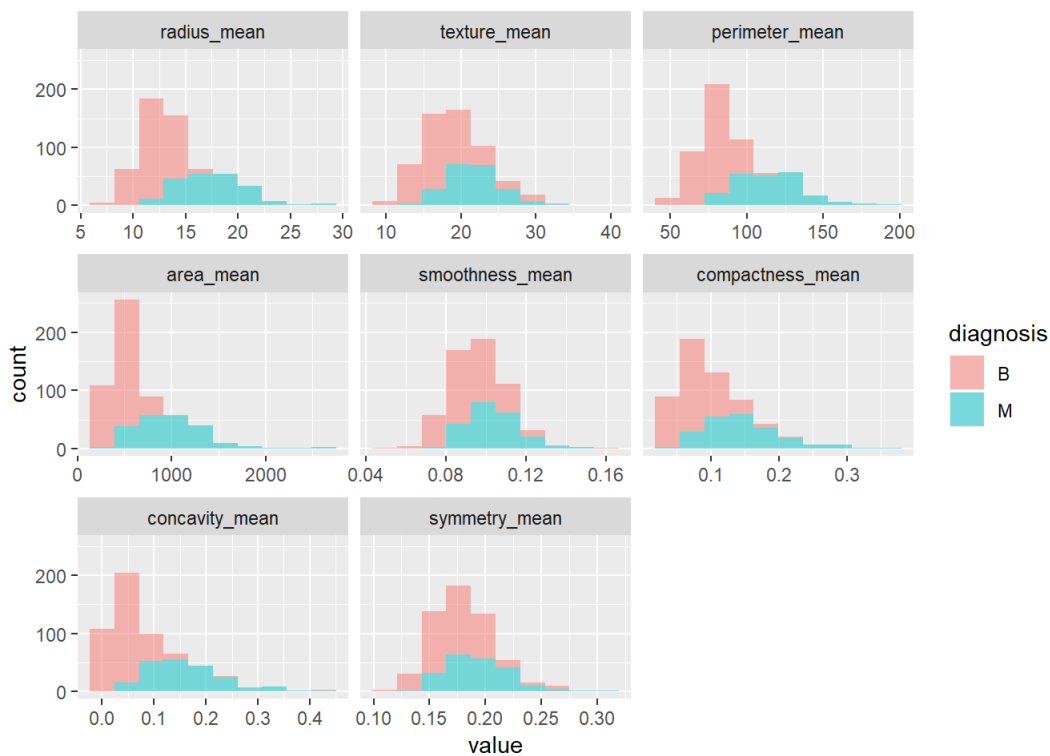
```
#Pie chart represented in frequency  
diagnosis.prop.table <- prop.table(diagnosis.table)*100  
diagnosis.prop.df <- as.data.frame(diagnosis.prop.table)  
pielabels <- sprintf("%s - %3.1f%s", diagnosis.prop.df[,1], diagnosis.prop.table, "%")  
colors <- terrain.colors(2)  
pie(diagnosis.prop.table,  
    labels=pielabels,  
    clockwise=TRUE,  
    col=colors,  
    border="gainsboro",  
    radius=0.8,  
    cex=0.8,  
    main="frequency of cancer diagnosis")  
legend(1, .4, legend=diagnosis.prop.df[,1], cex = 0.7, fill = colors)
```

## frequency of cancer diagnosis



```
#Plot histograms of "mean" variables group by diagnosis
data_mean <- cancer[,c("diagnosis", "radius_mean", "texture_mean", "perimeter_mean", "area_mean", "smoothness_mean", "compactness_mean", "concavity_mean", "symmetry_mean")]

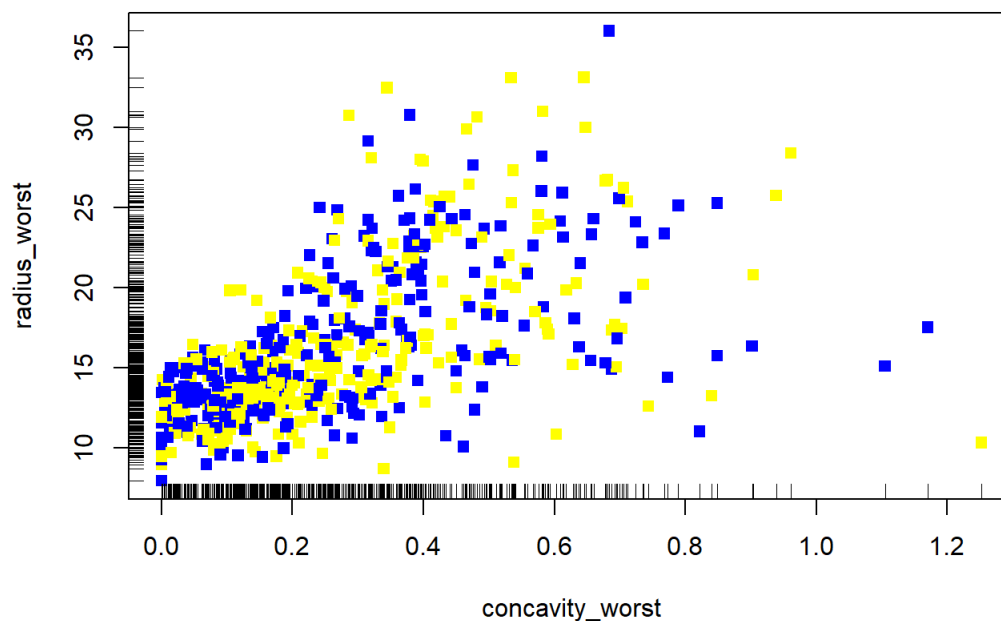
#Plot histograms
ggplot(data = melt(data_mean, id.var = "diagnosis"), mapping = aes(x = value)) +
  geom_histogram(bins = 10, aes(fill=diagnosis), alpha=0.5) + facet_wrap(~variable, scales = 'free_x')
```



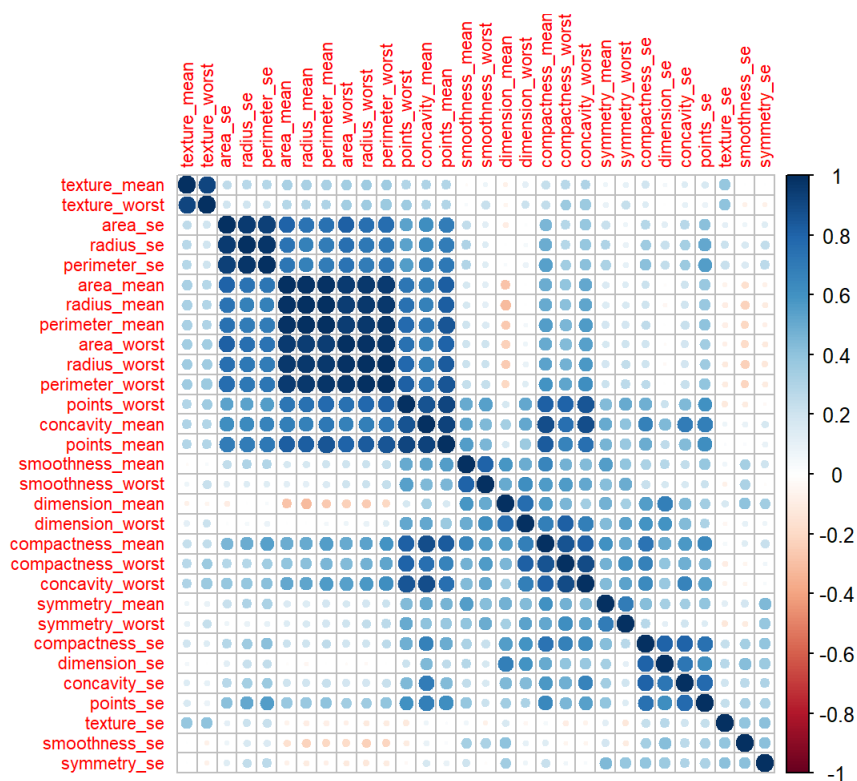
```
#Scatter plot of two variable (concavity again radius)
a <-cancer[,c('concavity_worst','radius_worst')]
plot(x = cancer$concavity_worst,y = cancer$radius_worst,
     xlab = "concavity_worst",
     ylab = "radius_worst",
     main = "Concavity_worst vs radius_worst",
     pch=15,col=c("blue","yellow"))
rug(cancer$concavity_worst, side = 1)

rug(cancer$radius_worst, side = 2)
```

Concavity\_worst vs radius\_worst

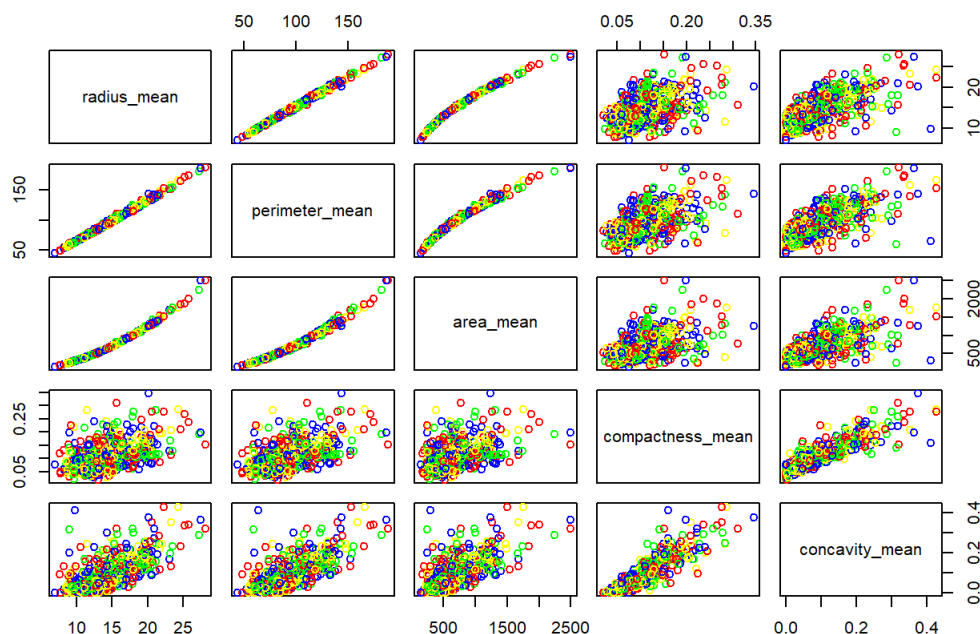


```
#Corelation Matrix of columns
corMatMy <- cor(cancer[,3:32])
corrplot(corMatMy, order = "hclust", tl.cex = 0.7)
```



```
#Scatterplot Matrix
pairs(~radius_mean+perimeter_mean+area_mean+compactness_mean+concavity_mean,data = cancer,main = "Scatterplot Matrix",col=c("blue","green","yellow","red"))
```

## Scatterplot Matrix



```
names(cancer)
```

```
## [1] "id" "diagnosis" "radius_mean"
## [4] "texture_mean" "perimeter_mean" "area_mean"
## [7] "smoothness_mean" "compactness_mean" "concavity_mean"
## [10] "points_mean" "symmetry_mean" "dimension_mean"
## [13] "radius_se" "texture_se" "perimeter_se"
## [16] "area_se" "smoothness_se" "compactness_se"
## [19] "concavity_se" "points_se" "symmetry_se"
## [22] "dimension_se" "radius_worst" "texture_worst"
## [25] "perimeter_worst" "area_worst" "smoothness_worst"
## [28] "compactness_worst" "concavity_worst" "points_worst"
## [31] "symmetry_worst" "dimension_worst"
```

```
#Multivariate analysis
#T TEST
with(data=cancer,t.test(radius_mean[diagnosis=="B"],radius_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: radius_mean[diagnosis == "B"] and radius_mean[diagnosis == "M"]
## t = -25.436, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -5.726832 -4.905781
## sample estimates:
## mean of x mean of y
## 12.14652 17.46283
```

```
with(data=cancer,t.test(texture_mean[diagnosis=="B"],texture_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: texture_mean[diagnosis == "B"] and texture_mean[diagnosis == "M"]
## t = -10.867, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -4.357107 -3.023181
## sample estimates:
## mean of x mean of y
## 17.91476 21.60491
```

```
with(data=cancer,t.test(perimeter_mean[diagnosis=="B"],perimeter_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: perimeter_mean[diagnosis == "B"] and perimeter_mean[diagnosis == "M"]
## t = -26.405, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -40.06379 -34.51615
## sample estimates:
## mean of x mean of y
## 78.07541 115.36538
```

```
with(data=cancer,t.test(area_mean[diagnosis=="B"],area_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: area_mean[diagnosis == "B"] and area_mean[diagnosis == "M"]
## t = -23.939, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -557.8898 -473.2826
## sample estimates:
## mean of x mean of y
## 462.7902 978.3764
```

```
with(data=cancer,t.test(smoothness_mean[diagnosis=="B"],smoothness_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: smoothness_mean[diagnosis == "B"] and smoothness_mean[diagnosis == "M"]
## t = -9.1461, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.012658756 -0.008182931
## sample estimates:
## mean of x mean of y
## 0.09247765 0.10289849
```

```
with(data=cancer,t.test(compactness_mean[diagnosis=="B"],compactness_mean[diagnosis=="M"],var.equal=TRUE))
```



```
##
## Two Sample t-test
##
## data: compactness_mean[diagnosis == "B"] and compactness_mean[diagnosis == "M"]
## t = -17.698, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.07232827 -0.05787805
## sample estimates:
## mean of x mean of y
## 0.08008462 0.14518778
```

```
with(data=cancer,t.test(concavity_mean[diagnosis=="B"],concavity_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: concavity_mean[diagnosis == "B"] and concavity_mean[diagnosis == "M"]
## t = -23.104, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.1244696 -0.1049646
## sample estimates:
## mean of x mean of y
## 0.04605762 0.16077472
```

```
with(data=cancer,t.test(points_mean[diagnosis=="B"],points_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: points_mean[diagnosis == "B"] and points_mean[diagnosis == "M"]
## t = -29.354, df = 567, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.06643938 -0.05810581
## sample estimates:
## mean of x mean of y
## 0.02571741 0.08799000
```

```
with(data=cancer,t.test(symmetry_mean[diagnosis=="B"],symmetry_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: symmetry_mean[diagnosis == "B"] and symmetry_mean[diagnosis == "M"]
## t = -8.3383, df = 567, p-value = 5.733e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.02313331 -0.01431262
## sample estimates:
## mean of x mean of y
## 0.174186 0.192909
```

```
with(data=cancer,t.test(dimension_mean[diagnosis=="B"],dimension_mean[diagnosis=="M"],var.equal=TRUE))
```

```
##
## Two Sample t-test
##
## data: dimension_mean[diagnosis == "B"] and dimension_mean[diagnosis == "M"]
## t = 0.30571, df = 567, p-value = 0.7599
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.001016083 0.001390684
## sample estimates:
## mean of x mean of y
## 0.06286739 0.06268009
```

```
#Hotelling's T2 test
#install.packages("Hotelling")
library(Hotelling)
```

```
## Loading required package: corpcor
```

```
t2testcan <- hotelling.test(radius_mean + texture_mean + perimeter_mean + area_mean + smoothness_mean + compactness_mean + concavity_mean + points_mean + symmetry_mean + dimension_mean ~ diagnosis, data=cancer)
# Output of the function hotelling.test is given
cat("T2 statistic =",t2testcan$stat[[1]],"\n")
```

```
## T2 statistic = 1220.313
```

```
#print(t2testcan)
# T2 statistic is located in the first element of the list "stat"
#View(t2testcan)
```

```
## Levene's tests based on absolute differences around means using t-tests. Standardizing the sparrows data set with scale()
matstand <- scale(cancer[,3:10])
head(matstand)
```

```
##      radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## [1,] -0.5128453 -1.60418301 -0.5399006 -0.5421468 0.4578825
## [2,] -1.0009202 -0.07896900 -0.9337442 -0.8766033 0.0369535
## [3,] -0.8760638 -0.57187353 -0.8662517 -0.8004484 0.8062867
## [4,] -0.8079604 -1.37168088 -0.7806514 -0.7674858 1.4248817
## [5,] 0.3015589 -1.41353126 0.2337944 0.1617181 -1.1895712
## [6,] -0.7256686 -0.05804381 -0.7312666 -0.6967299 -0.7750414
##      compactness_mean concavity_mean points_mean
## [1,] -0.6538379 -0.6137661 -0.30717196
## [2,] 0.1961461 -0.3127117 -0.57983238
## [3,] -0.4980044 -0.7318045 -0.62158190
## [4,] 0.1753178 -0.5324814 -0.02471844
## [5,] -0.6627373 -0.6882771 -0.57596668
## [6,] -0.5135309 -0.4258580 -0.89269604
```

```
matsurv <- matstand[cancer$diagnosis == "B",]
head(matsurv)
```

```
##      radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## [1,] -0.5128453 -1.60418301 -0.5399006 -0.5421468 0.4578825
## [2,] -1.0009202 -0.07896900 -0.9337442 -0.8766033 0.0369535
## [3,] -0.8760638 -0.57187353 -0.8662517 -0.8004484 0.8062867
## [4,] -0.8079604 -1.37168088 -0.7806514 -0.7674858 1.4248817
## [5,] 0.3015589 -1.41353126 0.2337944 0.1617181 -1.1895712
## [6,] -0.7256686 -0.05804381 -0.7312666 -0.6967299 -0.7750414
##      compactness_mean concavity_mean points_mean
## [1,] -0.6538379 -0.6137661 -0.30717196
## [2,] 0.1961461 -0.3127117 -0.57983238
## [3,] -0.4980044 -0.7318045 -0.62158190
## [4,] 0.1753178 -0.5324814 -0.02471844
## [5,] -0.6627373 -0.6882771 -0.57596668
## [6,] -0.5135309 -0.4258580 -0.89269604
```

```
matnosurv <- matstand[cancer$diagnosis == "M",]
vecmediansurv <- apply(matsurv, 2, median)
# in the above 2 represents column. Hence, we are asking for column median
vecmediansurv
```

```
##      radius_mean texture_mean perimeter_mean area_mean
##      -0.5468970 -0.4416723 -0.5674737 -0.5583439
## smoothness_mean compactness_mean concavity_mean points_mean
##      -0.3981961 -0.5500751 -0.6486382 -0.6566309
```

```
vecmediannosurv <- apply(matnosurv, 2, median)
matabsdevsurv <- abs(matsurv - matrix(rep(vecmediansurv,nrow(matsurv)),nrow=nrow(matsurv), byrow=TRUE))

matabsdevnosurv <- abs(matnosurv - matrix(rep(vecmediannosurv,nrow(matnosurv)),nrow=nrow(matnosurv), byrow=TRUE))

head(matabsdevnosurv)
```

```
##      radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## [1,] 0.9974323 0.53242989 0.9317263 0.9496635 2.14019666
## [2,] 0.9264911 0.05115047 0.9712341 1.1025417 0.44794814
## [3,] 0.6427266 0.82305756 0.5555789 0.7359750 0.07110288
## [4,] 0.7846089 0.55800512 0.8436568 0.8951047 0.41239670
## [5,] 1.0002699 1.31828711 0.9782303 0.9885934 0.10665432
## [6,] 0.5746231 0.88583314 0.4856171 0.5671838 0.42661727
##      compactness_mean concavity_mean points_mean
## [1,] 0.84165269 0.05582051 0.14122676
## [2,] 0.60686094 0.84608833 0.66541513
## [3,] 0.63696730 0.17749666 0.11210518
## [4,] 0.97419643 0.96525570 1.07517890
## [5,] 0.08236646 0.92147737 0.91720079
## [6,] 0.70721548 0.21261968 0.03169871
```

```
matabsdev.all <- rbind(matabsdevsurv,matabsdevnosurv)
matabsdev.all <- data.frame(cancer$diagnosis, matabsdev.all)

t.test(matabsdev.all$radius_mean[cancer$diagnosis == "B"],matabsdev.all$radius_mean[cancer$diagnosis == "M"],
, alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$radius_mean[cancer$diagnosis == "B"] and matabsdev.all$radius_mean[cancer$diagnosis == "M"]
## t = 0.32562, df = 567, p-value = 0.6276
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.07485419
## sample estimates:
## mean of x mean of y
## 0.5301158 0.5177632
```

```
t.test(matabsdev.all$texture_mean[cancer$diagnosis == "B"],matabsdev.all$texture_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$texture_mean[cancer$diagnosis == "B"] and matabsdev.all$texture_mean[cancer$diagnosis == "M"]
## t = -2.1618, df = 567, p-value = 0.01553
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf -0.02723094
## sample estimates:
## mean of x mean of y
## 0.6364762 0.7509490
```

```
t.test(matabsdev.all$perimeter_mean[cancer$diagnosis == "B"],matabsdev.all$perimeter_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$perimeter_mean[cancer$diagnosis == "B"] and matabsdev.all$perimeter_mean[cancer$diagnosis == "M"]
## t = 0.2439, df = 567, p-value = 0.5963
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.07148672
## sample estimates:
## mean of x mean of y
## 0.5125724 0.5033541
```

```
t.test(matabsdev.all$area_mean[cancer$diagnosis == "B"],matabsdev.all$area_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$area_mean[cancer$diagnosis == "B"] and matabsdev.all$area_mean[cancer$diagnosis == "M"]
## t = 0.40112, df = 567, p-value = 0.6558
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.0909786
## sample estimates:
## mean of x mean of y
## 0.4981297 0.4803166
```

```
t.test(matabsdev.all$smoothness_mean[cancer$diagnosis == "B"],matabsdev.all$smoothness_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$smoothness_mean[cancer$diagnosis == "B"] and matabsdev.all$smoothness_mean[cancer$diagnosis == "M"]
## t = 1.6742, df = 567, p-value = 0.9527
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.167207
## sample estimates:
## mean of x mean of y
## 0.7680704 0.6837950
```

```
t.test(matabsdev.all$compactness_mean[cancer$diagnosis == "B"],matabsdev.all$compactness_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$compactness_mean[cancer$diagnosis == "B"] and matabsdev.all$compactness_mean[cancer$diagnosis == "M"]
## t = 1.8406, df = 567, p-value = 0.9669
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.1710355
## sample estimates:
## mean of x mean of y
## 0.6249227 0.5346711
```

```
t.test(matabsdev.all$concavity_mean[cancer$diagnosis == "B"],matabsdev.all$concavity_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$concavity_mean[cancer$diagnosis == "B"] and matabsdev.all$concavity_mean[cancer$diagnosis == "M"]
## t = 1.0995, df = 567, p-value = 0.864
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.1302286
## sample estimates:
## mean of x mean of y
## 0.4977532 0.4456302
```

```
t.test(matabsdev.all$points_mean[cancer$diagnosis == "B"],matabsdev.all$points_mean[cancer$diagnosis == "M"], alternative="less",var.equal = TRUE)
```

```
##
## Two Sample t-test
##
## data: matabsdev.all$points_mean[cancer$diagnosis == "B"] and matabsdev.all$points_mean[cancer$diagnosis == "M"]
## t = 0.31387, df = 567, p-value = 0.6231
## alternative hypothesis: true difference in means is less than 0
## 95 percent confidence interval:
##      -Inf 0.07740908
## sample estimates:
## mean of x mean of y
## 0.4434506 0.4310634
```

```
head(matstand)
```

```
##      radius_mean texture_mean perimeter_mean area_mean smoothness_mean
## [1,] -0.5128453 -1.60418301 -0.5399006 -0.5421468 0.4578825
## [2,] -1.0009202 -0.07896900 -0.9337442 -0.8766033 0.0369535
## [3,] -0.8760638 -0.57187353 -0.8662517 -0.8004484 0.8062867
## [4,] -0.8079604 -1.37168088 -0.7806514 -0.7674858 1.4248817
## [5,] 0.3015589 -1.41353126 0.2337944 0.1617181 -1.1895712
## [6,] -0.7256686 -0.05804381 -0.7312666 -0.6967299 -0.7750414
##      compactness_mean concavity_mean points_mean
## [1,] -0.6538379 -0.6137661 -0.30717196
## [2,] 0.1961461 -0.3127117 -0.57983238
## [3,] -0.4980044 -0.7318045 -0.62158190
## [4,] 0.1753178 -0.5324814 -0.02471844
## [5,] -0.6627373 -0.6882771 -0.57596668
## [6,] -0.5135309 -0.4258580 -0.89269604
```

```
matstand.all <- data.frame(cancer$diagnosis, matstand)
head(matstand.all)
```

```
## cancer.diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1 B -0.5128453 -1.60418301 -0.5399006 -0.5421468
## 2 B -1.0009202 -0.07896900 -0.9337442 -0.8766033
## 3 B -0.8760638 -0.57187353 -0.8662517 -0.8004484
## 4 B -0.8079604 -1.37168088 -0.7806514 -0.7674858
## 5 B 0.3015589 -1.41353126 0.2337944 0.1617181
## 6 B -0.7256686 -0.05804381 -0.7312666 -0.6967299
## smoothness_mean compactness_mean concavity_mean points_mean
## 1 0.4578825 -0.6538379 -0.6137661 -0.30717196
## 2 0.0369535 0.1961461 -0.3127117 -0.57983238
## 3 0.8062867 -0.4980044 -0.7318045 -0.62158190
## 4 1.4248817 0.1753178 -0.5324814 -0.02471844
## 5 -1.1895712 -0.6627373 -0.6882771 -0.57596668
## 6 -0.7750414 -0.5135309 -0.4258580 -0.89269604
```

```
colnames(matstand.all) <- colnames(cancer[2:10])
t2testcan <- hotelling.test(radius_mean + texture_mean + perimeter_mean + area_mean + smoothness_mean + compactness_mean + concavity_mean + points_mean + symmetry_mean + dimension_mean ~ diagnosis, data=cancer)
cat("T2 statistic =",t2testcan$stat[[1]],"\n")
```

```
## T2 statistic = 1220.313
```

```
print(t2testcan)
```

```
## Test stat: 120.09
## Numerator df: 10
## Denominator df: 558
## P-value: 0
```

```
# In the above we standardized using scale function
head(matabsdev.all)
```

```
## cancer.diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1 B 0.03405174 1.1625107 0.02757317 0.01619713
## 2 B 0.45402322 0.3627033 0.36627050 0.31825946
## 3 B 0.32916684 0.1302012 0.29877796 0.24210452
## 4 B 0.26106335 0.9300085 0.21317766 0.20914193
## 5 B 0.84845589 0.9718589 0.80126817 0.72006202
## 6 B 0.17877164 0.3836285 0.16379288 0.13838603
## smoothness_mean compactness_mean concavity_mean points_mean
## 1 0.8560787 0.10376281 0.03487214 0.34945891
## 2 0.4351496 0.74622121 0.33592655 0.07679849
## 3 1.2044828 0.05207075 0.08316628 0.03504898
## 4 1.8230778 0.72539291 0.11615683 0.63191243
## 5 0.7913750 0.11266217 0.03963883 0.08066419
## 6 0.3768453 0.03654420 0.22278026 0.23606517
```

```
#install.packages("car")
library(car)
```

```
## Loading required package: carData
```

```
#leveneTest() produces a two-sided test
# Levene test is used to verify Homoscedasticity. It tests if the variance of two samples are #equal. Levene's test is an inferential statistic used to assess the equality of variances for a #variable calculated for two or more groups.[1] Some common statistical procedures assume that #variances of the populations from which different samples are drawn are equal. Levene's test #assesses this assumption.
leveneTest(radius_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  90.477 < 2.2e-16 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(texture_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1   0.684 0.4086
##      567
```

```
leveneTest(perimeter_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  91.237 < 2.2e-16 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(area_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1 170.21 < 2.2e-16 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(smoothness_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  0.8377 0.3604
##      567
```

```
leveneTest(compactness_mean~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  39.892 5.428e-10 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(concavity_mean~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  70.484 3.723e-16 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(points_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  94.906 < 2.2e-16 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
leveneTest(symmetry_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  1   2.036 0.1542
##      567
```

```
leveneTest(dimension_mean ~ diagnosis, data=cancer)
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value  Pr(>F)
## group  1   6.113 0.01371 *
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
#PCA Analysis
```

```
#PCA
```

```
dim(cancer)
```

```
## [1] 569 32
```

```
attach(cancer)
```

```
head(cancer)
```



```
##      id diagnosis radius_mean texture_mean perimeter_mean area_mean
## 1  87139402      B      12.32      12.39      78.85      464.1
## 2  8910251      B      10.60      18.95      69.28      346.4
## 3   905520      B      11.04      16.83      70.92      373.2
## 4   868871      B      11.28      13.39      73.00      384.8
## 5   9012568      B      15.19      13.21      97.65      711.8
## 6   906539      B      11.57      19.04      74.20      409.7
## smoothness_mean compactness_mean concavity_mean points_mean
## 1      0.10280      0.06981      0.03987      0.03700
## 2      0.09688      0.11470      0.06387      0.02642
## 3      0.10770      0.07804      0.03046      0.02480
## 4      0.11640      0.11360      0.04635      0.04796
## 5      0.07963      0.06934      0.03393      0.02657
## 6      0.08546      0.07722      0.05485      0.01428
## symmetry_mean dimension_mean radius_se texture_se perimeter_se area_se
## 1      0.1959      0.05955      0.2360      0.6656      1.670      17.43
## 2      0.1922      0.06491      0.4505      1.1970      3.430      27.10
## 3      0.1714      0.06340      0.1967      1.3870      1.342      13.54
## 4      0.1771      0.06072      0.3384      1.3430      1.851      26.33
## 5      0.1721      0.05544      0.1783      0.4125      1.338      17.72
## 6      0.2031      0.06267      0.2864      1.4400      2.206      20.30
## smoothness_se compactness_se concavity_se points_se symmetry_se
## 1      0.008045      0.011800      0.01683      0.012410      0.01924
## 2      0.007470      0.035810      0.03354      0.013650      0.03504
## 3      0.005158      0.009355      0.01056      0.007483      0.01718
## 4      0.011270      0.034980      0.02187      0.019650      0.01580
## 5      0.005012      0.014850      0.01551      0.009155      0.01647
## 6      0.007278      0.020470      0.04447      0.008799      0.01868
## dimension_se radius_worst texture_worst perimeter_worst area_worst
## 1      0.002248      13.50      15.64      86.97      549.1
## 2      0.003318      11.88      22.94      78.28      424.8
## 3      0.002198      12.41      26.44      79.93      471.4
## 4      0.003442      11.92      15.77      76.53      434.0
## 5      0.001767      16.20      15.73      104.50      819.1
## 6      0.003339      13.07      26.98      86.43      520.5
## smoothness_worst compactness_worst concavity_worst points_worst
## 1      0.1385      0.1266      0.12420      0.09391
## 2      0.1213      0.2515      0.19160      0.07926
## 3      0.1369      0.1482      0.10670      0.07431
## 4      0.1367      0.1822      0.08669      0.08611
## 5      0.1126      0.1737      0.13620      0.08178
## 6      0.1249      0.1937      0.25600      0.06664
## symmetry_worst dimension_worst
## 1      0.2827      0.06771
## 2      0.2940      0.07587
## 3      0.2998      0.07881
## 4      0.2102      0.06784
## 5      0.2487      0.06766
## 6      0.3035      0.08284
```

```
#Get the Correlations between the measurements
head(cor(cancer[-2]))
```

```

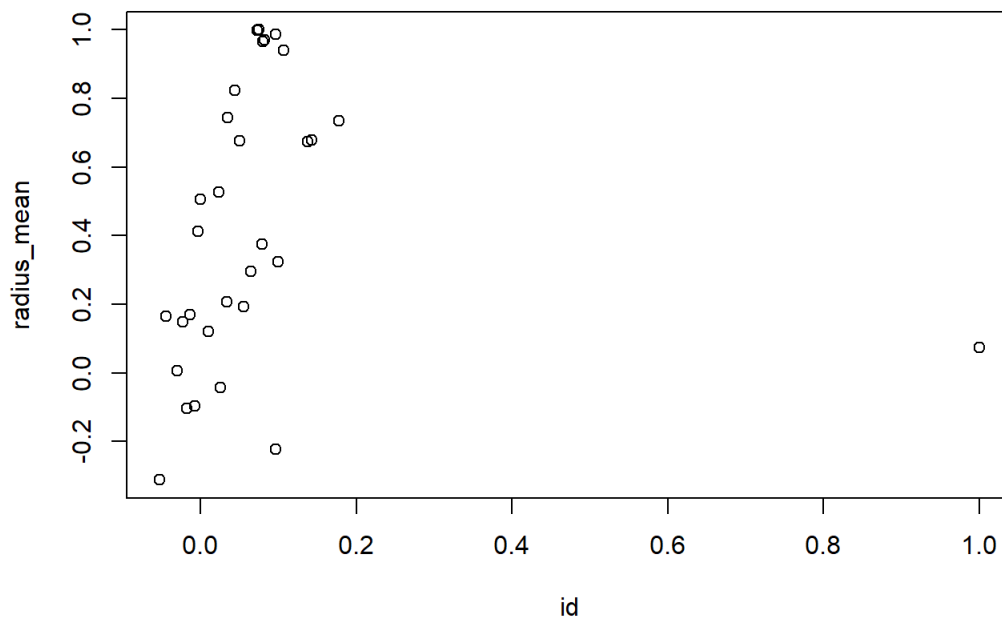
##          id radius_mean texture_mean perimeter_mean
## id          1.00000000  0.07462647   0.09976989   0.07315941
## radius_mean  0.07462647  1.00000000   0.32378189   0.99785528
## texture_mean 0.09976989  0.32378189   1.00000000   0.32953306
## perimeter_mean 0.07315941 0.99785528   0.32953306   1.00000000
## area_mean    0.09689282  0.98735717   0.32108570   0.98650680
## smoothness_mean -0.01296820 0.17058119 -0.02338852   0.20727816
##          area_mean smoothness_mean compactness_mean concavity_mean
## id          0.09689282 -0.01296820   0.0000957011   0.05007995
## radius_mean  0.98735717   0.17058119   0.5061235775   0.67676355
## texture_mean 0.32108570 -0.02338852   0.2367022221   0.30241783
## perimeter_mean 0.98650680   0.20727816   0.5569362109   0.71613565
## area_mean    1.00000000   0.17702838   0.4985016822   0.68598283
## smoothness_mean 0.17702838  1.00000000   0.6591232152   0.52198377
##          points_mean symmetry_mean dimension_mean radius_se
## id          0.0441581 -0.02211406 -0.05251145  0.1430476
## radius_mean  0.8225285  0.14774124 -0.31163083  0.6790904
## texture_mean  0.2934641  0.07140098 -0.07643718  0.2758687
## perimeter_mean 0.8509770  0.18302721 -0.26147691  0.6917650
## area_mean    0.8232689  0.15129308 -0.28310981  0.7325622
## smoothness_mean 0.5536952  0.55777479   0.58479200  0.3014671
##          texture_se perimeter_se   area_se smoothness_se
## id          -0.00752619  0.1373311 0.1777419   0.096780574
## radius_mean  -0.09731744  0.6741716 0.7358637  -0.222600125
## texture_mean  0.38635762  0.2816731 0.2598450   0.006613777
## perimeter_mean -0.08676108  0.6931349 0.7449827  -0.202694026
## area_mean    -0.06628021  0.7266283 0.8000859  -0.166776667
## smoothness_mean 0.06840645  0.2960919 0.2465524   0.332375443
##          compactness_se concavity_se points_se symmetry_se
## id          0.03396097  0.05523932 0.07876807 -0.017306295
## radius_mean  0.20599998  0.19420362 0.37616896 -0.104320881
## texture_mean  0.19197461  0.14329308 0.16385103  0.009127168
## perimeter_mean 0.25074368  0.22808235 0.40721692 -0.081629327
## area_mean    0.21258255  0.20766006 0.37232028 -0.072496588
## smoothness_mean 0.31894330  0.24839568 0.38067569  0.200774376
##          dimension_se radius_worst texture_worst perimeter_worst
## id          0.025725324  0.08240534  0.06471955   0.07998587
## radius_mean -0.042641269  0.96953897  0.29700764   0.96513651
## texture_mean 0.054457520  0.35257295  0.91204459   0.35803958
## perimeter_mean -0.005523391  0.96947636  0.30303837   0.97038689
## area_mean    -0.019886963  0.96274609  0.28748863   0.95911957
## smoothness_mean 0.283606699  0.21312014  0.03607180   0.23885263
##          area_worst smoothness_worst compactness_worst
## id          0.1071865  0.01033803 -0.0029681
## radius_mean  0.9410825  0.11961614  0.4134628
## texture_mean 0.3435459  0.07750336  0.2778296
## perimeter_mean 0.9415498  0.15054940  0.4557742
## area_mean    0.9592133  0.12352294  0.3904103
## smoothness_mean 0.2067184  0.80532420  0.4724684
##          concavity_worst points_worst symmetry_worst
## id          0.02320274  0.03517358 -0.04422425
## radius_mean  0.52691146  0.74421420  0.16395333
## texture_mean  0.30102522  0.29531584  0.10500791
## perimeter_mean 0.56387926  0.77124079  0.18911504
## area_mean    0.51260592  0.72201663  0.14356991
## smoothness_mean 0.43492571  0.50305335  0.39430948
##          dimension_worst
## id          -0.029865636
## radius_mean  0.007065886
## texture_mean  0.119205351
## perimeter_mean 0.051018530
## area_mean    0.003737597
## smoothness_mean 0.499316369

```

```

c <- (cor(cancer[-2]))
plot(c)

```



```
# Using prcomp to compute the principal components (eigenvalues and eigenvectors). With scale=TRUE, variable
means are set to zero, and variances set to one
cancer_pca <- prcomp(cancer[, -2], scale=TRUE)
head(cancer_pca)
```

```
## $sdev
## [1] 3.64527878 2.38679814 1.68386313 1.40760690 1.28406203 1.11115827
## [7] 0.98907696 0.81960537 0.67881693 0.63492763 0.59089337 0.54211662
## [13] 0.51102537 0.49125372 0.39619900 0.30680373 0.28250655 0.24299439
## [19] 0.22932770 0.22163467 0.17626907 0.17303527 0.16562163 0.15572098
## [25] 0.13431069 0.12441756 0.09039745 0.08305482 0.03986650 0.02735646
## [31] 0.01153431
##
## $rotation
##           PC1           PC2           PC3           PC4
## id          -0.02291216  0.034068491  0.096938436 -0.026598045
## radius_mean  -0.21891302  0.233271401 -0.011393786  0.042187950
## texture_mean  -0.10384388  0.060044199  0.066892342 -0.602954308
## perimeter_mean -0.22753491  0.214589002 -0.012124791  0.042752797
## area_mean     -0.22104577  0.230668816  0.026293150  0.054114724
## smoothness_mean -0.14241471 -0.186422211 -0.103182400  0.158098177
## compactness_mean -0.23906730 -0.152454726 -0.074768623  0.031818117
## concavity_mean -0.25828025 -0.060541625  0.001758736  0.019497124
## points_mean   -0.26073811  0.034167392 -0.027579607  0.065785353
## symmetry_mean  -0.13797774 -0.190684979 -0.040962032  0.067502543
## dimension_mean -0.06414779 -0.366531055 -0.020817875  0.047957856
## radius_se      -0.20611747  0.105935702  0.266917221  0.099114446
## texture_se      -0.01741339 -0.089547789  0.371439885 -0.356497230
## perimeter_se    -0.21144652  0.089807043  0.264925682  0.090293055
## area_se         -0.20307642  0.152771289  0.215790250  0.108568705
## smoothness_se   -0.01467821 -0.203189876  0.311787845  0.044368664
## compactness_se  -0.17028840 -0.232503362  0.154557465 -0.026425360
## concavity_se    -0.15354367 -0.196846081  0.176560052  0.002248291
## points_se       -0.18340675 -0.129965181  0.223850479  0.075252232
## symmetry_se     -0.04241552 -0.183558627  0.285265066  0.046936126
## dimension_se    -0.10249607 -0.279584139  0.211893354  0.016212450
## radius_worst    -0.22800935  0.219296044 -0.049406340  0.015659705
## texture_worst   -0.10451545  0.045501223 -0.039828934 -0.633119655
## perimeter_worst -0.23663734  0.199295985 -0.050431945  0.014068572
## area_worst      -0.22493214  0.218985461 -0.013188891  0.025970672
## smoothness_worst -0.12782441 -0.172562959 -0.255328751  0.014523359
## compactness_worst -0.20988456 -0.144253637 -0.234513609 -0.092562168
## concavity_worst -0.22860218 -0.098526524 -0.172024941 -0.074807188
## points_worst    -0.25074620  0.007534367 -0.170480673  0.005305980
##
```

## symmetry_worst	-0.12267993	-0.142619436	-0.270515902	-0.037129466
## dimension_worst	-0.13156024	-0.275702077	-0.229474476	-0.078971489
##	PC5	PC6	PC7	PC8
## id	0.011327587	-0.316733438	0.9071156324	-0.096362415
## radius_mean	-0.038129861	0.029588521	-0.0422987777	-0.116427419
## texture_mean	0.049091450	-0.031394323	0.0149935618	0.001875482
## perimeter_mean	-0.037715592	0.028394008	-0.0435888242	-0.106272097
## area_mean	-0.010562229	0.006113155	-0.0289256668	-0.047414568
## smoothness_mean	0.365750055	-0.262508993	-0.1403403617	-0.123541189
## compactness_mean	-0.011786637	-0.004903894	-0.0453031106	0.043145968
## concavity_mean	-0.086512506	-0.002356338	-0.0325530646	-0.102436021
## points_mean	0.043667412	-0.034509273	-0.0814216298	-0.136923237
## symmetry_mean	0.305378893	0.335082168	0.1182592361	-0.098874531
## dimension_mean	0.044767906	-0.112784169	-0.0410588768	0.306499872
## radius_se	0.154254367	-0.023261199	0.0167882718	0.307415709
## texture_se	0.190001500	0.022856912	-0.1902676469	-0.052632477
## perimeter_se	0.120703357	0.003820151	0.0195081762	0.311265679
## area_se	0.127765023	-0.051958835	0.0565606078	0.334287959
## smoothness_se	0.232745603	-0.330867850	-0.0678348099	-0.260833914
## compactness_se	-0.280298048	0.066788120	0.0222220211	0.021001944
## concavity_se	-0.354164595	0.049699104	0.0336810725	-0.219193299
## points_se	-0.195758558	-0.023197526	-0.0378517870	-0.370217167
## symmetry_se	0.251331178	0.477530515	0.1184032606	-0.084854768
## dimension_se	-0.263395188	-0.048462373	-0.0157602244	0.194418818
## radius_worst	0.004280034	0.004521737	-0.0166458140	-0.007508307
## texture_worst	0.092551860	-0.045174516	-0.0094601240	0.006617640
## perimeter_worst	-0.007599144	0.012921166	-0.0145260986	0.002162488
## area_worst	0.027413595	-0.024033338	-0.0007372602	0.066173186
## smoothness_worst	0.325860028	-0.365048687	-0.0670682168	-0.116496117
## compactness_worst	-0.121503371	0.034042714	0.0507556727	0.136509363
## concavity_worst	-0.188280510	0.017962040	0.0352007117	-0.067085744
## points_worst	-0.043123573	-0.029549100	-0.0207238959	-0.166500918
## symmetry_worst	0.244245936	0.451404312	0.2340143294	-0.041439633
## dimension_worst	-0.093699078	-0.092479698	0.0347167538	0.372034479
##	PC9	PC10	PC11	PC12
## id	0.149115642	-0.16926751	0.058188997	-0.006721252
## radius_mean	-0.046270835	-0.22402704	-0.079466081	-0.042213788
## texture_mean	-0.088727168	0.11945674	-0.253258091	0.304032359
## perimeter_mean	-0.036230738	-0.22634517	-0.069865929	-0.017573055
## area_mean	-0.080649856	-0.18600385	-0.062795372	-0.110760120
## smoothness_mean	0.278996404	-0.06133822	0.084661549	0.135321954
## compactness_mean	0.099214048	-0.19518602	0.005172841	0.307036205
## concavity_mean	0.075750464	0.03395563	0.134664686	-0.124553100
## points_mean	0.116569072	-0.14261678	0.006124860	0.071564686
## symmetry_mean	0.315150303	0.13561452	-0.574417320	-0.161058144
## dimension_mean	0.130639482	-0.15848117	-0.066456112	0.037318709
## radius_se	0.026200456	0.26504403	0.025847282	0.027030250
## texture_se	0.372989606	-0.31521084	0.323158815	-0.348396233
## perimeter_se	0.052860114	0.23789288	0.094867442	0.168501485
## area_se	-0.030627892	0.24966405	0.071991560	-0.050731496
## smoothness_se	-0.580789293	-0.01015980	-0.179568831	-0.081753374
## compactness_se	-0.148593714	-0.11518343	-0.038615749	0.206959272
## concavity_se	0.034715098	0.36592141	0.113536362	-0.348342358
## points_se	0.189022962	0.21518752	-0.094066850	0.342855186
## symmetry_se	-0.292785738	-0.22049558	0.328314881	0.185998712
## dimension_se	-0.060203202	-0.22637997	-0.353844543	-0.250428852
## radius_worst	-0.070224590	-0.09981025	-0.073013014	-0.105030701
## texture_worst	-0.008571809	0.10669296	-0.038561250	-0.012490348
## perimeter_worst	-0.058854223	-0.09821693	-0.045750979	-0.051125158
## area_worst	-0.097034650	-0.06179787	-0.068822329	-0.184460981
## smoothness_worst	-0.173257498	0.16912753	0.109278029	-0.142996001
## compactness_worst	-0.111218083	-0.06445290	0.175401648	0.196805544
## concavity_worst	-0.035467377	0.19661986	0.295581609	-0.184959562
## points_worst	0.052322473	0.05121611	0.075496752	0.117518361
## symmetry_worst	-0.188266324	0.10308901	0.019223451	-0.157210098
## dimension_worst	-0.087222442	-0.11291399	-0.007071634	-0.118625115
##	PC13	PC14	PC15	PC16
## id	-0.004841084	-0.006500099	0.006885943	-0.002753492
## radius_mean	0.050603927	-0.012496988	-0.059054553	0.050789156
## texture_mean	0.256273666	-0.201876125	0.020701124	0.108089530
## perimeter_mean	0.038470392	-0.044684430	-0.048019221	0.039590476
## area_mean	0.065047550	-0.067879244	-0.010152279	-0.014636050
## smoothness_mean	0.315872261	-0.046461624	-0.444044654	0.117493291

## compactness_mean	-0.104264618	-0.230005458	-0.007661166	-0.230759682
## concavity_mean	0.065723393	-0.387349680	0.189733740	0.128386008
## points_mean	0.042253113	-0.132637847	0.245219266	0.217299938
## symmetry_mean	-0.288054252	-0.189570545	-0.030903840	0.073950596
## dimension_mean	0.236120382	-0.106390748	0.377436108	-0.518333769
## radius_se	-0.015625578	0.069635807	-0.011959877	0.111103952
## texture_se	-0.308499115	0.165408488	0.012614192	-0.033389049
## perimeter_se	-0.100597125	0.038865462	0.044358477	0.008991734
## area_se	-0.017226446	-0.055687709	-0.083203050	0.045171638
## smoothness_se	-0.293287983	-0.149148603	0.200139961	-0.018414232
## compactness_se	-0.263398426	-0.010320713	-0.491903153	-0.167886977
## concavity_se	0.251864823	-0.157777595	-0.135322845	-0.250292522
## points_se	-0.006430584	0.494527095	0.199547389	-0.062548716
## symmetry_se	0.319874237	-0.010836031	0.047340593	0.113219397
## dimension_se	0.275943072	0.240767973	-0.145958050	0.353782637
## radius_worst	0.039582217	0.138036550	-0.023526025	-0.166213790
## texture_worst	0.080142089	0.080737140	-0.053897961	-0.100862417
## perimeter_worst	-0.009084762	0.097004376	-0.012559001	-0.182407021
## area_worst	0.047986766	0.101235629	0.006646192	-0.315142865
## smoothness_worst	0.056931408	0.206026671	-0.163389545	-0.045226715
## compactness_worst	-0.371991007	-0.013117334	-0.165941776	0.049613607
## concavity_worst	-0.086870368	-0.218055908	0.066854662	0.204743734
## points_worst	-0.068367254	0.254345228	0.276401728	0.169597618
## symmetry_worst	0.043937722	0.256766084	-0.005448734	-0.139913723
## dimension_worst	-0.035134642	0.172524501	0.212520491	0.255448214
##	PC17	PC18	PC19	PC20
## id	-0.007779983	-0.019707372	0.005442248	0.020454908
## radius_mean	0.150008977	0.209908003	-0.156773206	0.211821385
## texture_mean	0.159152972	-0.034161758	0.040048687	0.029931705
## perimeter_mean	0.113792993	0.201233658	-0.168413120	0.227079273
## area_mean	0.130173978	0.251460456	-0.269145594	-0.045499625
## smoothness_mean	0.203117911	0.168171613	0.354463321	-0.160358262
## compactness_mean	-0.170379447	-0.016302860	-0.014259132	0.292092522
## concavity_mean	-0.270010606	-0.005071590	0.027973937	0.007197446
## points_mean	-0.381111880	0.028741889	0.087065594	-0.153991624
## symmetry_mean	0.165691481	-0.194702559	-0.169168737	-0.058503329
## dimension_mean	0.039119713	0.046298986	-0.086779501	-0.062879947
## radius_se	-0.055118880	-0.124562479	0.231233991	0.181436577
## texture_se	0.032768777	0.041652813	0.009177450	0.038681291
## perimeter_se	-0.023929011	-0.009084130	0.014508488	0.364045783
## area_se	-0.045538238	0.313148246	-0.296273515	-0.433949999
## smoothness_se	0.058326686	0.145306166	0.228819703	-0.013932678
## compactness_se	-0.190065826	-0.015610691	-0.094108380	-0.250216687
## concavity_se	0.126034946	0.092345618	-0.005794297	0.119490304
## points_se	0.197671940	0.106747906	-0.046944796	-0.015851066
## symmetry_se	0.158541381	-0.279918359	-0.180195394	-0.084242460
## dimension_se	-0.267180143	-0.122002438	0.059970839	0.097082660
## radius_worst	0.083459877	-0.235215809	0.218781792	0.027741137
## texture_worst	-0.185972310	0.065992656	-0.057250572	-0.080880841
## perimeter_worst	0.056649279	-0.228493742	0.189279122	0.105666112
## area_worst	0.090325036	-0.286471546	0.158722686	-0.393681440
## smoothness_worst	-0.142781922	-0.276751162	-0.504565504	0.228506719
## compactness_worst	0.153347954	-0.003683424	0.073627229	0.025544372
## concavity_worst	0.216302398	-0.190307542	0.107894455	-0.035839305
## points_worst	-0.178353485	-0.085180057	-0.067182996	-0.261323873
## symmetry_worst	-0.260033510	0.436706158	0.269313654	0.111738683
## dimension_worst	0.404957673	0.162920272	-0.026674889	-0.022516600
##	PC21	PC22	PC23	PC24
## id	0.009870917	0.006195707	0.003190337	-0.010289027
## radius_mean	0.046009507	0.070394387	-0.073021974	-0.098704322
## texture_mean	0.264801220	-0.436269565	-0.095890704	0.001311285
## perimeter_mean	0.015122205	0.070963404	-0.074821704	-0.040500943
## area_mean	0.087345298	0.021672998	-0.097428804	0.009396470
## smoothness_mean	-0.023842011	0.117945821	-0.063741313	-0.020088204
## compactness_mean	-0.476395571	-0.213187888	0.094254664	0.058295270
## concavity_mean	0.037771062	-0.001270114	0.188862925	0.321062737
## points_mean	0.231546040	0.017493297	0.313280824	-0.057974684
## symmetry_mean	-0.030776761	0.085067786	0.018331111	-0.052004767
## dimension_mean	0.172565576	0.085104005	-0.286892578	-0.084701081
## radius_se	0.090564458	-0.085660592	0.147793165	-0.263799753
## texture_se	0.083589382	-0.212168357	-0.048761201	-0.001150858
## perimeter_se	0.169586632	0.317246026	-0.153859020	0.081384223
## area_se	-0.270679518	-0.207916141	-0.068745790	0.110258620

## area_se	0.270075010	0.120752011	0.000710750	0.110200020
## smoothness_se	-0.095370809	0.066602974	-0.051852247	-0.057154068
## compactness_se	0.451033960	0.159332265	0.048970757	0.003993806
## concavity_se	-0.070203251	-0.071023842	0.200850815	-0.388573085
## points_se	-0.064848884	-0.035557778	0.074494143	0.354040783
## symmetry_se	-0.112133933	0.092193625	0.084324570	-0.043455477
## dimension_se	-0.214213177	-0.069171668	-0.245408452	0.089594196
## radius_worst	0.006481267	-0.007068180	0.096292694	-0.057768458
## texture_worst	-0.330244412	0.578095532	0.111968438	-0.009473435
## perimeter_worst	-0.010544107	0.094457678	-0.014952244	0.058698441
## area_worst	-0.053510824	-0.149328216	0.096798702	0.193293235
## smoothness_worst	0.140127867	-0.156936236	0.069660581	0.091134610
## compactness_worst	-0.220884131	-0.191897773	-0.033373706	-0.145389941
## concavity_worst	0.047166544	0.139729448	-0.456817799	0.290302924
## points_worst	-0.039740929	-0.006870640	-0.305694162	-0.563297713
## symmetry_worst	0.125617213	-0.155827542	-0.096426675	0.122996111
## dimension_worst	0.095366679	0.092769737	0.470358007	0.002775112
##	PC25	PC26	PC27	PC28
## id	-0.004233388	-0.00132610	-0.002571324	-0.001623875
## radius_mean	-0.183664583	0.01859418	0.128713229	0.131697326
## texture_mean	0.099441545	-0.08442059	0.024821224	0.017622634
## perimeter_mean	-0.117262178	-0.02743488	0.124670225	0.115650274
## area_mean	0.070557041	0.21057100	-0.361014547	-0.467489167
## smoothness_mean	0.068940049	-0.02876100	0.037372832	-0.069482805
## compactness_mean	-0.102198309	-0.39651346	-0.262695425	-0.098624638
## concavity_mean	0.045550527	0.09717977	0.550227716	-0.363040016
## points_mean	0.082349955	0.18630114	-0.389316679	0.453345398
## symmetry_mean	0.018841491	0.02451053	0.015910368	0.015157593
## dimension_mean	-0.134601525	0.20670502	0.096796804	0.101343150
## radius_se	-0.561133900	0.17339784	-0.050411953	-0.213735821
## texture_se	0.023938591	-0.05709165	0.010893175	0.009925699
## perimeter_se	0.516048248	-0.07217201	-0.103485879	-0.041989200
## area_se	-0.018546693	-0.13093723	0.155929011	0.314758068
## smoothness_se	0.016193934	-0.03100551	0.008066566	0.009312365
## compactness_se	-0.122457873	-0.17364984	0.049404535	-0.046651501
## concavity_se	0.186159613	-0.01600952	-0.091931364	0.083824645
## points_se	-0.107166573	0.12999049	0.018674110	0.011675700
## symmetry_se	0.002613811	0.01936313	0.016991197	0.019891112
## dimension_se	0.076177800	0.08458109	-0.035156906	0.012141785
## radius_worst	-0.158114412	-0.07144112	0.195812320	0.178796461
## texture_worst	-0.118609952	0.11802219	-0.036347107	-0.021473842
## perimeter_worst	0.236463109	-0.11790535	0.243266456	0.241658719
## area_worst	0.146339946	0.03921251	-0.229813188	-0.237323945
## smoothness_worst	-0.011224935	0.04787154	-0.012860335	0.040730207
## compactness_worst	0.185437121	0.62471727	0.100772153	0.071087434
## concavity_worst	-0.286701322	-0.11586768	-0.267236886	0.142148446
## points_worst	0.105286798	-0.26352782	0.133749940	-0.230794105
## symmetry_worst	-0.013193455	-0.04505357	-0.027824916	-0.022695808
## dimension_worst	0.037882167	-0.28015574	-0.004500884	-0.060081371
##	PC29	PC30	PC31	
## id	-1.891724e-05	-0.0006852263	-7.122581e-05	
## radius_mean	2.111968e-01	-0.2114371011	-7.024325e-01	
## texture_mean	-6.362507e-05	0.0106165839	-2.644366e-04	
## perimeter_mean	8.434280e-02	-0.3838889617	6.898676e-01	
## area_mean	-2.725167e-01	0.4227208085	3.297173e-02	
## smoothness_mean	1.480038e-03	0.0034638648	4.850746e-03	
## compactness_mean	-5.466656e-03	0.0409079834	-4.468229e-02	
## concavity_mean	4.554138e-02	0.0101122808	-2.512860e-02	
## points_mean	-8.885707e-03	0.0041142627	1.067984e-03	
## symmetry_mean	1.432581e-03	0.0075571475	1.279594e-03	
## dimension_mean	-6.312291e-03	-0.0073311823	4.751885e-03	
## radius_se	-1.922290e-01	-0.1186768422	8.679321e-03	
## texture_se	-5.624974e-03	0.0086942153	1.063104e-03	
## perimeter_se	2.631905e-01	0.0060612569	-1.373310e-02	
## area_se	-4.205668e-02	0.0863645419	-1.054698e-03	
## smoothness_se	9.795835e-03	-0.0016737982	1.618711e-03	
## compactness_se	-1.539757e-02	-0.0032295613	-1.923037e-03	
## concavity_se	5.819985e-03	-0.0161202167	8.921294e-03	
## points_se	-2.900497e-02	0.0241014722	2.178643e-03	
## symmetry_se	-7.637856e-03	0.0051771158	-3.338380e-04	
## dimension_se	1.975791e-02	0.0083971145	-1.792802e-03	
## radius_worst	4.126296e-01	0.6356796555	1.356846e-01	
## texture_worst	-3.896988e-04	-0.0172219636	-1.020237e-03	

```

## perimeter_worst -7.286790e-01 -0.0228830657 -7.974244e-02
## area_worst 2.389679e-01 -0.4448733182 -3.976788e-02
## smoothness_worst -1.535941e-03 -0.0074142082 -4.586820e-03
## compactness_worst 4.869512e-02 0.0001075081 1.285262e-02
## concavity_worst -1.764174e-02 0.0126547542 -4.031809e-04
## points_worst 2.247340e-02 -0.0353341030 2.276561e-03
## symmetry_worst 4.922100e-03 -0.0133523613 -3.910451e-04
## dimension_worst -2.356283e-02 -0.0115053741 -1.897779e-03
##
## $center
## id radius_mean texture_mean perimeter_mean
## 3.037183e+07 1.412729e+01 1.928965e+01 9.196903e+01
## area_mean smoothness_mean compactness_mean concavity_mean
## 6.548891e+02 9.636028e-02 1.043410e-01 8.879932e-02
## points_mean symmetry_mean dimension_mean radius_se
## 4.891915e-02 1.811619e-01 6.279761e-02 4.051721e-01
## texture_se perimeter_se area_se smoothness_se
## 1.216853e+00 2.866059e+00 4.033708e+01 7.040979e-03
## compactness_se concavity_se points_se symmetry_se
## 2.547814e-02 3.189372e-02 1.179614e-02 2.054230e-02
## dimension_se radius_worst texture_worst perimeter_worst
## 3.794904e-03 1.626919e+01 2.567722e+01 1.072612e+02
## area_worst smoothness_worst compactness_worst concavity_worst
## 8.805831e+02 1.323686e-01 2.542650e-01 2.721885e-01
## points_worst symmetry_worst dimension_worst
## 1.146062e-01 2.900756e-01 8.394582e-02
##
## $scale
## id radius_mean texture_mean perimeter_mean
## 1.250206e+08 3.524049e+00 4.301036e+00 2.429898e+01
## area_mean smoothness_mean compactness_mean concavity_mean
## 3.519141e+02 1.406413e-02 5.281276e-02 7.971981e-02
## points_mean symmetry_mean dimension_mean radius_se
## 3.880284e-02 2.741428e-02 7.060363e-03 2.773127e-01
## texture_se perimeter_se area_se smoothness_se
## 5.516484e-01 2.021855e+00 4.549101e+01 3.002518e-03
## compactness_se concavity_se points_se symmetry_se
## 1.790818e-02 3.018606e-02 6.170285e-03 8.266372e-03
## dimension_se radius_worst texture_worst perimeter_worst
## 2.646071e-03 4.833242e+00 6.146258e+00 3.360254e+01
## area_worst smoothness_worst compactness_worst concavity_worst
## 5.693570e+02 2.283243e-02 1.573365e-01 2.086243e-01
## points_worst symmetry_worst dimension_worst
## 6.573234e-02 6.186747e-02 1.806127e-02
##
## $x
## PC1 PC2 PC3 PC4 PC5
## [1,] 2.50194550 -0.096948052 -0.4489597008 2.334117555 0.697715477
## [2,] 1.46743888 -1.686300588 1.1542038774 0.336210935 0.459625382
## [3,] 2.92902790 -0.383199241 -0.8955890691 -0.116482776 0.984413772
## [4,] 1.99534236 -1.330465924 1.1172875551 2.050276131 0.253038461
## [5,] 2.50025164 2.010350968 -0.7584034865 1.986216853 -1.135370958
## [6,] 2.01830827 -0.782420945 0.1125197163 -0.653227961 0.018415769
## [7,] 1.09348444 -1.293936715 1.4189069050 -3.356740242 -0.951965047
## [8,] -4.54183732 -3.099372405 -2.2612175075 -2.200950296 3.459973177
## [9,] 2.69412302 -1.421092569 0.9516155379 0.007476733 1.250335936
## [10,] 2.08173487 -1.812218651 -1.1720406658 1.137014305 0.414757427
## [11,] -5.08416948 2.000137924 -0.7512306390 -0.076186113 -0.385543991
## [12,] 2.42030088 -0.010337119 -0.8066693631 -0.070644793 0.075814497
## [13,] 0.42109190 -0.121776139 -0.5410059634 -0.365041743 -1.511092195
## [14,] 3.72127373 1.784296564 1.2485358731 0.129289545 0.520260616
## [15,] -2.50683608 2.519115720 0.7679362671 -0.814023090 0.426551810
## [16,] 0.10377563 0.205899348 0.3621314863 -1.000054021 -2.991100602
## [17,] 0.71352261 1.556166034 -0.7062636839 1.691564007 -0.340941385
## [18,] 2.87310984 0.482741343 -0.4233003513 0.743662891 0.860313171
## [19,] -7.18617681 -0.044244030 2.0258549210 0.087485348 0.664035557
## [20,] 1.88203558 -1.429919420 -1.0832586631 1.705943528 0.884175937
## [21,] 2.83789903 0.393325503 -0.3614479874 0.812880484 0.040063252
## [22,] -0.33608363 -3.535859467 0.0806908813 -1.552997026 1.956881414
## [23,] 2.34862913 -0.683708564 1.1197182845 -0.295906284 0.539770064
## [24,] -1.40123647 -1.312422336 0.6099807955 1.894731466 0.034197398
## [25,] 1.35378261 -3.553367632 1.7257338713 -0.038167893 0.343071810
## [26,] 0.36757240 -0.131511726 -2.0517854155 1.050460940 -0.752865683

```

##	[27,]	1.96773313	0.957849703	-0.1042456721	-0.088392018	0.547006886
##	[28,]	-3.99611352	-0.554685751	-2.7691318844	-1.904122982	0.524809460
##	[29,]	1.94377603	-2.549019049	-1.0010501923	0.023504095	-1.204979082
##	[30,]	3.14007439	1.481392013	-1.2100992985	0.450805086	-0.839570619
##	[31,]	4.02708469	2.536551854	0.3201023892	1.521284235	-0.668651573
##	[32,]	1.97963602	0.413646828	-0.3874100402	-1.737038268	0.307044021
##	[33,]	-5.92051113	-1.235591140	1.6913474333	-0.457479353	-2.884900796
##	[34,]	1.97245619	0.170054921	0.3939115987	-0.773371688	0.853191162
##	[35,]	1.13538658	1.400448882	-0.5969586419	1.997234324	-0.528505811
##	[36,]	1.60653102	-0.299793694	-1.5936523874	0.905026936	-1.233932411
##	[37,]	-2.69844100	4.420137831	0.2529603192	0.501660080	-0.376615080
##	[38,]	0.73892075	-3.702602060	0.6503933965	2.236743562	0.337401750
##	[39,]	-1.20949419	2.030094176	0.9393311840	0.254246634	-0.091939830
##	[40,]	-2.62903181	-0.590514951	-2.0090573484	0.268426633	-1.194710401
##	[41,]	-3.37008639	3.350976309	-1.7985794564	-2.074346194	0.594049060
##	[42,]	-6.13756604	1.994599998	-1.6150397012	0.976403193	0.332878874
##	[43,]	-7.11812078	-10.263194605	-3.1473916044	0.121405084	2.965445913
##	[44,]	2.39686919	-0.995805736	-0.7705310186	1.553017799	-1.428655251
##	[45,]	3.17370620	2.079136566	-1.0061465196	0.391506420	-1.421225837
##	[46,]	-1.27212896	2.434528242	2.4069357804	-0.101418611	-2.164134739
##	[47,]	4.64234140	0.803512818	0.2422677400	0.480313638	-0.529696031
##	[48,]	-10.91746308	3.672587536	-0.9712242881	2.355734704	0.483077938
##	[49,]	0.48966745	-0.091895060	-0.9743219974	-0.323695888	-0.131359549
##	[50,]	1.45902605	-0.595347371	1.1194916680	0.093040615	-1.092491404
##	[51,]	-1.31071031	-2.163284902	-1.7896139702	-0.014878073	-0.166863596
##	[52,]	0.37899113	0.625986823	-1.3115137359	1.157684780	-1.781580029
##	[53,]	2.71068202	0.214197953	-0.3290871583	0.057868635	0.046815390
##	[54,]	0.68520263	1.130602189	1.2114889784	-3.846059245	-1.434177469
##	[55,]	-9.02109721	0.634635478	0.1673933507	-0.747308053	-0.571766253
##	[56,]	-1.16002006	-2.522911903	-1.9063958530	0.630738306	-0.234081020
##	[57,]	1.89187412	-1.675750393	0.1045973919	1.222231193	-2.566361316
##	[58,]	3.88962340	-0.814349374	1.0112433799	0.825915255	2.132628805
##	[59,]	-12.87573436	-2.324575387	6.2450981501	1.985364374	3.143767328
##	[60,]	-3.77524767	1.881732616	-1.7830011567	0.394615080	0.336620919
##	[61,]	-9.07163621	-2.032511308	2.0795521059	-1.035032956	-0.814114250
##	[62,]	-5.06161345	1.774290825	1.1401674892	-0.682053867	-0.650295434
##	[63,]	-3.52696866	-2.336951122	7.7489267037	-0.523555170	-2.691800431
##	[64,]	2.15342402	1.913412787	-1.2005079052	-1.109606651	-0.451361168
##	[65,]	-4.72102980	-3.317643560	-1.4912712243	2.043051365	0.022275985
##	[66,]	1.32751070	-1.468128570	0.8509474426	-1.139782681	0.048274411
##	[67,]	2.47879771	1.413541128	-0.3300293450	0.329186462	-0.661062602
##	[68,]	3.28383340	3.154081348	0.1797972729	0.733291311	-0.390150526
##	[69,]	1.86854679	0.894248748	-0.8926930624	1.030400589	0.229769428
##	[70,]	1.76125095	-0.787484445	-1.9530764794	-0.715597778	0.626092114
##	[71,]	-0.75772517	-0.898784355	-2.7028656356	-0.287112874	-0.805196696
##	[72,]	3.07004076	-1.137654329	0.3645176409	-0.621084533	1.439458140
##	[73,]	-1.56317061	-6.506081229	2.1551984163	0.046802299	-1.059106630
##	[74,]	1.63922138	4.568310634	0.7665801344	1.643167615	-1.397621661
##	[75,]	0.75307340	3.062757775	1.3999768264	-0.929764763	-0.901643353
##	[76,]	0.93888949	-0.932974158	-0.0515719454	-1.346989022	-0.068349941
##	[77,]	-0.35976583	3.555468206	-2.2591684707	0.223134444	-0.779394631
##	[78,]	3.51923913	0.655941140	0.5770684508	-0.005683076	-0.021764084
##	[79,]	2.12321200	0.022804183	-0.0079139450	1.771500671	-1.291026449
##	[80,]	-2.77132199	1.087548931	-1.1390502599	0.396154946	0.171847035
##	[81,]	1.97882278	1.835388762	-0.3024160196	0.554071039	0.204874318
##	[82,]	3.35841683	1.098081357	0.1255485894	0.835385947	-0.736585457
##	[83,]	2.48784540	1.182801959	0.3238305432	-1.244671309	0.123510536
##	[84,]	-1.25193513	-1.025145982	-0.1126310289	2.057308860	-0.140038831
##	[85,]	0.93178328	-2.309906917	-1.6003994900	1.667412705	1.428669764
##	[86,]	4.31206406	1.971577569	-0.2802141590	1.579424140	-1.982828702
##	[87,]	3.14232842	0.885778200	-2.1383772174	1.422536047	-0.420519084
##	[88,]	1.85744292	1.568886080	0.8181346387	-3.918373504	0.215618482
##	[89,]	-4.20063730	5.106542143	-0.8039110546	-0.852966939	0.466182541
##	[90,]	0.62500097	-0.643566700	-0.5024130627	-0.013864636	0.105817554
##	[91,]	4.06387726	1.242978608	0.5530591326	1.708039317	-0.613862590
##	[92,]	2.55604475	0.754405572	-1.6220992846	0.057008703	-0.505254685
##	[93,]	1.91095867	3.109332934	-1.0918757059	-1.056248694	-0.960001763
##	[94,]	3.17353516	2.072192725	0.0653368157	-1.864627331	0.206783972
##	[95,]	-6.50582706	-8.018131761	-0.3314399120	-2.757528828	-1.607920461
##	[96,]	-1.77786660	0.254481260	-1.7460651293	1.030151031	-1.183314722
##	[97,]	2.00452164	0.287116039	0.5844453196	-0.335501280	-1.172587586
##	[98,]	2.87272100	0.263011629	-0.4821301150	-0.243167336	0.555534181
##	[99,]	2.97732093	-1.810950696	-0.2218200555	0.389630689	1.528248268



##	[100,]	-10.75407134	2.235395747	-0.0150317513	-0.376563477	-1.189667182
##	[101,]	0.74369721	-3.149394191	1.4666856924	-0.306471973	-0.948920976
##	[102,]	5.56419667	0.480329489	4.0666384040	-2.307360378	1.030819908
##	[103,]	3.15974344	-0.414099653	-1.1126449042	1.963719390	0.062114722
##	[104,]	-0.22502189	1.553242547	-0.8230668033	-0.648931048	0.493406049
##	[105,]	3.22993309	1.166555416	0.2405502778	-0.991857082	-0.898922810
##	[106,]	2.20667901	-1.291744626	-0.8964793212	0.699329128	-0.179330561
##	[107,]	0.98492738	-0.795767487	2.3452665725	0.173830356	-1.549954277
##	[108,]	1.23832538	-1.577605200	-1.2869771554	0.101176628	-0.013222090
##	[109,]	2.55333527	-0.229205082	1.3975774444	-1.955998009	1.447903371
##	[110,]	3.34331455	0.019535956	0.4886576929	-1.133840406	1.558965743
##	[111,]	0.75467299	-1.802314504	-0.5675651783	-0.563776953	0.934046866
##	[112,]	-0.23405551	-6.909577147	0.6432228540	-1.991372884	-0.657265287
##	[113,]	-3.32563601	1.312453602	0.6822569181	1.015191328	0.928825573
##	[114,]	-4.34396173	-4.850419127	-2.7395300114	-1.482475038	-1.279040206
##	[115,]	3.54319152	1.279452421	0.9941661042	-0.596285222	0.214662584
##	[116,]	-2.46541768	1.489076147	0.5631340431	-2.254085759	-1.409238648
##	[117,]	-1.24815169	-0.399600312	-3.8408229784	-0.729563054	0.651902115
##	[118,]	-4.13838217	-0.780943254	-0.9077267332	-0.008248176	0.604476357
##	[119,]	-4.93583227	2.834367243	0.8654055442	0.349982907	0.477256185
##	[120,]	-0.35258994	-2.130394017	0.6917292948	0.193867619	0.098333135
##	[121,]	3.14475887	1.868857446	-0.6929978118	0.305619965	-0.408682352
##	[122,]	-4.96178269	3.255662851	3.3541117097	0.126932945	-0.125838022
##	[123,]	3.07589792	0.303342578	1.2318930380	-2.188096474	0.594856428
##	[124,]	-5.30134864	6.705490137	1.4169226015	1.792384917	1.068659622
##	[125,]	3.32800427	-0.479244890	-0.8989743659	0.806462957	0.588303101
##	[126,]	3.05868796	0.176163451	0.6036047514	0.267996089	-0.897428969
##	[127,]	-3.20194758	-4.058183169	-2.7060133717	1.310403583	0.229486669
##	[128,]	0.54660499	1.310515958	0.9688659512	-1.471547838	-0.207680931
##	[129,]	-1.91347476	3.524061808	1.1921877006	0.358825247	-0.598259120
##	[130,]	-0.54620527	-0.365054558	-0.3894794319	-1.891669003	-0.222237680
##	[131,]	-4.93667851	-3.019620986	-1.7627540211	-0.674128621	-2.861908580
##	[132,]	0.37675040	-0.123705021	-1.0182512870	-0.152079817	-1.476851207
##	[133,]	2.376505453	1.675406255	0.3641592639	-3.003351619	0.031511002
##	[134,]	-6.42967129	3.562223895	2.3970024123	1.196760812	0.071026479
##	[135,]	1.24613355	-4.092640542	-0.3296484329	1.025456769	1.152127508
##	[136,]	-4.93900909	1.524965221	-1.7377797515	0.042748150	1.738797218
##	[137,]	3.59610065	-2.599196504	1.8549658372	0.093409236	2.441117941
##	[138,]	3.65596070	0.668084254	-0.9222607586	1.508003180	-0.291817585
##	[139,]	-3.32807721	1.589791411	1.3853613310	-0.695880706	0.910135699
##	[140,]	3.45171557	0.493645518	-0.1687036600	0.578352099	0.050789739
##	[141,]	-3.05717681	1.867826869	2.5297619845	0.151065606	0.109621092
##	[142,]	-9.17512669	-1.969538383	-1.1705947085	3.636132897	1.192049579
##	[143,]	-3.78612656	3.570277327	2.0277209606	-2.476509024	0.498082463
##	[144,]	-4.74708917	-3.020362883	-0.1740351662	-0.604178954	-1.140171668
##	[145,]	-3.49819558	-2.189440708	-3.8933665908	-1.307716516	0.069244787
##	[146,]	3.31199304	-0.159026138	0.5204251577	-0.502275645	1.780683275
##	[147,]	-2.65735509	-0.058420105	-1.4841126892	0.033967958	-0.325750138
##	[148,]	0.78154772	2.116914996	0.2926301717	0.086811635	0.083377733
##	[149,]	4.02593835	1.402315477	3.1373574119	0.048370686	-0.190636328
##	[150,]	3.16092338	1.026915066	-1.5028142442	-0.594200248	-0.514593131
##	[151,]	4.86998090	2.333703525	-0.1896292816	0.697303658	-0.820064808
##	[152,]	1.85254735	-2.538463969	1.9924625936	0.494722844	3.501232597
##	[153,]	1.84126494	0.081472232	-1.4617360110	0.671064401	0.135018238
##	[154,]	4.23789740	-0.187035082	-0.3338779135	0.587216485	0.704439326
##	[155,]	-3.14113339	-4.243948078	5.8836153610	0.619438921	-4.202406757
##	[156,]	3.03053729	-0.335164808	1.1810683379	-0.145009044	0.804868418
##	[157,]	3.49122498	2.628294411	-0.0956220793	-0.301117013	-0.527681106
##	[158,]	0.10005406	-2.267692611	-1.8890954371	-1.4544440128	1.708389220
##	[159,]	3.90121776	-0.729136663	2.1103085825	-0.761575134	0.823287254
##	[160,]	1.57070979	1.199673442	-0.3918013345	-1.467088289	-0.177538480
##	[161,]	2.84805222	2.885829845	0.4913528507	0.609333144	-1.437556876
##	[162,]	-0.39881700	-3.715142277	4.5573395622	0.246226789	-0.818146604
##	[163,]	3.19482762	1.842380524	0.0730476205	-0.015662383	-0.181442852
##	[164,]	5.38991844	-0.556585142	0.5430028989	0.480171363	0.395021380
##	[165,]	-7.24903297	5.474980658	1.8283919731	1.919299996	-0.403335527
##	[166,]	-9.49848726	5.572588077	-0.7193124915	0.241526929	0.398806581
##	[167,]	0.81398320	1.264952402	0.2972668125	2.299175885	1.018825208
##	[168,]	-3.27653012	0.981760715	2.4975002373	-0.094763769	-0.361854918
##	[169,]	0.97287731	-0.950362778	-0.8988725568	1.093720489	0.613039684
##	[170,]	3.05107067	2.228865845	-0.4977435440	0.188926230	-1.577134062
##	[171,]	-1.69031709	-2.365213204	-3.0719795026	-0.080713640	1.059556494

## [172,]	-0.65718535	-0.450077454	-2.6813942566	-0.739975778	0.031115138
## [173,]	-2.14954157	-2.325644511	-0.8100154852	-0.149277074	1.435638201
## [174,]	2.01288744	1.100878086	1.3116132858	-1.598168836	-0.698670397
## [175,]	0.95104246	1.675419077	-0.3721404026	-0.573502850	0.339696206
## [176,]	2.02343028	0.249627268	-0.6581670067	0.059344397	0.054315582
## [177,]	-4.63890499	2.291683054	-0.7716227078	0.645378358	1.154696569
## [178,]	3.78639838	0.320275220	-1.0674568156	0.603340211	-1.523602820
## [179,]	-5.36869600	0.115824344	-1.7126596436	1.507048460	-0.152401569
## [180,]	3.44899854	1.418741567	-0.1071372395	-1.702137890	0.101773932
## [181,]	1.47712989	-0.122692114	-0.2263450597	-0.488574076	0.712201748
## [182,]	-1.42434723	1.960376486	1.0839045026	0.760197981	0.538487581
## [183,]	3.31644321	1.433802935	-0.6130689322	1.787790448	0.017668185
## [184,]	0.22869703	0.688532733	-2.2837812338	0.990181994	-0.643088910
## [185,]	3.21520178	-1.102627055	1.5935388949	-0.473290795	3.449549794
## [186,]	4.76954021	0.540142828	0.8597706560	1.743191407	-1.005530179
## [187,]	-3.24697650	0.106441179	-2.9140544440	0.740083612	0.355281138
## [188,]	-2.16481716	2.810743587	-0.5976144490	-0.654054163	0.471403518
## [189,]	-1.82926213	4.304327234	0.2530941187	1.014778645	-0.262564780
## [190,]	3.63907752	-1.585802244	0.7212294195	0.668811040	1.577674859
## [191,]	-1.33890020	1.264301286	0.5186113334	0.585216580	0.466706612
## [192,]	3.43205704	0.985905284	-0.7482663467	1.341428228	-0.233956506
## [193,]	1.40300774	1.759456064	-1.5078772902	1.308112352	-1.804137853
## [194,]	-4.07859093	-2.968555495	-3.0498013784	-2.485990722	0.416372034
## [195,]	-0.75287346	1.594332697	-1.5363512829	-1.074867388	0.047242918
## [196,]	-5.02530634	-0.781343899	2.6362573912	-1.638836435	0.301083956
## [197,]	-2.11291381	-0.300666426	0.8598358657	-1.445051908	0.538468367
## [198,]	1.59095196	1.611961540	0.2823855591	-1.080812600	-0.058919097
## [199,]	0.84859271	-0.084394848	-2.7448026541	0.152345985	0.641451464
## [200,]	2.06227610	-0.326510578	-0.1456218446	1.026841470	-2.079658212
## [201,]	0.99867305	3.350171877	4.2543601140	-0.532000286	0.455724524
## [202,]	2.31709971	-0.405624752	0.2634484397	-1.662371063	0.531800098
## [203,]	-0.14945474	0.427658843	-0.4868769250	-1.444332209	-0.861147497
## [204,]	0.10891763	-2.279876952	2.0922165553	-0.338283979	-0.625120066
## [205,]	2.16394913	-0.938596583	-0.1749286518	1.831737840	1.490950228
## [206,]	-4.08266081	-2.812412626	-0.5141617152	-1.974185172	-0.134024666
## [207,]	2.80418141	0.311403175	-0.0807821084	-0.241162406	-0.145754983
## [208,]	2.38745622	0.821899703	1.9514855274	0.071228350	0.500353005
## [209,]	4.65657121	3.057567171	-0.1123512300	1.515757901	-1.274307242
## [210,]	-8.98977481	-0.606936867	-3.1640551169	-0.864188920	-0.048073783
## [211,]	1.37464215	-0.007400690	1.5211249800	0.599184364	-3.006419592
## [212,]	-2.16761997	-0.986024631	-1.9581424971	-0.738858263	0.393794553
## [213,]	-5.49097769	-0.955494860	-2.2199733939	-1.527989332	-0.923406727
## [214,]	2.30350465	0.922467294	-1.1530825149	1.452187616	-1.554340444
## [215,]	1.99531958	-1.906354886	-2.0271526600	0.900966300	-1.226092011
## [216,]	2.38983518	-2.757958152	1.1893290588	1.805985521	3.328341598
## [217,]	1.18082935	-1.017898281	-0.7228424483	1.063295155	1.421489997
## [218,]	0.52512860	0.963874821	-0.3485778454	-0.537184068	-1.430995581
## [219,]	-2.36906611	-3.961424731	-2.9267667306	0.924875051	1.060235342
## [220,]	-5.48555952	4.145099411	-0.6562594942	0.161879145	-0.631023339
## [221,]	3.36739736	0.800646415	-0.8246480058	1.660919634	-0.048765061
## [222,]	2.92432433	0.002755394	-0.9152429086	1.787544847	-0.574350239
## [223,]	-6.57828205	1.467522312	0.3130793730	1.198241462	0.118302130
## [224,]	1.64233904	-1.717441602	0.4332022436	-1.524637599	1.766703765
## [225,]	4.65845853	0.222352429	1.5283762520	0.526800762	1.887849642
## [226,]	3.76722342	-4.387146807	3.9365144689	-0.285268179	4.776012550
## [227,]	-1.06673442	-8.289180715	0.4640803496	1.940495345	1.403992016
## [228,]	-4.53861239	0.799583755	-0.5577715706	0.921829616	0.069684233
## [229,]	-1.64280677	2.087042848	-1.0084390353	0.191905148	-0.917609222
## [230,]	4.38667569	0.756350189	-0.4170181028	0.588888875	0.374793031
## [231,]	1.33059112	-0.776172394	1.2547857939	-3.772448530	1.237573665
## [232,]	3.64751113	1.238377720	1.3514834757	1.626472664	0.168534666
## [233,]	-3.58009537	-3.930791681	2.0113772036	-0.207429313	-5.468890245
## [234,]	-2.24381118	0.337316241	-1.0803899740	-0.232872394	1.003591445
## [235,]	2.89656574	1.448675757	0.7698177588	-2.960092393	0.352489027
## [236,]	1.73014344	-1.002335191	-0.0906934116	1.063489830	1.435458371
## [237,]	-2.61807263	-1.547571448	-0.1721247834	-0.504081251	-1.098745753
## [238,]	3.35636470	-2.676188168	-1.7638810132	1.373717970	0.361233702
## [239,]	2.56923218	-0.709022264	-0.4780858120	-2.349441576	1.839187568
## [240,]	2.28397274	-2.073809462	2.4199353830	-1.172161800	2.851566497
## [241,]	-0.45393258	-0.404503017	-1.0235114555	1.073947619	0.427410851
## [242,]	2.51450220	-3.253562631	-1.6677534812	1.172921141	0.463191819
## [243,]	3.99722047	-0.960234636	0.2031532378	-1.505410543	-1.709351585
## [244,]	0.84277065	3.488917121	0.1474683803	-1.231377406	0.103760283

##	[245,]	-7.07110609	-0.545834514	-1.3025778653	0.648525414	-1.849094449
##	[246,]	3.83723739	-0.496149052	0.9126200426	-0.544137621	-0.082618535
##	[247,]	4.70269768	0.430281382	-0.0008561058	-1.366618899	0.083119744
##	[248,]	-1.00455722	-1.100757342	-0.6423927562	-1.753979749	-1.048832576
##	[249,]	4.56714653	-1.460709725	0.1063231304	0.278694417	0.720243356
##	[250,]	2.21788936	-0.030096334	0.6365238667	-3.367658394	-0.483619227
##	[251,]	0.60538839	0.827782566	-0.7145914509	1.157382390	-0.981630768
##	[252,]	-8.71810460	-3.287712015	2.8625300217	-0.253772369	1.052899419
##	[253,]	0.47808732	-3.700014104	1.9441730824	1.005952725	-3.811314227
##	[254,]	-6.29127392	-2.031817166	-3.1215379527	0.124631439	-0.190316224
##	[255,]	-0.34079274	-1.542560611	2.8064510060	1.928210419	0.566826031
##	[256,]	2.62476369	-2.496988719	2.4294762979	-1.863859269	3.142497927
##	[257,]	1.25268973	1.579051876	-0.3537337308	-0.916611334	-1.537891294
##	[258,]	2.93323571	0.488364553	-1.0216257612	-1.686773009	0.564259871
##	[259,]	3.26242254	0.932985479	0.1833833847	1.093686111	0.459189205
##	[260,]	1.23982397	0.182120665	-0.6080958795	1.594253100	0.442777491
##	[261,]	2.01379503	-0.434976980	-0.1194601117	-0.156273940	1.505742223
##	[262,]	2.05769335	-1.613579284	1.8388580521	-3.101215453	-0.214518737
##	[263,]	-1.42498620	1.035714965	-1.2853050001	0.531401234	0.626782132
##	[264,]	2.48275826	2.354640224	-0.4584985010	-0.377768877	-1.039596768
##	[265,]	-4.55924187	-0.329218253	-0.7147911687	-0.713664643	1.551678149
##	[266,]	-3.16294377	-3.405829538	-3.1165344333	-0.612514026	1.522156631
##	[267,]	2.75792258	-1.085307017	1.6848196660	-0.498799733	-0.814496705
##	[268,]	0.31460901	-7.375250470	3.8218536136	2.144343377	-2.707014990
##	[269,]	2.87946321	0.995917330	-0.7438991960	-1.737888611	0.035036342
##	[270,]	-3.78662739	1.013699567	0.8563038170	-0.744480316	0.750755140
##	[271,]	1.89761823	0.671560181	1.4843187235	0.397964807	-2.058494837
##	[272,]	-8.17025666	-2.706886209	5.6446232863	-1.055831821	-1.065793794
##	[273,]	2.92226541	1.693164261	0.2627882599	-0.401797242	-0.369333199
##	[274,]	2.63091502	0.692201907	-0.5966191343	0.338798923	-0.467580534
##	[275,]	-3.46446115	2.259578599	-1.2741226314	-1.106397268	-1.012324109
##	[276,]	-12.27538365	7.534976906	9.9761684119	5.253259821	3.834023304
##	[277,]	1.47792166	1.582683014	0.2883305714	-0.787112405	-0.162865663
##	[278,]	-1.25078953	1.892311705	0.5339969865	-2.075806241	-1.813233332
##	[279,]	4.69392206	0.767770063	1.5226677118	-0.764827757	0.778109363
##	[280,]	4.19778142	-2.361801586	1.3370526100	-2.033652494	1.757807570
##	[281,]	-6.21939189	-0.932468578	0.0559198046	2.543577973	-0.063180835
##	[282,]	4.42974415	0.781296321	-0.4855399867	-0.693621167	-0.105640267
##	[283,]	3.36918312	0.558479071	-0.2040622826	-0.567449025	0.349876498
##	[284,]	2.21408235	1.231206989	-0.1507589647	1.455534428	-0.012458378
##	[285,]	-1.60810402	2.457264254	-2.0157869799	-0.381548843	0.442661946
##	[286,]	2.28637139	2.455924452	-0.8495717882	-0.036313395	-1.093929013
##	[287,]	-2.50066195	-2.619856612	0.1943602737	-1.883628020	2.114743279
##	[288,]	-3.37037453	2.315063721	-1.2401153351	0.556245329	-0.528127304
##	[289,]	-7.13162893	2.056655599	1.0245719092	0.737305466	-0.827554641
##	[290,]	0.23604874	-1.525815207	-2.2161873966	0.544847533	-0.247129593
##	[291,]	4.06322887	-0.117172872	3.2199823983	-3.443849844	2.229166199
##	[292,]	2.61604614	1.094798217	-1.2582575963	0.909229429	-0.379754088
##	[293,]	-2.48998251	-2.281988826	1.3085887694	-1.172642347	1.895880282
##	[294,]	2.22533885	0.251527308	-1.1073111389	0.182796136	0.239561609
##	[295,]	-7.23741109	3.634422040	-0.2139444434	1.237671698	-0.300939164
##	[296,]	-8.63353979	3.459025489	-0.1785056134	1.172585880	0.025231811
##	[297,]	-5.15473327	2.361867832	-0.4798488593	0.896135846	0.203122000
##	[298,]	-4.93982745	4.094605135	-0.3619856118	-0.080241754	0.054397305
##	[299,]	2.46469830	-0.607257344	-1.1796656632	2.202520525	0.695506424
##	[300,]	-3.81333242	-2.315620428	-0.0011374585	0.679453389	-1.292753879
##	[301,]	-3.38202580	2.902611702	2.9416374165	2.852058366	-0.514873052
##	[302,]	2.78850338	2.522670559	-0.9109064348	-0.254420379	-1.649432502
##	[303,]	4.67980735	1.099639009	-0.2740666177	1.247122953	-0.414029767
##	[304,]	-2.21728118	-1.954232965	-2.2885576865	-0.347741914	0.537942468
##	[305,]	-1.79613487	-0.179903922	-2.6335419506	-0.651563979	0.522096234
##	[306,]	-3.32515110	3.945384235	-0.1802391699	-2.123830028	-0.966443623
##	[307,]	-5.90260783	-3.499457891	-3.2561723319	-3.921868793	-1.717162150
##	[308,]	2.47674615	0.325121610	-1.5017622956	0.465315324	-0.050811862
##	[309,]	-0.40293939	-1.063479658	2.2720166682	-0.454264062	-1.693099323
##	[310,]	0.97099433	-0.446279851	-1.4594153556	1.984105063	0.095959004
##	[311,]	-4.03668377	2.950384280	1.6570189155	0.234392741	0.508432798
##	[312,]	-1.30868548	1.761103474	-1.6981763997	0.693068298	-0.112945804
##	[313,]	2.23787877	1.289134995	-0.9244961908	0.435851359	-0.183919957
##	[314,]	1.27828094	-0.845568770	3.0438878228	1.181996915	2.671747949
##	[315,]	-0.98258973	-0.997465519	-2.3161487140	-0.284244035	0.641048377
##	[316,]	3.06592622	2.177572561	-0.2860272961	-2.932488426	-0.476370936
##	[317,]	-3.94222512	1.957966685	1.3999456125	2.934972617	-0.540377368

## [317,]	-8.40721651	4.154354053	0.0564816333	-0.556647635	0.290563108
## [319,]	2.02880128	-1.264820521	0.4849104933	-1.122238796	0.106637333
## [320,]	1.21063322	1.305812364	-0.9600681561	1.705998765	-0.718793386
## [321,]	-2.30766540	-4.391016775	1.7527424175	0.986368261	-2.649298304
## [322,]	-2.75716304	0.337962638	-1.9212959898	-0.532709883	0.879240878
## [323,]	-4.38667401	2.106910355	0.5235549894	-0.756491191	0.293172770
## [324,]	2.04903657	-0.309392801	-0.5343870517	-0.493335379	0.070165091
## [325,]	4.47759348	1.733467485	-0.9114239429	0.767119669	-0.606647086
## [326,]	-3.28115594	1.655238021	0.1053511791	0.448847365	1.361523161
## [327,]	2.32002306	1.367061430	0.2832989706	-1.225198444	-0.045517916
## [328,]	-4.94412875	-2.398266796	-1.9352742691	-0.619670301	0.151657046
## [329,]	1.28699008	-0.074180875	1.1989425404	0.181278470	2.773214131
## [330,]	-7.34219116	5.219114040	0.2512487696	0.445824572	0.701203014
## [331,]	5.01541696	-0.577927104	-0.8518766118	2.165153839	0.882397056
## [332,]	2.24368335	0.447679622	-0.4837276950	0.191865316	0.825039495
## [333,]	4.38751753	-0.011142231	-0.9546015296	2.787802454	-0.438893298
## [334,]	4.74646435	1.793365484	0.1407660257	1.557864917	-0.537062502
## [335,]	-3.77316608	-0.864899791	3.6136080749	2.075271015	2.171634658
## [336,]	2.06024015	2.462482494	-1.4828903147	1.863251057	-1.834043222
## [337,]	4.42549163	3.001985054	1.6444179948	0.184084166	-0.143310873
## [338,]	-4.31582500	-9.199525903	1.4956708649	0.331499243	-4.728132573
## [339,]	-4.66989046	0.953065243	-0.3259743279	-1.064085660	0.127229907
## [340,]	0.06248385	0.213528735	-2.2750542126	2.700479392	-0.796388389
## [341,]	1.14691394	1.948967348	-1.2739318873	1.480544513	-0.484904520
## [342,]	-3.59003122	2.210234996	-1.6750435814	-0.813771454	-0.362172012
## [343,]	-2.10000735	-1.127785201	1.7393814581	0.279711479	0.953483535
## [344,]	-1.31311294	-4.793667784	-0.6589745753	-1.019753227	-2.149432625
## [345,]	-1.36140479	1.163223258	-1.1703191740	-0.841912460	0.989720632
## [346,]	2.49572871	-2.595236994	1.6647884818	0.638899390	1.155462135
## [347,]	2.99349968	-1.625668220	2.5395986402	1.359313165	-0.044540304
## [348,]	2.45895999	-0.901600050	0.3394183414	-0.362299509	1.100992623
## [349,]	0.72084892	1.958068868	-0.2325452407	-0.351124378	-0.654191485
## [350,]	1.25989813	-1.068864432	0.2589017555	-1.238769486	0.391769243
## [351,]	3.21178488	2.227137473	-0.1963671300	1.135211741	-1.260443309
## [352,]	-1.70852165	1.510710438	0.1013327971	1.920263759	-0.538477534
## [353,]	2.15578208	0.826509643	0.5558642135	-3.002056105	-0.569315453
## [354,]	2.23173048	-0.671785044	-1.0819686603	-1.086115548	0.302525938
## [355,]	-1.80399835	-0.734673424	-1.4761234432	-1.200705159	1.426189871
## [356,]	2.78878540	-2.309555755	0.4786568026	-1.604969641	1.610651985
## [357,]	3.45691371	-1.308443945	-0.0337157211	0.330228675	1.860114609
## [358,]	2.99913471	0.393406756	-0.6000451158	-0.209701932	-0.567021965
## [359,]	-2.23156326	2.671724995	-1.6742616542	0.150510731	-0.041665379
## [360,]	3.50337548	-1.795887616	2.7482853493	-0.846941117	0.617478794
## [361,]	-2.64182063	3.937812381	1.3188183197	0.224951506	-1.408492942
## [362,]	-0.33748187	0.962045655	1.6782610683	-0.575043680	-0.475740123
## [363,]	3.53454512	1.250355160	3.3557542193	-4.632734301	1.858692062
## [364,]	3.62918002	-0.767742600	-1.1017436835	2.073520369	0.434188781
## [365,]	2.59461099	-0.217007641	1.0077122264	0.673246457	0.536066766
## [366,]	1.66951097	-2.388763570	1.4885530344	0.883881984	-0.485153549
## [367,]	-4.09294552	0.370471678	1.4100466686	0.715209141	-0.003971311
## [368,]	4.08548593	0.486126777	0.6336680062	-3.394394708	0.014166502
## [369,]	4.03955715	0.233136340	-1.3488107029	2.437827496	-0.277482346
## [370,]	-3.70269683	2.786982036	-1.7948849741	0.903922003	0.070485617
## [371,]	1.41360782	-1.510934480	-0.3655994091	1.120778638	1.810160312
## [372,]	2.31800321	-3.264867812	2.7622845766	0.591349171	0.369641557
## [373,]	3.81037876	0.906658903	0.4268162583	-0.942704028	0.348098630
## [374,]	2.98734956	0.667024320	-0.6033609456	-0.592465215	-0.462425971
## [375,]	2.83865073	1.008610390	-1.5036215421	0.454979435	-0.115584388
## [376,]	4.06414082	0.560902528	2.1406180234	1.393035369	-0.205081505
## [377,]	1.30384281	1.813106080	0.3434531491	-1.833825790	-0.206606955
## [378,]	0.40517343	-2.167385179	-0.9485730134	0.368731742	-1.009853076
## [379,]	4.34480772	0.321428969	0.3739680132	1.110722971	1.500175109
## [380,]	2.48892114	-0.466170166	-0.6110439409	0.997150306	0.430697547
## [381,]	2.61665638	1.825922292	0.7331069540	-0.809708160	0.294719465
## [382,]	3.39492398	-0.752415278	1.7552820174	-0.264533585	1.080585264
## [383,]	-0.61757370	-0.144514295	1.6690516114	-1.112985137	0.539507366
## [384,]	-2.97464823	-0.777096467	-3.5052443958	0.044352274	-0.165927686
## [385,]	2.33684795	-0.794558326	-0.3594567353	0.440698429	1.420804759
## [386,]	2.68114201	-2.316395007	-0.0519470212	0.338667973	-0.448603974
## [387,]	-7.66552765	3.058434306	1.4197164199	0.572964284	-0.892285492
## [388,]	3.58030465	-0.892489488	0.2582132651	-0.253481025	0.600060595
## [389,]	0.43685122	1.383500063	-0.1007785980	-1.928253946	0.031312162

##	[390,]	1.17007394	1.655136843	-0.7647130395	1.761492887	-0.736260617
##	[391,]	-3.23818455	1.763005360	-1.8075976461	-2.484713739	-0.551407648
##	[392,]	4.86780798	2.133573665	3.3837236782	-5.101413172	0.475360249
##	[393,]	3.15904838	1.681196178	-0.5187689280	0.197717109	-1.439806957
##	[394,]	-4.95116280	1.325613003	-1.4719240988	-1.470236646	0.612283002
##	[395,]	2.66608395	1.498916434	-1.6871451758	0.998559342	-0.287055739
##	[396,]	3.42501230	2.437484016	0.0095606468	0.796083965	-1.606144088
##	[397,]	1.67399207	-0.869475578	-1.0224672822	1.320437371	0.282586180
##	[398,]	-0.24737404	0.523777831	0.5616946601	-0.100682911	-0.431782369
##	[399,]	-4.96439202	1.315627678	0.8067436117	-1.264229625	0.946364004
##	[400,]	3.90492025	-1.186740773	1.5498037503	-0.929696937	0.707362898
##	[401,]	3.25449802	-1.287594856	-0.2183620911	0.304629161	0.101864149
##	[402,]	2.20500981	0.729605522	0.2426828073	-0.028777747	-2.933933823
##	[403,]	-4.97925718	1.111992832	-2.5979470523	-1.220541842	-0.669826582
##	[404,]	-3.51135449	3.838551293	-1.0694296094	1.387036189	-0.320593869
##	[405,]	-1.36369824	-2.115640263	-0.8534680357	-0.724119237	-3.820459876
##	[406,]	-2.72842099	3.928028215	-0.0674857979	0.311125878	-0.286865371
##	[407,]	0.10236288	0.116730847	-1.6978103517	1.526461865	-0.403615366
##	[408,]	2.96896391	-0.379544939	-2.0701544207	2.059968651	-0.157660797
##	[409,]	-3.09986006	-1.584315906	-2.6198435377	0.606807912	1.184372534
##	[410,]	4.03753336	-1.162078357	0.1903419552	0.937378110	0.567718980
##	[411,]	-1.01759526	-2.370490183	-1.6223768308	1.140072703	-4.137373493
##	[412,]	4.00328560	1.372943228	-0.3043402577	-2.645779055	-0.732409527
##	[413,]	4.34627532	0.890970685	0.6179728858	0.433374031	-0.957876130
##	[414,]	2.60228779	0.480879027	1.8459991689	-0.423835743	-0.019575766
##	[415,]	2.47131113	0.137828348	1.7630774014	1.562701227	0.690361836
##	[416,]	-4.74381108	1.469838574	-1.2940813424	-0.047002440	0.093350382
##	[417,]	3.25989047	0.411816872	-0.7088635132	0.660796224	-0.122230842
##	[418,]	-0.28873282	-0.238193582	-1.1125759564	0.948526591	-0.729609615
##	[419,]	-6.21759203	1.379634010	2.6758285584	-1.062873542	0.569651015
##	[420,]	-2.38825669	-4.847580637	-1.0518115676	0.352826796	2.379282350
##	[421,]	-7.07789490	-12.554883895	7.3405395029	1.266306390	-7.494442924
##	[422,]	0.67853348	2.104165275	-1.4125558491	-1.044128093	-0.241693881
##	[423,]	3.74487498	-0.254089331	-0.1134712705	1.931935530	1.042995492
##	[424,]	-1.28796097	-7.729781497	-0.6718208447	2.878456242	2.021041334
##	[425,]	2.66132173	-0.540236395	1.6828861216	1.212992003	-2.354266293
##	[426,]	-1.69886069	-1.527444481	-1.7279018644	-1.417367198	1.222107341
##	[427,]	1.93311747	-1.466669264	-0.1232268565	1.824847037	1.931105590
##	[428,]	2.19720576	1.796392965	-0.4618512427	0.956953854	-0.554140276
##	[429,]	3.87799290	-1.081555731	1.8463011111	-0.422304964	1.682169981
##	[430,]	-5.24194147	-3.905260300	-0.8455874001	1.677007487	0.786375919
##	[431,]	0.64371117	0.899260215	-2.1473835938	-2.144783622	0.428037440
##	[432,]	-2.68931058	1.927421355	-0.9955546145	0.462605135	0.582453053
##	[433,]	2.17670829	-0.501863117	-0.9565264470	0.206102818	0.883344375
##	[434,]	-3.70686636	1.045836713	0.4816649717	1.405224666	-0.369691450
##	[435,]	0.31260041	-2.188432075	0.0360614069	-0.484602153	-2.086898740
##	[436,]	3.15083363	1.764061105	-0.0632294997	1.509996120	-0.352585269
##	[437,]	-0.01524751	3.448970079	0.2683611903	0.485325701	-0.403802202
##	[438,]	2.82107844	0.962685843	-0.4077529743	0.469826563	-0.554806245
##	[439,]	4.13798735	-2.404639228	-1.2300675528	2.033618977	1.171460520
##	[440,]	0.60139962	-1.785240622	1.4666782849	-0.166436664	1.582803448
##	[441,]	0.53352373	-1.273635188	-0.9336863953	0.430309268	-0.561901558
##	[442,]	1.93007176	1.131792203	0.4550268686	-1.146989409	0.197448697
##	[443,]	-2.76695531	-0.569358293	-0.6252299679	0.500201389	-0.498706564
##	[444,]	1.27740734	-0.521156760	-2.2513060674	1.663647265	0.120097127
##	[445,]	-3.35826618	2.162947995	-1.0565262725	-4.361530635	-0.058435653
##	[446,]	3.55786464	-1.660931769	0.4482697727	2.071446564	0.492862897
##	[447,]	1.83618421	1.602212545	1.2948376261	-0.801846011	-0.711360764
##	[448,]	4.62757459	1.830934754	0.0434021735	0.099618868	-0.801502697
##	[449,]	0.39315730	-2.277710841	0.6189674261	-0.422007359	-0.123067010
##	[450,]	-3.63473825	1.910328910	1.5351454389	-1.341170932	1.461068813
##	[451,]	3.88022769	-0.518846486	-0.8185369950	1.014783257	0.818621654
##	[452,]	-1.77103983	-2.782678257	-0.9305531747	-3.076978087	0.694773741
##	[453,]	-4.69388630	0.188522351	3.6947443763	-0.968598650	-0.341453721
##	[454,]	1.08027822	-1.801568388	1.7689836487	-1.612246835	-3.744079904
##	[455,]	1.93304443	-0.895951051	0.0345573012	-0.555885766	1.277336273
##	[456,]	0.40183385	0.402263545	-1.0023283842	1.347274382	-0.854399957
##	[457,]	0.83838745	-1.966762653	0.7725877851	3.437948548	2.353723768
##	[458,]	-6.62685720	6.006832709	1.0015365559	-2.885629142	1.693922797
##	[459,]	5.35125402	-1.025804930	0.3181294790	1.369092486	0.918035196
##	[460,]	4.97367372	3.380264972	0.4093731190	-1.563279652	-1.039634881
##	[461,]	-16.46938497	8.001283491	6.8227122980	2.178064474	1.779251131
##	[462,]	-4.43287778	0.980297785	1.3946494971	-0.555251668	0.349506979

##	[463,]	3.29059930	-0.207287422	-0.6465120094	0.616613224	-0.173755530
##	[464,]	3.43847027	2.154949388	0.2409668794	1.518021787	-0.933154105
##	[465,]	-7.08380326	-2.033853631	-0.0709913272	2.594994840	2.033805629
##	[466,]	0.92117411	-2.481318017	0.3551849407	0.264808325	-0.138496571
##	[467,]	3.85446131	1.516422548	-1.1629509462	0.813792591	-0.492554063
##	[468,]	-0.97691061	2.195771085	-1.7282163142	0.969959641	-1.182368239
##	[469,]	1.29999759	-3.469659371	1.1030087446	0.771752001	-0.210809159
##	[470,]	2.12740559	1.188622789	0.4616456305	0.863254679	0.103054750
##	[471,]	1.71986719	0.542564358	3.2518722785	-0.059043180	-0.094851341
##	[472,]	2.99689351	2.731643097	-0.1890402758	-0.404471752	-0.409732471
##	[473,]	3.74961031	1.409849793	1.6902313540	-0.543500944	-0.089467851
##	[474,]	-4.30662137	4.672237959	0.0235188886	-3.658236399	-0.176429245
##	[475,]	2.04159305	0.905201564	2.8185006831	-2.861454997	1.005801946
##	[476,]	-1.88824118	2.374723415	-1.7088784564	0.711253582	-0.383072016
##	[477,]	1.55874214	-0.982545866	1.1750816342	-1.757890448	-3.502568512
##	[478,]	-4.48999960	4.277621617	0.4603975344	-0.472569054	-0.531661087
##	[479,]	0.42300838	0.797151507	-1.1153035345	-0.087755288	-0.258604554
##	[480,]	-2.77998463	-3.392976475	-0.7521116151	-1.334441777	1.583555887
##	[481,]	0.77614055	0.052750091	-1.1645115054	2.510123359	-0.020412574
##	[482,]	-0.60979819	-0.647069698	-0.2164656954	-1.091856046	-0.120983694
##	[483,]	-6.04737544	-0.739789652	-0.3875141402	-1.053516423	0.739878672
##	[484,]	-1.16246198	-7.004627198	4.2606786726	-0.308147895	-2.913473034
##	[485,]	4.04176095	1.353040592	0.5127792697	0.841962897	-0.181889207
##	[486,]	-6.16693990	-5.117734958	0.4877032413	0.955645338	0.597533472
##	[487,]	2.68517460	-1.442920215	0.3367702304	-0.241159207	0.789622443
##	[488,]	-13.03506747	-1.004983354	0.5311678616	1.492210275	0.590957437
##	[489,]	2.79463414	1.073832317	0.8210316872	-1.097659561	-0.010418035
##	[490,]	-3.75325184	-5.996140633	-4.8357917197	-1.151186016	0.573456712
##	[491,]	-3.09556060	1.224625925	1.2377328737	0.626478204	1.113719412
##	[492,]	-10.35592316	-1.694906212	-1.9057410023	-2.349739772	0.028194838
##	[493,]	-2.80883133	-1.280874054	-2.1763518377	2.700578691	0.043082472
##	[494,]	2.13976976	-1.520474753	0.1761986584	-0.499332004	-0.681683440
##	[495,]	2.58210428	-3.135038371	1.4011848989	-0.757874406	2.779442989
##	[496,]	0.20588012	-1.084141740	-0.6862811811	0.626860697	0.840548098
##	[497,]	2.11977193	-1.852084367	-0.5520734905	-0.468183290	0.476308210
##	[498,]	0.28415442	0.145945995	-3.2352065154	-1.039955783	0.032713006
##	[499,]	-6.39728226	1.830013556	0.5032329987	-1.698616527	-0.555042544
##	[500,]	-3.69647780	-1.057918785	-3.4310567524	-4.803225993	0.811199050
##	[501,]	0.74620212	2.435993214	-2.0302544596	-0.453035176	-0.267162264
##	[502,]	0.81368970	2.647839565	-0.5156845929	-1.664502015	-0.279827642
##	[503,]	-4.42147784	-1.411711503	-2.2150775265	-0.211780495	1.431990635
##	[504,]	-2.03452475	-6.425374063	1.2724599041	-0.099902061	-4.600696205
##	[505,]	-0.63831360	-3.427027880	0.6106901398	0.232945182	1.211435755
##	[506,]	3.66054805	1.312233041	0.4831790551	-4.606045057	0.739689168
##	[507,]	4.50412687	3.163152158	-0.2168751969	0.398921843	-1.387764377
##	[508,]	2.76873417	2.152881994	-0.0536981339	1.615546908	-0.717140166
##	[509,]	-8.72659351	0.555855882	0.8428759683	0.402161897	-0.684357967
##	[510,]	-6.00904695	0.105313185	1.7442354073	0.939652604	1.179842425
##	[511,]	1.58160293	-0.580754994	-1.8093603808	1.118841070	0.396147154
##	[512,]	-0.33466018	3.133976261	-0.1416830569	-1.806826702	-0.038911673
##	[513,]	-2.89047627	-4.017286035	-2.9923030112	-0.337842490	0.856546078
##	[514,]	2.37505103	0.725942626	-1.5357978170	1.845147722	-1.177832271
##	[515,]	-4.19709874	-1.189911932	-1.6089726944	-0.974578499	0.111877495
##	[516,]	-2.74460834	-3.476536508	-2.4634009979	-1.019516606	-0.151657089
##	[517,]	-2.38120246	3.750159029	-0.5797185731	1.126446585	-0.624301073
##	[518,]	-5.73742406	1.079400718	-0.5326192329	0.902675836	0.180442702
##	[519,]	-3.29377188	1.117043191	0.7711039905	1.000309242	1.186358789
##	[520,]	-0.30821634	-2.085558711	-2.0794937290	-1.073778856	0.216900864
##	[521,]	1.28839449	-2.553856815	-0.0911444274	0.772815346	-0.556805009
##	[522,]	0.78632237	-0.660183210	-0.6558631717	0.214280882	0.437071402
##	[523,]	0.93673811	2.099509593	1.3988917258	-2.872373307	1.263250737
##	[524,]	5.47344760	0.672196573	1.4758664356	-2.283033549	0.176718937
##	[525,]	4.55695054	-3.526077823	-0.2041227666	1.084674429	2.758993529
##	[526,]	2.28611591	-0.014487357	-0.4674202069	0.300346220	0.799136770
##	[527,]	1.44511948	0.217810147	-1.0353200872	-2.023720743	-1.470364673
##	[528,]	-0.84527881	2.292676412	0.5048986202	-0.018565599	2.076889872
##	[529,]	2.98947391	-0.332674223	1.2726378839	-0.718293436	1.309913877
##	[530,]	3.83781210	-0.896352307	0.7017898365	-0.217783148	1.335216237
##	[531,]	0.69043773	-1.695054635	1.0177396721	-0.866008187	-2.175500988
##	[532,]	1.14834301	-5.592125893	1.3271094555	-2.186535737	-0.763949388
##	[533,]	3.92661587	2.050066562	0.7339364697	0.502946664	-0.334386041
##	[534,]	-2.96250508	-0.696175098	-0.9977727035	-0.536715654	-1.406619041
##	[535,]	-4.63303653	1.462743378	-1.2105920136	-1.209013820	-0.183946933

##	[536,]	2.00189285	0.196839703	-1.6545301304	1.034559190	-0.902129136
##	[537,]	2.84469305	-0.133127057	0.4745695745	0.472207485	1.512816534
##	[538,]	3.34962817	0.063488601	-0.2871035394	-0.621116699	1.119876959
##	[539,]	1.66922234	0.207833811	-0.1631375423	-0.194091500	-0.556458267
##	[540,]	2.82110178	-0.374649303	-1.3592772183	1.730834304	-0.280572137
##	[541,]	-0.44201240	2.775367202	0.3966928739	0.486732332	0.522352684
##	[542,]	1.29865971	-4.962105055	0.3526022459	2.234331114	3.840065291
##	[543,]	4.13725536	1.375072291	0.8551058344	-0.048917995	0.592027695
##	[544,]	-7.22128200	0.010718318	-2.8799687746	0.040062109	2.446911017
##	[545,]	-11.64894933	-4.761813536	1.9451698825	0.350864750	3.370483386
##	[546,]	1.42496615	-1.399869981	-0.8450435069	1.102039048	0.365230708
##	[547,]	2.09990574	-3.657502132	3.6257113913	1.551381636	-2.233469867
##	[548,]	2.39991037	0.246681497	-0.3378671702	-0.274970968	0.352897453
##	[549,]	0.48590718	0.173477406	1.0135793621	-1.997904671	-0.331200038
##	[550,]	2.13997388	-0.103944360	-1.5001858808	1.113655093	0.071153309
##	[551,]	1.35404318	-0.370549656	2.4529396180	-1.116387394	-1.913508379
##	[552,]	3.01378035	-0.244652955	1.9465697299	1.697858904	-1.708872342
##	[553,]	-6.34937295	-7.716748627	-4.2345641977	-3.414140485	-1.695312257
##	[554,]	1.53390730	-0.409744080	0.5850370461	-0.339481767	0.782786302
##	[555,]	2.80247498	1.662304949	-0.2002936463	-2.229008377	0.202865323
##	[556,]	-7.65724966	0.835800511	-2.1970463290	0.257856262	0.232863640
##	[557,]	3.01791604	0.668841737	0.3570566166	0.567682198	0.737429477
##	[558,]	-1.97984933	-2.321801686	1.2034762501	1.781761087	-0.147789993
##	[559,]	3.48514918	-1.615286352	2.6549210046	1.266803646	0.595881571
##	[560,]	1.55955384	1.028960265	-1.3197775498	0.621701342	0.376933156
##	[561,]	-1.28833307	-0.924570038	-1.5853581885	-1.044030076	-0.415744943
##	[562,]	3.13117092	0.759786107	-0.8078990191	0.734645380	-0.291094479
##	[563,]	2.55960867	2.489030874	0.1537135592	-2.100294779	-0.982931938
##	[564,]	1.81436070	-0.403841548	-1.2387230231	1.269441800	-0.002995888
##	[565,]	2.59208254	2.033925156	-0.0683395784	-0.169487840	-1.199669593
##	[566,]	2.43449839	-3.439805597	3.4401454793	0.511458026	1.040071996
##	[567,]	0.39541303	0.975171322	-2.5944480530	-0.791160326	-0.732682392
##	[568,]	1.17806944	0.465701673	-0.5094579617	2.144876827	0.243326085
##	[569,]	-3.62685594	1.938721085	-0.8802583979	1.389599791	-0.998290771
##		PC6	PC7	PC8	PC9	PC10
##	[1,]	-0.243005836	0.5092014591	-1.114233e+00	0.2840243356	0.324631968
##	[2,]	1.230824782	0.2937433944	1.000046e-01	-0.0668399016	0.426121795
##	[3,]	-0.258787224	-0.3303384517	3.599041e-02	0.8734350372	0.022221919
##	[4,]	-1.553963404	-0.9692185222	-1.318521e+00	0.6254396236	0.056664698
##	[5,]	0.594036057	0.1198200600	-4.827970e-01	-0.2727816446	-0.294394853
##	[6,]	0.691445258	0.1454025895	6.214539e-02	0.2342453501	0.736812390
##	[7,]	-1.418752354	-1.2388811831	-2.165076e-01	0.9315565326	-0.268145770
##	[8,]	-1.081225510	-0.4658149824	3.804442e-02	0.2385509971	0.541705535
##	[9,]	0.972459383	0.0819567466	1.751165e-01	0.6908540096	0.288307896
##	[10,]	0.095284975	0.0625272462	-1.062398e-01	-0.1778243252	0.115976898
##	[11,]	-1.203709368	-1.0330083689	-4.662867e-01	0.4201199428	-0.605111938
##	[12,]	0.812108515	0.3060748681	8.738049e-02	0.2419410388	0.365639712
##	[13,]	-0.539258610	-0.0996748214	-2.485447e-01	-0.6655039982	0.802021236
##	[14,]	0.758438841	0.0317275218	4.888299e-01	-0.3406210411	-0.058962380
##	[15,]	-1.573412378	-1.0849024065	-2.361521e+00	-0.9159464767	0.102473556
##	[16,]	0.118726637	-0.3446117463	-2.433840e-01	0.2389030176	-0.077298378
##	[17,]	0.318471906	-0.2688675939	-7.889994e-01	0.4451436582	-0.356377025
##	[18,]	-0.466661042	0.3785832621	-4.549091e-01	0.0643287310	-0.124219026
##	[19,]	0.386491087	0.2202986848	8.037426e-01	0.7244786367	-0.035828230
##	[20,]	0.612680388	0.2058233138	3.130149e-01	-0.3910788638	-0.601850454
##	[21,]	-0.571512030	-0.3028143767	-5.915440e-01	-0.0424183692	0.612853494
##	[22,]	-2.125361510	-1.0205658953	-4.133036e-01	0.4584351566	-0.241614991
##	[23,]	-1.227651735	-0.7812871502	1.186259e-01	0.0772507569	0.091978458
##	[24,]	-0.374286225	-0.6669001959	-1.185580e+00	0.5997355807	-0.574364571
##	[25,]	-1.072827677	-0.7787326475	1.877774e-01	0.5411289008	-0.557347619
##	[26,]	-0.873828006	-0.3348789581	7.399897e-01	0.2356607813	-0.380983925
##	[27,]	-0.201713972	-0.4460408631	-5.170205e-01	0.3532327453	0.031001284
##	[28,]	0.183124494	0.0783370475	1.446612e-01	-0.3090054963	0.501950132
##	[29,]	0.646631112	0.4006972374	7.852818e-01	0.3136289323	0.763256973
##	[30,]	0.280170184	0.1822270867	1.342487e-01	-0.2564342902	0.119478766
##	[31,]	-0.025278377	-0.2111594348	8.752728e-01	0.2504173641	-0.014629661
##	[32,]	-0.619514542	-0.3518807381	-3.129277e-01	-0.3649050396	0.434518749
##	[33,]	-0.911391449	-0.6624347459	2.102538e+00	0.1788796291	-0.685443917
##	[34,]	1.603601454	0.2003580803	-5.664399e-01	0.2925186417	0.289779519
##	[35,]	0.113336816	-0.1466828996	-1.537758e-01	0.2944745573	0.283773673
##	[36,]	0.911780229	0.5368713244	2.472982e-01	-0.8199302475	-0.261170401
##	[37,]	-0.145344472	-0.4292595370	3.156379e-01	-0.0735878263	0.415127020

##	[38,]	-0.353164991	-0.1050608983	1.375170e+00	-0.6835159477	-1.112481503
##	[39,]	0.723122865	-0.1826208659	-3.182262e-01	0.2516837803	0.043807476
##	[40,]	-0.415366317	-0.4097246157	1.162924e-01	0.7129563632	-0.796713323
##	[41,]	-0.349746811	-0.5153796187	-7.868544e-01	-0.4233846133	-0.406537211
##	[42,]	0.437175823	-0.2827684007	-1.055016e-02	0.5515347428	-0.077923707
##	[43,]	2.559415577	1.9484628103	1.286858e+00	-1.2715190317	-1.170346504
##	[44,]	-0.315518485	-0.1701827591	1.254641e+00	0.1896129904	-0.988357108
##	[45,]	1.274601480	0.4150196773	5.198808e-01	-0.0382748425	-0.079150152
##	[46,]	1.332601472	-0.0878076702	6.289778e-03	-0.2399777549	-0.059747751
##	[47,]	0.038151689	0.5680425674	1.774667e-01	0.0759580917	-0.308469517
##	[48,]	0.378240285	-0.5731740129	-2.068647e-02	-0.7579397801	-1.508260219
##	[49,]	-0.846498664	0.0601963202	-1.069404e+00	1.1489867269	0.168132472
##	[50,]	1.075898588	0.1532310034	5.948280e-02	-0.1413657992	0.209916555
##	[51,]	0.531354820	0.1438185386	-2.550616e-02	0.4288271014	-0.153506324
##	[52,]	0.687755054	0.9059044038	-1.176474e-01	0.1508802562	-0.031423916
##	[53,]	0.187173381	0.0086699045	6.930719e-01	0.3400918790	0.419273108
##	[54,]	-1.006835348	-1.0556025893	1.924850e-01	0.5774347910	-0.420909087
##	[55,]	-0.077461298	-0.9337311465	-2.575898e+00	0.1304511617	-0.508831025
##	[56,]	0.113413200	0.0158864112	-3.133097e-01	0.0826367605	-0.223900653
##	[57,]	0.241970807	0.0853750457	5.407370e-01	-0.7043882363	-0.433627298
##	[58,]	-0.748171662	-0.1228793450	3.840828e-01	-1.9575022282	0.219802681
##	[59,]	-0.480500118	-1.4838315679	-1.166848e+00	-1.3333929484	-1.265921901
##	[60,]	0.221883238	-0.3424202572	-1.235137e+00	-0.0330467256	-0.275336180
##	[61,]	4.231125686	1.0601609757	3.713915e-01	-1.4678768121	0.090595486
##	[62,]	-1.733438062	-0.9399865276	1.670854e+00	0.4665486353	0.715730652
##	[63,]	-6.007545293	4.5786997347	-4.808517e+00	-3.2829570049	-0.853070369
##	[64,]	0.903611778	0.2489926365	2.377796e-02	0.2246776108	0.604252170
##	[65,]	2.846149314	0.9274806597	-1.051971e+00	0.0078196232	0.134193099
##	[66,]	-1.716342795	-0.7924647757	7.167521e-02	-0.6189025573	-0.446067749
##	[67,]	-0.407934869	-0.1681029771	-7.356165e-02	-0.3127034395	0.420750283
##	[68,]	0.462845696	0.6107179168	-2.264838e-01	0.0518516309	-0.085354010
##	[69,]	0.902860571	0.1149502893	-5.465184e-01	1.0699234087	0.207848206
##	[70,]	-0.542495400	0.7053588675	3.859499e-01	0.1662943975	0.427468571
##	[71,]	-1.022671062	-0.2399894281	-1.809293e-01	-0.1040901850	0.508863784
##	[72,]	-0.081786575	-0.3805157736	-1.141573e-01	0.7461520304	0.116026029
##	[73,]	1.151170962	0.0504346650	2.904540e-01	1.1468524605	0.484341271
##	[74,]	-0.588362883	-0.0583767518	1.468285e-01	0.0831299932	-0.985482890
##	[75,]	1.425650760	-0.2131017559	-1.391775e-01	1.1464761531	-0.257522807
##	[76,]	0.275258116	-0.0919395773	8.954692e-02	0.1974373642	0.209945627
##	[77,]	0.524271271	-0.0128034231	-5.532844e-01	-0.3102295771	-0.254991746
##	[78,]	-0.348111360	-0.1723096076	-5.573505e-01	-0.9612237931	0.729290126
##	[79,]	-0.272520924	0.5993920868	3.455491e-01	-0.2346390490	-0.077683191
##	[80,]	-0.588860701	0.2474676356	-7.814022e-01	0.0174919393	-0.332934122
##	[81,]	-0.170575115	-0.4633412263	-4.826599e-01	0.8113381681	-0.441367394
##	[82,]	0.701349834	0.0894516267	-1.932227e-01	-0.3083117623	0.175066275
##	[83,]	0.622956092	-0.1584406867	-1.109609e-01	0.3622054707	-0.005580005
##	[84,]	0.858041164	0.0467339814	-1.492149e-01	0.6665900949	0.101317593
##	[85,]	-0.383832271	-0.2434681453	-2.857823e-01	0.8722893476	0.085951468
##	[86,]	0.459583999	0.1001849001	2.378814e-01	-0.6265070059	-0.143756040
##	[87,]	0.041491587	0.8195254366	-1.713726e-01	0.3347040070	0.158110882
##	[88,]	-0.985897249	-0.7789707715	4.097159e-01	0.3679873834	-0.195212459
##	[89,]	-0.414373257	-0.6078054437	-2.533740e-02	-0.3183108069	-0.277370756
##	[90,]	-0.506259427	-0.3969890115	1.834544e-01	0.1821476589	-0.264846811
##	[91,]	-1.362678733	-0.6811377003	3.858522e-01	-0.0856829421	-0.347487689
##	[92,]	0.203990728	0.0411694355	1.009222e-01	-0.0088894614	0.154726274
##	[93,]	0.385676600	-0.1313055419	5.861534e-02	0.1555958414	-0.082725854
##	[94,]	-0.396541374	-0.2846822352	-1.731591e-01	0.0829576156	0.477377242
##	[95,]	3.509829035	1.0923653908	4.188991e-01	-1.7690401618	-1.504305929
##	[96,]	-0.100693881	-0.1723514482	-5.352170e-01	-0.1900829181	0.023259970
##	[97,]	2.385001153	0.5314898567	2.040450e-01	0.1265666279	-0.180276718
##	[98,]	0.420698244	0.0585379429	-6.769576e-01	-0.2506477826	0.514545179
##	[99,]	0.051461209	0.0024429304	4.558757e-01	0.1124396442	-0.186721375
##	[100,]	-1.835812708	-1.4626654461	1.898481e-01	-0.0148742665	-1.601637488
##	[101,]	-0.434288612	-0.3670927931	-2.535144e-01	0.0298908022	0.129867849
##	[102,]	2.433579405	-0.8460166409	1.460977e+00	3.0428897901	-2.565872410
##	[103,]	-0.308577232	-0.0004944335	-8.554935e-02	0.1170666009	0.223529985
##	[104,]	-0.653654455	-0.4257009261	-6.369134e-02	0.0396584643	0.581064616
##	[105,]	0.687169316	-0.0732295781	-2.312993e-01	-0.4750206987	-0.228534585
##	[106,]	-0.002002907	-0.1114380097	3.048926e-01	0.6539659760	0.155835573
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##	[291,]	0.370944229	-0.4093149628	1.126798e+00	-0.3484262937	-0.240469818
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##	[293,]	-1.470622784	-0.9132532105	-8.625514e-01	-0.4222840487	0.563238819
##	[294,]	0.345872257	0.2457435567	-1.045540e-01	-0.4242127421	0.610226707
##	[295,]	-0.306258125	-0.5836253708	9.235721e-01	0.4637284130	-0.256405019
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##	[300,]	0.848400202	-0.0557692270	-1.559274e+00	-0.2900566953	-0.089480651
##	[301,]	0.700067425	-0.1533016942	-8.497777e-01	-0.8756026944	0.792176989
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##	[462,]	1.445997891	0.4287780163	9.970134e-02	0.3863305176	0.235660245
##	[463,]	-1.071971987	0.2549331365	6.384951e-01	-0.2362035264	-0.322484302
##	[464,]	1.197576346	0.1613564676	6.256264e-01	1.5679536333	0.602978076
##	[465,]	-0.865181646	-0.5595374935	1.356727e-03	-0.1110770362	-0.584009100
##	[466,]	0.270345397	0.1120956238	1.051918e+00	-0.0680618115	-0.378687088
##	[467,]	0.169231598	-0.1294319171	-4.302984e-01	-0.0555307911	-0.441822136
##	[468,]	-0.727717899	-0.4711492622	2.531774e-01	-0.2008830506	-0.498333329
##	[469,]	0.251641678	-0.1057119878	5.123864e-05	-0.4800224366	-0.005925717
##	[470,]	1.152198677	-0.2111267799	1.069001e+00	0.9298893016	0.075861642
##	[471,]	0.771072297	-0.0582610367	-3.931354e-01	0.0088037559	-0.458318891
##	[472,]	0.527308405	-0.7900417316	-6.515414e-01	1.3311120113	-1.128311638
##	[473,]					

##	[474,]	-0.954055677	0.1170425933	6.009403e-01	-1.2426745154	0.279927796
##	[475,]	0.304254446	-0.5035410387	3.907648e-01	1.0861727724	0.383322961
##	[476,]	-0.317307893	-0.3309680600	-5.740482e-01	-0.1232595731	-0.071288516
##	[477,]	0.412795081	-0.2416871780	6.927872e-01	-0.3700920176	-0.930124835
##	[478,]	-3.451229240	5.4877883861	-1.259550e+00	1.3359072021	-1.710249506
##	[479,]	0.279939954	-0.0863085419	-2.376465e-01	0.1332303824	-0.045630744
##	[480,]	-0.440442617	-0.2484646893	2.189255e-01	-0.0926938543	-0.073399597
##	[481,]	0.241406775	-0.2925593368	-4.256433e-01	1.1986834207	-0.357922481
##	[482,]	-0.687138123	-0.6865918211	-4.298382e-01	0.5088933028	-0.340069660
##	[483,]	0.358275660	-0.2666854770	5.008674e-01	0.2839585122	0.276060071
##	[484,]	-0.224830135	-0.4812778455	7.605898e-01	-0.8761024800	-1.008188418
##	[485,]	0.957490503	0.3434052408	5.251766e-01	-0.5906840785	0.387528306
##	[486,]	2.452203267	0.3333649015	-1.452160e+00	-0.4637818690	-0.655429293
##	[487,]	0.869846981	0.3848653610	4.605897e-01	0.5938194226	1.025436573
##	[488,]	1.165175788	-0.2802992604	-2.821728e-02	0.7920518895	0.589561423
##	[489,]	0.620504983	0.0037139618	4.674111e-01	-0.6803090154	-0.174633041
##	[490,]	-1.055772558	0.1879614957	5.133178e-01	-0.1850760741	0.710593575
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##	[492,]	0.656142285	-0.1950922896	2.749603e-01	0.0727122564	-0.517724665
##	[493,]	-0.499939750	-0.4282403434	-1.929100e-01	0.9534386634	-0.265431676
##	[494,]	-1.399576113	-0.7333262784	-6.711072e-01	0.1390741282	0.215094772
##	[495,]	-0.674274970	-0.5123611717	-3.675883e-01	-0.2577982561	0.266407014
##	[496,]	-1.131902985	-0.7286776375	8.511138e-01	1.1791331010	-0.495103066
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##	[498,]	-0.170413484	0.8254187472	1.393189e-01	0.0682038256	0.464063903
##	[499,]	-0.174914704	0.2699011927	1.312018e+00	-0.3639189284	-0.465865173
##	[500,]	-1.304526579	0.3060988064	-7.124623e-02	0.1711658151	0.414238636
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##	[515,]	2.522752626	0.8707103716	-1.015807e+00	-0.6818502382	0.595280881
##	[516,]	-0.701688852	-0.1204708780	2.680713e-01	0.1775183506	0.478151727
##	[517,]	0.126504812	-0.2880164341	4.489533e-02	-0.4265407888	-0.659359218
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## [3,] 0.4208601858 -0.066872858 0.374354577 0.2585457288 -0.3302742156
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##	[75,]	-0.0355827346	-0.517525386	-1.136521744	0.0506356363	-0.3924042754
##	[76,]	-0.4752791887	0.019983397	-0.314225761	0.3847227125	0.4354901863
##	[77,]	-0.1185528566	-0.363119211	0.233407007	0.0101145900	0.0347659821
##	[78,]	0.2976772228	0.178007654	0.096254953	-0.2084783603	0.4629508916
##	[79,]	0.0927109467	0.082048795	-0.204737909	0.2065594353	-0.1485075332
##	[80,]	-0.7594078156	0.239666738	-0.349634667	0.1984432088	-0.0016961634
##	[81,]	-0.3254246133	0.141393803	-0.257874230	0.0122569168	-0.5714903057
##	[82,]	0.2151243746	0.221999475	-0.471559697	-0.6398934891	-0.4109253790
##	[83,]	-0.2207116914	-0.055412960	-0.310547755	-0.3972968464	-0.4704640952
##	[84,]	-0.3888913660	0.742586919	0.020688915	0.0664747385	-0.8234375494
##	[85,]	0.2300696101	0.020031263	0.365803120	0.3619603844	-0.1891779022
##	[86,]	0.4085960369	-0.035118683	-0.082717309	-0.2013104393	0.32471110364
##	[87,]	0.2573423050	-0.236146920	-0.305266327	0.2053676218	-0.0773363254
##	[88,]	-0.0888156952	0.797062184	0.897168381	0.1344217425	0.0078755579
##	[89,]	-0.7019660311	-0.840988731	0.201268534	0.7635809130	-0.1536269356
##	[90,]	0.0165885930	0.354641640	0.169021988	0.6057738775	0.2971640712
##	[91,]	-0.2566030591	-0.418349583	-0.215521143	-0.0118092871	0.3478939652
##	[92,]	0.5700694647	0.299019546	0.115220778	0.1834733325	-0.0420734438
##	[93,]	-0.0426065100	-0.443368189	0.014991807	-0.0474505987	-0.1399771970
##	[94,]	-0.7185620737	0.318142225	0.037149053	-0.2879987289	-0.2724976613
##	[95,]	1.0227520801	-0.002359375	-0.990335506	0.1726820341	-2.6203039623
##	[96,]	0.4525160753	0.155283259	-0.860442213	0.2643141528	0.0484620742
##	[97,]	-0.1048707208	0.149901692	-0.399783572	0.1114674830	-0.3341206355
##	[98,]	-0.1819028995	-0.336294234	-0.726477514	0.2757802178	0.0309988780
##	[99,]	-0.1760836040	0.147324454	0.521766451	0.0575714643	0.0325281602
##	[100,]	-0.3040170344	0.251301665	-0.569198422	-0.7551665683	0.5453957030
##	[101,]	0.2970640900	0.511244074	0.778446852	0.0758737257	-0.7712845862
##	[102,]	2.9412881026	-1.671742402	-1.171982373	-0.0557680574	0.8137153409
##	[103,]	-0.1223262382	0.121254607	0.091175389	0.0260986751	0.1088560123
##	[104,]	0.4440701158	-0.280828083	0.323990073	0.8764569166	0.2034931074
##	[105,]	0.7892129312	-0.999122505	-0.329129372	-0.1284220284	0.0987010238
##	[106,]	0.5138101469	-0.573826244	0.333011512	-0.0125725203	-0.4521049529
##	[107,]	0.6421924721	0.819024502	-0.184690069	-0.2338294582	0.2251702775
##	[108,]	-0.9189058421	-0.085835964	0.321087131	-0.9856011260	-0.3924722093
##	[109,]	-0.4583557416	-0.104220791	-0.475906688	-0.1322818757	0.0871875954
##	[110,]	0.5922872035	0.242146386	0.693735966	0.1297679103	-0.3603469979
##	[111,]	0.4302849272	-0.154461451	-0.186793284	0.6342123334	-0.4052294294
##	[112,]	-0.3245299230	-1.925286555	-0.547994462	-0.2550444588	0.4867012050
##	[113,]	-0.1340538374	-0.883526592	-0.026731844	0.6127729072	0.2200129554
##	[114,]	0.2087874335	0.629348805	-0.548905161	-0.1594271987	-0.0138911395
##	[115,]	0.3937443289	0.641510585	0.608246134	-0.2212891720	0.0418879950
##	[116,]	0.6676067860	0.131398251	-0.739562187	0.5196495647	-0.3947917466
##	[117,]	0.1173728387	-0.495899737	0.102337158	0.3882470578	0.3567855897
##	[118,]	0.5675428207	-0.204731001	0.100382490	0.3139972639	0.2404426198
##	[119,]	-0.8634320374	-0.210088860	-0.550122515	0.6601212083	-0.2038515138
##	[120,]	-0.1167850210	0.416743659	0.162831123	0.3323733785	-0.3777926782
##	[121,]	-0.2833445881	-0.109660802	0.105498218	-0.2450985868	-0.2812186773



##	[122,]	1.0161507721	0.999126181	-0.301938383	0.6316794489	0.1715012688
##	[123,]	-0.2146274052	0.254658622	-0.121431266	-0.2802225429	0.1034685097
##	[124,]	-0.1001508613	-1.262080977	-0.098546281	0.9295212938	-0.3318820563
##	[125,]	-0.1619819500	-0.394382213	0.199628044	0.1670496218	0.4326589690
##	[126,]	0.4836234583	0.581447497	0.101306012	-0.2630559651	-0.2085513291
##	[127,]	0.6209756068	-0.569230015	0.917117306	-0.0139124324	0.2183653888
##	[128,]	0.1396114731	0.064247407	-0.153129212	0.3656987849	0.3332133948
##	[129,]	-0.2734561930	-0.523655989	-0.583836398	0.1980993519	-0.4698047776
##	[130,]	0.1634795439	-0.470715219	-0.177547340	-0.4497421244	-0.2709749020
##	[131,]	0.3507522688	1.013169900	-1.244228520	-1.0944882773	0.4899229158
##	[132,]	-0.1887419661	0.348841879	-0.167826269	-0.2216577821	0.1245944709
##	[133,]	-0.2922638993	0.756190343	0.458057333	-0.3371038350	0.0008351230
##	[134,]	-0.3647956849	0.072562079	0.129607861	0.0599528009	0.3969422422
##	[135,]	-1.1910514981	-0.111717167	0.810136994	0.4799652605	0.5511167790
##	[136,]	-0.1238119718	-0.592222549	0.236431199	0.7257376387	-0.0627998786
##	[137,]	-0.9007912360	-1.202140984	-1.062622402	-0.4961548924	-0.2115650004
##	[138,]	0.1508861083	-0.228409225	0.036153451	0.1894627965	-0.1168587307
##	[139,]	0.9132971676	-0.427154541	0.349519723	0.6604701652	0.1573605667
##	[140,]	-0.8764008404	0.032182562	0.163497643	-0.2411205262	0.5060482783
##	[141,]	0.3457900054	-0.408792120	-0.313339617	0.3020815400	0.2907451887
##	[142,]	0.8744983475	-0.264318593	-0.858839630	-0.1044714065	0.6894535217
##	[143,]	0.1344870495	-0.246081714	0.221899658	0.1924763855	-0.0163453917
##	[144,]	0.4029522146	0.723560131	-1.181210913	-0.5853631293	-0.3079274483
##	[145,]	-0.2730888030	0.440756009	-0.974995217	0.5146731947	0.7089323370
##	[146,]	0.9918935188	-0.595774643	0.343595820	0.1913350807	-0.5064295350
##	[147,]	0.3581654499	0.146154662	-0.876045249	0.9745930948	-0.4100336909
##	[148,]	0.4284611586	-0.096792448	0.015955299	0.1168216644	-0.4634769346
##	[149,]	1.1114906101	0.093602108	-0.182490883	0.1748517158	0.5571318289
##	[150,]	0.1643495391	0.066545016	0.076347737	-0.1283383120	0.0368836766
##	[151,]	0.4718480213	0.283280740	0.624561020	-0.4256768584	-0.1292193265
##	[152,]	-1.3828769147	0.049820953	-0.764879250	-0.1065048439	0.1717319759
##	[153,]	0.2404990292	0.037187600	-0.155977525	0.1289266173	0.2534708660
##	[154,]	-0.6127068202	-0.332872717	-0.024166518	-0.3100372711	-0.1768182261
##	[155,]	-1.5353095213	0.232444395	1.669535641	1.5714422158	-1.7020627285
##	[156,]	1.1362149632	0.094890835	0.762405403	-0.1129759787	0.3116021873
##	[157,]	0.0625731549	-0.357535807	0.005999796	-0.1761288541	-0.0642768545
##	[158,]	0.3773785444	-0.113334013	0.332694348	-0.0175103356	-0.2342595452
##	[159,]	-1.5110364153	-1.434834863	-1.793740775	-0.1628485822	0.3049463756
##	[160,]	-0.2167502237	0.239060727	-0.010686466	0.2102668772	0.1498017103
##	[161,]	0.5595326665	0.050253233	-0.688605059	0.4650124930	0.4043678724
##	[162,]	-2.0647095058	0.946491305	-2.091833671	0.4075620144	0.0795268311
##	[163,]	0.3905633014	-0.276806452	0.107061193	0.2250851389	-0.0005093655
##	[164,]	0.0749072778	-0.545302820	-0.211164168	-0.3373699164	1.3664457296
##	[165,]	0.4693727189	0.575688422	0.163727328	1.2002245866	0.0638644651
##	[166,]	0.1153516031	-1.001367952	0.455919622	-0.4804731159	0.2805186949
##	[167,]	-0.1791281811	0.011736734	-0.484690816	0.1514214421	-0.2987336033
##	[168,]	-0.7856120762	0.691214955	-0.788439430	0.8778968882	-0.8998580373
##	[169,]	0.3775679774	-0.560978011	0.199656698	0.1902029394	0.1508125383
##	[170,]	0.1328752059	0.216087344	0.049268657	-0.3386584644	-0.3029317057
##	[171,]	0.0650405151	-0.287459315	-0.072655404	0.5624391601	0.2615283842
##	[172,]	0.4762962651	-0.095908847	0.238617900	0.3856372758	0.3114632707
##	[173,]	-0.9638104229	0.195990285	-0.279075782	0.4588977581	0.0982536506
##	[174,]	0.2342049467	0.015613071	-0.282958762	-0.0817477133	-0.1082908837
##	[175,]	0.3879957532	-0.328097985	0.114681413	0.5447304498	0.0193338027
##	[176,]	0.1162048622	0.126055523	0.135138303	-0.0287600828	-0.5167953171
##	[177,]	0.0770035325	-0.602862307	-0.114866392	1.0995413651	-0.1308954520
##	[178,]	0.1140168918	-0.518094220	-0.130662212	-0.0699550150	0.2777756235
##	[179,]	1.0004739153	0.003980140	-0.119615692	0.1513586044	-0.3166045682
##	[180,]	-0.1700653891	-0.441356362	-0.211403992	0.0806117599	0.2575644217
##	[181,]	-0.6929143045	0.003493937	-0.513657948	0.3670425466	-0.0489672495
##	[182,]	-0.2475784179	0.153088972	-0.761938172	0.4370243737	0.1557555227
##	[183,]	0.2446924139	0.131665277	0.466550428	0.1758293592	-0.1830351731
##	[184,]	0.2130917452	-0.214803416	0.003700508	0.4222082161	0.0496055613
##	[185,]	0.5026002321	-0.122399841	0.164447324	-0.2648053558	-0.4157961113
##	[186,]	0.9112486621	0.494905261	0.673244162	0.0942424205	0.1474076022
##	[187,]	-0.3026740360	0.107527056	-0.137956897	-0.3713026143	0.3884784440
##	[188,]	0.0969777835	-0.786071619	0.322236695	0.0834154614	-0.0897704403
##	[189,]	-0.7232228376	-0.214205967	0.192796238	-0.2112821416	0.2876961491
##	[190,]	-1.1530715605	-0.880262941	-1.075139348	0.2435233391	0.5612109152
##	[191,]	-0.0505522289	-0.340474459	-0.113154238	0.1140377336	0.1090747854
##	[192,]	0.5547976175	-0.757946836	-0.818242273	0.2678343171	-0.3985311126
##	[193,]	-0.1055912893	-0.060676328	-0.484424824	-0.1399273351	0.0806792524
##	[194,]	-0.4551608671	-0.089380390	-0.093308832	-0.2743671565	-0.4167076410

##	[195,]	0.3917161513	-0.177454106	-0.091693846	0.9829356290	-0.5529968182
##	[196,]	0.2384424826	0.694854511	1.041028410	0.4823833177	-0.2565437113
##	[197,]	0.1675359004	-0.057713945	0.676243626	0.5222192885	0.4374608482
##	[198,]	-0.5089234768	0.725812611	0.557180938	-0.2121131140	-0.3294507632
##	[199,]	0.2625080649	0.305249096	0.368321618	0.3684330069	-0.5061524450
##	[200,]	0.3847259201	-0.116683838	-0.202064780	-0.0173276302	0.1183124202
##	[201,]	-0.1332267317	1.056902794	-0.606831868	0.2978169252	-0.1320773835
##	[202,]	-0.4103673485	-0.287548951	-0.439958456	0.1590592052	-0.2211925108
##	[203,]	-0.4845828694	-0.000476333	-0.382851315	0.2440889870	-0.0169920400
##	[204,]	-0.3320378581	0.652936028	-0.291631878	0.1145340465	0.7568629491
##	[205,]	-0.6578961137	0.129274768	0.317250959	-0.1004523866	-0.1154346278
##	[206,]	0.7583672684	0.312184299	-0.065016100	0.2044743145	-0.0748621566
##	[207,]	0.8538961517	0.002972056	0.273649998	0.2245112640	0.0436336534
##	[208,]	0.5542259212	0.304973886	-0.145258472	0.5803317549	0.2539161764
##	[209,]	0.2939154764	-0.234327548	0.026146760	-0.1435321574	-0.0572817376
##	[210,]	-1.1115804729	0.857418957	-0.243040677	-0.5744633477	0.5021564888
##	[211,]	1.1017711631	0.110307074	-0.466832608	-0.3011595423	0.1403881016
##	[212,]	-0.1575519196	0.378792956	0.279952967	0.3751242324	0.0242797136
##	[213,]	-0.0662990773	0.021002939	-0.742942434	0.1334212601	-0.9399707142
##	[214,]	0.3731641728	0.052530657	-0.460779041	-0.2099658895	-0.2951130003
##	[215,]	-0.2182206018	0.138926091	-0.331131371	-0.4689351397	-0.5121601047
##	[216,]	-1.2884928739	-0.367665731	0.438387259	-0.0899294192	-0.3354222161
##	[217,]	-0.8023196100	-0.099484217	0.075472497	-0.0603022530	-0.4626173626
##	[218,]	0.4025112766	1.084754070	-0.197033459	0.3497376917	-0.3484045885
##	[219,]	0.5419056189	-0.112420539	0.079905517	0.0246864081	-0.0019295466
##	[220,]	-0.7165621766	-0.488156319	0.182570707	1.1266121359	0.5362700139
##	[221,]	-0.0459802057	0.391736917	-0.121458854	-0.1588255496	-0.2579340680
##	[222,]	-0.0588380107	-0.368088177	0.136206691	0.7251220728	0.3659112209
##	[223,]	0.7326675180	-0.348737213	0.361504186	0.1853432439	-0.0176475188
##	[224,]	0.0447583406	-0.786991607	0.034380580	-0.0333212074	-0.1851473985
##	[225,]	0.5708895642	-0.601567312	-0.686465789	-0.8109765583	-0.1423158831
##	[226,]	0.3140437655	-1.049495478	0.126460447	-0.7636414079	0.6139264235
##	[227,]	-0.9792318815	-0.529402887	-0.230900908	-0.4028581360	1.1766123434
##	[228,]	0.5144433888	-0.156184157	0.892824906	-0.1126293114	0.2947396064
##	[229,]	0.4378855309	0.400877148	-0.219597513	0.5123442316	0.0786704737
##	[230,]	-0.3118082177	-0.480873998	-0.215771063	-0.1222350232	-0.0211088616
##	[231,]	0.4762758894	-0.201404498	-0.085432487	-0.5791238963	-0.2338833679
##	[232,]	0.5813684724	0.610862230	0.242090446	-0.1966869927	0.3267215193
##	[233,]	0.3053642671	-0.289003291	0.725944872	-1.2144816155	0.7170695735
##	[234,]	-0.0815931141	-0.006432649	0.294192025	-0.0695219479	-0.2766625547
##	[235,]	-0.5282562836	0.652865603	0.482332354	-0.2306701274	0.1071580124
##	[236,]	0.0584046417	0.138159009	0.231009115	0.2880913371	-0.1584226575
##	[237,]	0.4608403318	1.737182194	0.024091839	-0.7270640297	0.0142118823
##	[238,]	0.3150008406	-0.196376674	0.138247658	0.4050250934	0.2066383417
##	[239,]	-0.3693032829	-0.074353571	0.538917680	0.1052581892	-0.1345985698
##	[240,]	0.9087444892	-0.584166830	-0.247166700	0.3421378153	0.4852447668
##	[241,]	0.2447027140	0.508310166	-0.059837500	-0.0008375843	-0.5710483144
##	[242,]	0.4222554981	0.289917517	0.812539547	0.2340101144	0.1230649167
##	[243,]	0.6613155673	0.156642015	0.757918710	-0.4728486557	0.1621509543
##	[244,]	-0.3531015366	-0.216507978	0.197197991	0.1852718766	-0.4998966252
##	[245,]	0.3570597048	-0.538800972	-0.246283690	0.2935874854	0.1865050098
##	[246,]	0.1676216868	-0.045757661	0.378656226	0.1991494842	0.3787730395
##	[247,]	-0.3882378188	-0.102817738	0.220735550	-0.3136931038	0.4956802288
##	[248,]	-0.6397066713	0.270965578	-0.216059941	-0.0584988093	-0.4125701238
##	[249,]	0.1183583177	0.090340397	-0.024870001	-0.3794846706	0.2413948573
##	[250,]	-0.4373572070	0.178094930	0.319086797	-0.1317068939	-0.1107183395
##	[251,]	-0.3382260731	0.521336674	0.282187676	-0.5803615825	0.3820417974
##	[252,]	0.0259850220	1.075379139	-1.758660497	-0.6487744283	1.4932216205
##	[253,]	-1.4727051824	-0.563245718	-0.412025185	0.2354482787	-0.1810987356
##	[254,]	0.4812492375	-0.444736645	0.086014654	-1.9847895311	-0.0096650233
##	[255,]	0.1889286290	-0.225295190	-0.744223752	1.1961376681	-0.3428170179
##	[256,]	0.0500222067	-0.931121649	-0.686989886	0.3168093119	0.0630624703
##	[257,]	0.8182112894	-0.257365049	-0.199678485	-0.3162637571	-0.1005603288
##	[258,]	0.6406844760	-0.677362895	-0.216241708	0.6074055263	-0.1243662272
##	[259,]	0.2870121132	0.132602185	0.541404487	-0.2759919730	-0.1156276656
##	[260,]	-0.0499114593	-0.084718138	-0.321589334	0.2422903374	0.1478572735
##	[261,]	0.1674262100	-0.336283979	-0.425439847	-0.2921333445	-0.4306927470
##	[262,]	-0.0644142757	0.141075232	-0.179534931	0.2568214534	0.3247262805
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##	[264,]	-0.2547183394	-0.179274247	-0.016748720	-0.0230468765	0.0215268323
##	[265,]	-0.1392640704	-0.586837072	0.254201323	-1.1214096937	-0.2160770082
##	[266,]	-0.0244994218	0.559318075	0.078928078	-0.4936114027	-0.1110598441
##	[267,]	0.2239969601	-0.737562198	-0.267800572	-0.1339148531	-0.1222934465

##	[267,]	-0.12239393801	-0.137332133	-0.237333372	-0.1333113331	-0.122393133
##	[268,]	-3.1477190596	-0.047074590	0.516231336	0.3429634355	-0.4868361666
##	[269,]	0.0163039299	-0.119667852	0.315682725	0.2520970191	-0.0143988146
##	[270,]	-0.3978321397	-0.300766055	-0.318803463	-0.5359209692	0.0123792377
##	[271,]	0.3179673201	0.474466067	-0.361233345	-0.3003529367	-0.0781777230
##	[272,]	-0.2189091541	1.108047687	0.044904851	1.9770889416	0.2698808314
##	[273,]	0.2064370802	-0.305252497	-0.466191335	0.1964570358	0.3076077380
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##	[276,]	2.2377013183	0.396776485	0.713318777	-1.9506080950	-0.2336010225
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##	[46,]	0.027241062	-4.783811e-02	3.647888e-02	-1.705672e-01	
##	[47,]	0.026833779	-4.734618e-02	5.843090e-02	4.947846e-02	
##	[48,]	-0.555953043	-4.066040e-01	-1.211012e-01	3.671663e-01	
##	[49,]	0.102861102	-1.282732e-01	-9.936293e-03	-1.110597e-01	
##	[50,]	-0.010018401	3.911403e-02	-1.016924e-01	-2.008620e-02	
##	[51,]	-0.123075581	1.368015e-01	2.252240e-01	-1.368558e-01	
##	[52,]	-0.026895711	1.735375e-01	-1.285103e-02	-5.023757e-02	
##	[53,]	0.069750673	-7.866944e-02	1.405715e-02	3.218193e-02	
##	[54,]	-0.218941828	-2.562217e-01	1.920552e-01	1.194130e-01	
##	[55,]	0.207821187	6.344923e-02	2.959831e-01	-3.884609e-01	
##	[56,]	0.153030859	-1.522467e-01	4.169582e-02	8.696207e-02	
##	[57,]	0.199017477	2.379359e-02	1.181418e-01	9.812868e-05	
##	[58,]	0.127131332	-2.752838e-01	-1.006724e-01	2.038471e-01	
##	[59,]	0.172469710	-8.647610e-01	7.262622e-01	1.956888e-02	
##	[60,]	-0.343578522	-3.229187e-01	1.379908e-01	2.472202e-02	

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## [61,] -0.218198246 1.259744e-01 -5.190770e-01 -3.811198e-02
## [62,] 0.223477206 -3.303582e-01 -2.896124e-01 5.510999e-01
## [63,] -0.283067579 2.803105e-01 1.197289e+00 1.344579e+00
## [64,] -0.004249728 -8.430511e-02 1.516885e-02 1.168719e-01
## [65,] -0.179295547 -8.150818e-02 3.797931e-02 1.439501e-01
## [66,] -0.136527933 1.425655e-01 9.787605e-02 -4.806061e-02
## [67,] 0.175616342 -8.243703e-02 -6.381668e-02 -9.536536e-02
## [68,] -0.122518294 -1.091700e-01 4.247097e-02 6.804639e-02
## [69,] -0.018517613 4.778023e-03 7.568765e-02 -1.079477e-01
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## [72,] -0.079199196 -2.068270e-01 3.099509e-02 -9.146318e-02
## [73,] -1.116351100 1.154812e-01 -1.258013e-01 -1.205257e-01
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## [77,] -0.186509352 -1.820081e-01 1.300136e-01 9.874569e-02
## [78,] 0.322424948 -2.695424e-01 -2.730996e-01 -1.397568e-01
## [79,] 0.064814678 -3.494165e-02 -3.737264e-03 6.404672e-02
## [80,] 0.111005160 3.943212e-02 5.985223e-03 -7.554262e-02
## [81,] -0.055601789 6.495184e-02 9.386670e-02 -6.039542e-02
## [82,] 0.018578716 -1.957055e-01 -2.542637e-01 -4.413392e-02
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## [85,] 0.181428902 -2.392292e-01 1.130391e-01 7.235949e-02
## [86,] 0.068145730 -1.181127e-01 3.362285e-02 -1.718386e-02
## [87,] 0.065452361 -4.570033e-01 2.140008e-01 -2.361075e-02
## [88,] 0.048064377 -9.019228e-02 2.890748e-01 1.325708e-01
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## [94,] 0.090687783 -1.673595e-01 -6.981836e-02 -1.827023e-01
## [95,] -0.179002899 -3.227320e-02 1.807734e-01 -4.037691e-01
## [96,] 0.201266790 -3.899332e-03 -1.476732e-01 -9.979733e-02
## [97,] -0.307271309 -1.855001e-01 4.826845e-02 -1.295130e-01
## [98,] 0.010918923 -4.294400e-01 -5.169970e-03 -3.107285e-01
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## [177,] -0.596695797 1.686586e-02 -2.696835e-01 4.406408e-02
## [178,] 0.156166497 -6.320437e-03 4.653165e-02 4.947341e-02
## [179,] 0.269850604 5.694780e-02 -3.119842e-01 7.252457e-03
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## [199,] -0.254622312 -1.831581e-01 2.196529e-01 -1.365678e-01
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## [213,] 0.370107093 7.076398e-01 -3.141872e-01 2.768654e-01
## [214,] 0.184460047 -1.632661e-01 -5.617051e-02 2.764911e-02
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## [233,] -0.250953954 -5.977497e-01 -1.810416e-01 2.586629e-02
## [234,] -0.047911673 -1.860799e-01 7.519659e-02 1.038998e-01
## [235,] 0.048399368 6.184851e-02 5.391726e-02 -1.231416e-01
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## [261,] -0.303101533 -2.154955e-01 7.462495e-02 1.642826e-02
## [262,] 0.297754427 -1.840264e-02 1.338298e-01 -1.131429e-01
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## [474,] -0.793888072 9.113932e-02 -6.231881e-01 1.802401e-01
## [475,] 0.490390249 4.206388e-02 1.444518e-03 3.732401e-01
## [476,] 0.194558951 1.065368e-01 -2.703042e-01 -1.832076e-01
## [477,] 0.104406066 -2.029487e-01 9.143765e-03 -8.764407e-02
## [478,] -0.131892905 -1.728015e-01 -3.374861e-01 -2.453675e-02
## [479,] 0.237160597 -7.589834e-02 1.284184e-01 -3.049761e-01
## [480,] 0.278073334 7.642517e-02 7.834827e-02 -4.114467e-01
## [481,] 0.035489310 7.554027e-02 1.064340e-01 2.369870e-02
## [482,] 0.075341273 -2.679651e-02 7.012865e-02 -2.191363e-01
## [483,] 0.378214785 -2.994907e-01 -1.718938e-01 1.884331e-01
## [484,] 0.207366238 -5.127782e-01 -3.057416e-01 -5.080697e-02
## [485,] 0.267661517 -1.475477e-01 -5.880012e-02 2.418804e-01
## [486,] 0.160793835 -6.273395e-02 -3.355876e-01 -2.163270e-01
## [487,] 0.135816514 -4.255877e-02 1.036395e-02 6.282936e-03
## [488,] -0.531399452 -4.496353e-01 -3.185160e-01 4.075489e-02
## [489,] -0.207794417 -2.662606e-02 2.779920e-02 -1.687871e-01
## [490,] 0.113393152 1.461215e-01 -2.297842e-01 -6.620763e-01
## [491,] -0.103007964 1.943839e-01 -5.543440e-02 -4.570038e-02
## [492,] 0.229914505 6.398183e-02 -1.532645e-01 2.999025e-01
## [493,] 0.317532497 -3.956745e-02 -6.010655e-02 5.091094e-01
## [494,] -0.329124788 -1.681714e-01 1.558327e-01 -2.237534e-01
## [495,] -0.320876607 1.769579e-01 -7.245117e-02 1.136919e-01
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## [504,] -0.587762677 1.443914e-01 2.253109e-01 -2.219344e-01
## [505,] -0.301767474 -1.331452e-02 -1.601497e-02 -5.344261e-02
## [506,] 0.248285550 -1.003313e-01 1.713688e-01 5.698937e-02
## [507,] -0.082443008 -1.682447e-02 1.438520e-01 -1.074637e-01
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## [515,] 0.316351789 -2.068107e-01 2.599902e-01 2.412226e-01
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## [535,] 0.137951400 -2.011831e-01 1.580920e-01 1.431658e-01
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## [537,] 0.348951641 4.366443e-02 -7.993361e-02 1.460571e-01
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## [541,] 0.341929890 1.289705e-02 3.247747e-02 1.198331e-01
## [542,] -0.553313202 5.671734e-01 7.486506e-02 4.305565e-02
## [543,] -0.045412315 2.427122e-01 -1.199505e-01 -1.661727e-02
## [544,] -0.113251800 -7.198274e-01 7.052837e-01 5.161733e-01
## [545,] -0.904924324 1.028031e-01 -4.337089e-01 -6.636632e-01
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## [568,] 0.445170663 -4.445366e-02 1.158968e-02 1.025494e-01
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##	PC20	PC21	PC22	PC23	
##	[1,]	-9.691187e-02	-2.846306e-02	-6.736280e-03	-0.0389719369
##	[2,]	-5.262226e-02	-5.987170e-02	5.868642e-02	0.0709786126
##	[3,]	-1.380489e-01	-1.348974e-01	1.008003e-01	0.0539090082
##	[4,]	-4.001824e-01	-1.030209e-01	-2.882171e-01	0.1820459068
##	[5,]	8.515543e-02	-8.500541e-02	-6.332008e-02	0.0435910301
##	[6,]	1.897094e-01	-6.872875e-02	9.669594e-02	-0.0014580538
##	[7,]	-2.937883e-02	-1.475160e-01	-1.731877e-02	-0.0108743761
##	[8,]	3.024854e-01	-3.099751e-02	9.995874e-02	-0.0072754677
##	[9,]	-3.919811e-02	-5.436148e-02	-7.930105e-02	0.1166388585
##	[10,]	-2.211534e-01	1.244503e-01	2.906959e-03	-0.0958436133
##	[11,]	1.932840e-03	-1.077269e-01	3.219922e-01	-0.0207780502
##	[12,]	-1.206356e-01	5.042482e-02	1.573921e-01	-0.0222931936
##	[13,]	1.515462e-01	-6.981790e-02	-1.931869e-01	-0.2024735878
##	[14,]	2.401749e-01	-5.455272e-02	-4.795192e-02	-0.0424807415
##	[15,]	1.270436e-01	1.373108e-01	-3.501457e-02	-0.0602123244
##	[16,]	5.353835e-02	-5.469285e-02	-1.008057e-01	-0.0522950385
##	[17,]	-6.569926e-02	-1.493094e-01	1.716667e-02	0.0597777408
##	[18,]	1.634152e-01	-3.505539e-02	-1.464825e-01	-0.0039775402
##	[19,]	2.239174e-01	5.765831e-01	1.983251e-01	-0.1213930293
##	[20,]	4.683065e-02	6.678614e-02	6.078671e-03	0.1437547933
##	[21,]	-2.227016e-01	5.752789e-02	-2.271678e-02	-0.0993528734
##	[22,]	-1.446453e-03	-1.498505e-01	-2.707121e-01	-0.1656619655
##	[23,]	-5.508613e-02	1.981001e-01	1.483337e-01	-0.0618197083
##	[24,]	-4.532253e-02	-2.759078e-01	-3.047715e-01	0.2331576854
##	[25,]	-1.764213e-01	6.727165e-03	-2.542099e-01	-0.2043585353
##	[26,]	3.859665e-02	-9.409569e-02	-8.135817e-02	0.2831371452
##	[27,]	1.156892e-01	-1.749649e-01	-3.564202e-02	-0.0021298665
##	[28,]	1.635999e-01	-1.848541e-01	-6.633801e-02	-0.2971181506
##	[29,]	-3.608488e-01	2.075860e-01	1.482093e-01	-0.1579593052
##	[30,]	1.262038e-01	6.594744e-02	-1.394044e-01	0.0686306984
##	[31,]	1.932421e-01	-2.564502e-02	4.135938e-02	0.0759173497
##	[32,]	-2.004161e-02	-1.317350e-02	1.869560e-01	0.0006658619
##	[33,]	-8.026859e-02	9.746735e-02	-6.751488e-02	0.1257145839
##	[34,]	-1.495394e-01	-6.830546e-02	8.381920e-02	0.0983623254
##	[35,]	1.261303e-01	-1.181033e-02	-9.847136e-03	0.0919067189
##	[36,]	3.626214e-02	1.484199e-01	-1.239235e-01	0.0374694412
##	[37,]	-4.197287e-02	2.687950e-02	-5.888385e-02	-0.0859464734
##	[38,]	1.940495e-02	1.230285e-01	3.737305e-01	-0.1400014645
##	[39,]	-1.021625e-01	-8.007357e-02	1.273240e-01	0.0428784496
##	[40,]	1.837580e-02	-1.085884e-01	5.159482e-02	0.2692212532
##	[41,]	-7.182280e-02	9.492884e-02	2.480937e-01	0.1557606094
##	[42,]	-3.661367e-01	-2.251888e-02	-4.545154e-02	0.0014049365
##	[43,]	-2.551570e-02	4.871783e-01	-4.105041e-01	0.2049395102
##	[44,]	-4.464008e-02	-1.383938e-02	1.263177e-02	0.0731473296
##	[45,]	3.368770e-02	-9.491693e-02	1.219370e-01	0.1056865731
##	[46,]	-6.757124e-02	5.126289e-01	1.365662e-02	0.1544413525
##	[47,]	-2.387263e-01	2.589452e-02	-2.408946e-02	0.0129381577
##	[48,]	-3.665774e-01	2.505283e-02	-2.875499e-01	0.2702383409
##	[49,]	-1.304463e-01	-2.190066e-01	-5.820846e-02	-0.1852676668
##	[50,]	-1.911266e-02	-1.180622e-01	-9.377084e-02	0.1568846712
##	[51,]	-5.049758e-02	-2.459290e-01	1.174748e-01	-0.1628544758
##	[52,]	1.196252e-01	-2.345591e-02	-1.214327e-02	-0.2335117134
##	[53,]	6.765320e-02	1.443405e-01	1.415283e-01	0.1538616179
##	[54,]	7.615175e-04	-2.072122e-01	1.323145e-01	0.0802648379
##	[55,]	-1.572611e-01	3.299894e-01	1.889017e-02	-0.1873737113
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##	[57,]	-3.218577e-01	-7.521182e-02	-2.059829e-02	-0.0401296842
##	[58,]	4.480643e-01	-1.985189e-02	4.734385e-02	0.1577233862
##	[59,]	-2.216465e-01	1.803297e-01	-1.893444e-01	0.1820445696
##	[60,]	-1.208383e-02	-1.865519e-01	-7.992594e-03	-0.1665103209
##	[61,]	1.732927e-01	3.122983e-01	4.079434e-01	-0.1192643306
##	[62,]	2.233374e-01	1.020955e-01	5.578265e-02	0.2234615113
##	[63,]	1.105663e-01	-3.027858e-01	2.495947e-01	-0.0385025175
##	[64,]	-2.090100e-01	-1.657851e-01	1.484928e-01	-0.1907336224
##	[65,]	-2.400854e-01	-2.771342e-01	-1.369491e-01	-0.2089155797
##	[66,]	4.014291e-02	2.160654e-05	-7.557324e-02	-0.0038943873
##	[67,]	8.480001e-02	2.445064e-02	9.166255e-02	0.0541509910
##	[68,]	7.100866e-02	-2.756946e-02	1.220851e-01	0.0163544543
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##	[70,]	1.520258e-01	-3.014141e-02	-1.688518e-03	-0.0759812609
##	[71,]	-2.444988e-01	-6.300314e-02	-2.164920e-01	-0.2378835401

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## [72,] -6.982760e-02 -8.479141e-02 -5.422003e-02 -0.0027982237
## [73,] -1.510822e-01 8.541415e-02 2.915549e-02 -0.0333658295
## [74,] 3.044185e-01 -6.402310e-02 1.137560e-01 0.0488086884
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## [538,] -6.467692e-02 5.105389e-02 -8.668392e-02 -0.1414456773
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## [546,] -4.077239e-02 1.146042e-01 -1.222713e-01 0.0329535421
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## [2,] -3.082234e-02 -0.0167415796 4.173030e-02 -5.933300e-02
## [3,] 8.548436e-02 0.0382776645 -4.151896e-02 -3.554641e-02
## [4,] 2.228481e-01 -0.1157200651 -3.676948e-02 -1.481717e-01
## [5,] 8.165322e-03 0.0027380524 5.983731e-02 4.616773e-02
## [6,] -3.133835e-02 0.0427842226 -8.646068e-02 -3.094469e-02
## [7,] 3.634293e-02 -0.0074700186 -3.691957e-02 -5.978630e-02
## [8,] 2.939741e-02 0.0004695672 3.573416e-01 5.216734e-02
## [9,] -6.923093e-02 0.0497355910 7.027952e-03 -2.066589e-02
## [10,] -7.627162e-02 0.0756044146 -6.937821e-02 -1.796520e-02
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## [18,] 9.139378e-02 0.0938305177 -9.511740e-02 2.112906e-02
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##	[390,]	-1.226762e-01	-0.0332274957	-5.204382e-02	6.555382e-02
##	[391,]	1.065979e-01	-0.0714290635	-1.265815e-01	-5.748008e-02
##	[392,]	-1.309833e-01	0.0777592791	-2.155272e-01	-4.381554e-03
##	[393,]	-1.017737e-01	-0.0173820829	-6.814400e-02	7.420863e-02
##	[394,]	2.864119e-01	-0.1298843403	7.115241e-02	-2.342321e-02
##	[395,]	-1.233121e-01	0.0103671079	-1.548752e-01	8.138412e-02
##	[396,]	4.835490e-02	-0.0518655372	-1.963524e-02	8.336186e-02
##	[397,]	5.728350e-02	-0.0324249392	-5.604223e-02	-1.322974e-01
##	[398,]	-2.133494e-01	-0.0715130925	6.777719e-02	-1.248135e-02
##	[399,]	-1.039137e-01	0.1418629305	-1.127397e-02	3.857840e-04
##	[400,]	-4.036181e-03	0.0651854688	-1.784458e-02	3.212601e-02
##	[401,]	-8.834938e-02	0.1111761383	1.003437e-01	-6.623646e-02
##	[402,]	-4.782460e-02	-0.0650342592	7.742818e-02	2.052615e-02
##	[403,]	1.032396e-01	0.0253855294	3.774294e-01	3.091429e-02
##	[404,]	-1.298475e-01	0.0111945153	1.568840e-01	8.939623e-02
##	[405,]	1.189915e-02	0.3443668269	-2.390574e-01	-9.134783e-02
##	[406,]	-1.499472e-01	0.0468450726	-2.369625e-02	-7.465967e-02
##	[407,]	-3.980824e-02	-0.0681233789	-1.923930e-01	-1.138304e-01
##	[408,]	9.181292e-02	0.1147245374	8.787314e-02	-5.060023e-02
##	[409,]	1.517050e-02	0.0475764113	4.302627e-02	1.233156e-01
##	[410,]	7.041737e-02	0.0379507787	4.681250e-02	-1.048100e-02
##	[411,]	2.532662e-02	0.2323072391	-6.776329e-02	-1.596578e-01
##	[412,]	1.179507e-01	0.1264690874	8.209105e-02	-6.142649e-03
##	[413,]	6.806865e-02	0.0571341072	-5.089157e-02	-4.894583e-02
##	[414,]	3.841262e-02	0.1219376224	-6.021517e-02	-2.356393e-02
##	[415,]	8.350928e-02	-0.2458722521	2.577584e-01	3.650691e-02
##	[416,]	1.117854e-01	-0.1822749263	7.863451e-02	-4.348345e-03
##	[417,]	-2.958598e-02	0.0336648672	3.956873e-02	-4.468675e-02
##	[418,]	-1.798478e-01	-0.0274724217	-2.615568e-02	2.871442e-02
##	[419,]	-3.302723e-01	-0.0578280722	3.970549e-02	-2.939581e-01
##	[420,]	1.918586e-01	-0.1558996694	-1.886195e-02	8.659171e-02
##	[421,]	-7.093082e-01	0.5508781429	7.700362e-01	1.406354e-01
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##	[423,]	5.203484e-02	0.0300053200	6.695560e-02	3.726869e-02
##	[424,]	4.156870e-01	-0.1593279619	7.507259e-02	-1.138143e-01
##	[425,]	5.798483e-02	-0.1356946242	1.799952e-02	4.028849e-03
##	[426,]	-2.062171e-02	0.1146382477	6.595167e-02	2.771565e-02
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##	[428,]	-7.924047e-02	-0.1728866189	1.426384e-02	4.843584e-02
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##	[430,]	-2.692379e-02	-0.1055179597	-1.099104e-01	1.992519e-01
##	[431,]	8.691772e-04	-0.0574132517	8.451702e-02	2.607840e-02
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##	[435,]	-1.286488e-01	0.1624365763	4.323049e-02	-8.205219e-02
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##	[437,]	9.503451e-02	0.0214902131	9.145336e-02	-3.547183e-02
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##	[444,]	-2.034225e-01	0.0658304726	-1.800201e-01	-4.066865e-02
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## [568,] 3.274830e-04 0.1276164883 -1.587248e-02 -6.099950e-02
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## [1,] 0.0535613058 0.0151848822 1.598541e-02 1.396101e-03
## [2,] -0.1869655269 0.0270113107 -8.033300e-04 8.096490e-03
## [3,] -0.0765306661 -0.0146403879 1.030789e-02 9.074601e-03
## [4,] -0.0171166487 -0.0478284944 2.386299e-02 2.650750e-04
## [5,] 0.0383536434 0.0324507997 -2.312178e-03 -2.563269e-03
## [6,] 0.0095543400 -0.0044034309 3.869919e-03 -2.931194e-03
## [7,] 0.0378787886 0.0203768196 4.010932e-04 -1.269166e-02
## [8,] 0.1590301296 0.0211851026 2.063600e-02 -1.136547e-03
## [9,] -0.0586366278 -0.0157101706 1.578442e-02 8.784686e-03
## [10,] 0.0208900863 -0.0229256417 -3.656928e-02 3.436465e-03
## [11,] -0.1836996047 -0.0702399725 -1.960853e-02 1.499158e-02
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## [13,] -0.0115189160 -0.0236487859 -1.336927e-02 -9.541018e-04
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## [15,] 0.0526092277 -0.0106431857 1.382817e-02 -1.138219e-02
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## [17,] 0.0118991338 -0.0219583607 1.264325e-02 4.760172e-03
## [18,] 0.0091836992 0.0184535080 3.004816e-03 -8.284949e-03
## [19,] 0.2263597091 0.0319045180 -5.109774e-02 1.888498e-02
## [20,] 0.0030067774 -0.0211027308 -1.938230e-02 9.852988e-04
## [21,] -0.0198932675 -0.0136803305 -8.551012e-03 -1.325546e-03
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##	[24,]	0.0901569755	-0.0098411879	2.301966e-02	-2.374885e-02
##	[25,]	0.0109952266	-0.0379124107	4.791318e-03	8.663743e-03
##	[26,]	0.0315139751	-0.0401102951	4.734871e-02	9.919702e-03
##	[27,]	-0.0247139379	0.0219728384	1.146276e-02	1.347780e-03
##	[28,]	0.2407008095	-0.1852027901	1.514934e-02	-9.338919e-04
##	[29,]	0.0814109162	-0.0090939596	2.163938e-02	-1.755034e-03
##	[30,]	0.0125186331	0.0273630567	-1.261799e-03	-1.246042e-03
##	[31,]	-0.0685101420	0.0017889958	1.805305e-03	-1.806891e-03
##	[32,]	0.0452194197	0.0061246303	-1.474198e-02	7.480681e-03
##	[33,]	-0.0715863646	-0.0595115348	-1.294207e-02	3.415065e-02
##	[34,]	-0.0590833361	0.0130416480	7.452318e-03	9.309105e-03
##	[35,]	-0.0252578940	0.0047644298	1.129211e-02	-7.572504e-04
##	[36,]	-0.0136113786	-0.0323834364	-5.070655e-02	3.761900e-03
##	[37,]	0.0145404352	-0.0403402638	4.594615e-02	4.646818e-05
##	[38,]	0.0620363491	0.0259186233	-1.038252e-02	1.782104e-02
##	[39,]	0.0551020192	0.0091668531	1.530145e-02	1.309894e-02
##	[40,]	-0.0360424650	0.0146077001	1.910994e-02	2.733524e-03
##	[41,]	-0.0507089905	-0.0501071660	-7.727756e-03	-1.182598e-02
##	[42,]	-0.0446278063	0.0911078308	-1.362661e-03	1.313363e-02
##	[43,]	-0.1841875377	0.0424279229	6.857974e-02	-1.998307e-02
##	[44,]	0.0855229177	-0.0160270811	-2.834893e-02	1.060561e-02
##	[45,]	0.0328784540	-0.0146923196	-7.281896e-03	-5.593681e-03
##	[46,]	0.0511279444	-0.0069384905	-1.819427e-03	-7.746198e-03
##	[47,]	0.0547823196	-0.0023206355	-8.758586e-03	3.372264e-03
##	[48,]	-0.2137482100	-0.0381373067	-2.763514e-02	4.146805e-03
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##	[51,]	0.0815819893	0.0152921924	-6.954635e-03	-2.622044e-03
##	[52,]	0.0297321325	-0.0331236455	-1.219745e-02	-1.497444e-02
##	[53,]	-0.0402841172	0.0107722059	-1.137519e-02	3.710160e-03
##	[54,]	0.0411842454	-0.0065017458	2.731969e-03	-7.122045e-03
##	[55,]	-0.3121274609	-0.1007394701	1.109937e-03	3.822175e-02
##	[56,]	0.1271426338	0.0718062109	7.998705e-02	-8.613806e-03
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##	[58,]	-0.0723397173	0.0078063902	-4.017460e-03	6.460942e-03
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##	[64,]	-0.0695511185	0.0115904549	2.266887e-02	1.568908e-02
##	[65,]	0.0225291261	0.0010160584	1.636328e-02	-1.872231e-02
##	[66,]	0.0155835137	0.0132711018	-4.069241e-03	3.713134e-03
##	[67,]	0.0063615856	-0.0200441666	-7.372887e-03	-4.932517e-03
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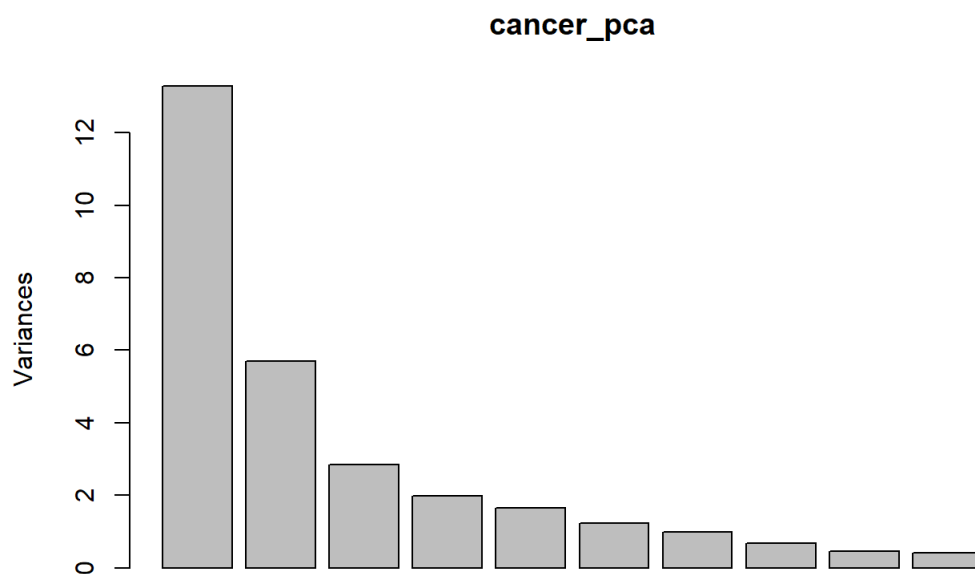
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## [453,] 0.0295149019 -0.0140034566 5.639098e-02 -7.523633e-03
## [454,] -0.0106002592 0.0265833751 9.392628e-05 -9.942180e-03
## [455,] -0.0123625079 0.0064421088 -2.338543e-02 4.479801e-03
## [456,] 0.0250653194 -0.0323661340 -1.288361e-02 -4.932915e-03
## [457,] 0.1731726298 0.0567668257 -3.945065e-02 -2.635609e-04
```

```
## [458,] 0.1122419264 0.0928558859 -1.494124e-01 -2.460544e-02
## [459,] -0.0706313591 0.0057360028 -6.830642e-03 4.327957e-03
## [460,] 0.0377633229 0.0151558628 5.822948e-03 -7.239153e-03
## [461,] 0.1548050138 -0.0798835029 -1.416941e-02 1.570558e-02
## [462,] 0.0285530316 -0.0432694777 3.240388e-04 1.347570e-02
## [463,] 0.0603150184 -0.0112962893 1.065499e-02 1.170937e-03
## [464,] -0.0347133203 -0.0029773356 7.425218e-03 3.459640e-03
## [465,] 0.0417058316 -0.0295098362 1.664518e-02 3.187039e-03
## [466,] 0.0669804663 0.0247731421 -2.384961e-02 -1.136713e-02
## [467,] -0.0537566841 0.0014715952 -7.879551e-03 -1.122062e-03
## [468,] -0.0036705130 0.0044647944 -4.907562e-03 -1.931371e-02
## [469,] -0.0462464219 -0.0870265468 -9.578580e-03 1.446233e-02
## [470,] 0.0696740942 0.0086360351 -1.657304e-02 -3.880822e-03
## [471,] 0.0101882986 0.0099682420 -4.864309e-02 1.219165e-03
## [472,] -0.0217680090 0.0146804137 6.548298e-03 -1.147811e-02
## [473,] 0.1652006122 -0.0321987677 1.615000e-02 -5.160398e-04
## [474,] 0.0404867349 0.1042476923 -1.801906e-02 1.798879e-02
## [475,] -0.0600300369 0.0132322290 -5.067542e-03 9.467318e-04
## [476,] 0.0411966404 0.0372092199 1.049049e-02 -3.297660e-03
## [477,] 0.0087345724 -0.0066951686 6.261255e-03 -7.853052e-03
## [478,] -0.0290854323 0.0314593832 -1.688671e-02 -2.796787e-03
## [479,] -0.0687275509 -0.0070471310 -5.146066e-02 -7.753824e-03
## [480,] -0.0902827784 -0.0231176989 -3.365654e-02 1.531822e-02
## [481,] 0.0285956655 -0.0159264328 -1.763929e-02 -5.580673e-03
## [482,] 0.0569252374 0.0009415398 -1.306305e-02 7.644811e-03
## [483,] 0.2129481507 -0.0985963944 -2.112252e-02 -1.606756e-02
## [484,] -0.0090227346 0.0248997990 3.734145e-02 1.790719e-03
## [485,] -0.0125412778 0.0127037430 1.009832e-02 4.256908e-03
## [486,] 0.0636391030 -0.0323824607 -2.607947e-02 -4.951705e-03
## [487,] -0.1397578741 0.0088616024 -6.041273e-04 1.252251e-02
## [488,] -0.0747773145 -0.0420757978 -5.595981e-03 -1.960175e-02
## [489,] 0.0802388777 -0.0138229184 -2.376301e-02 -2.479727e-03
## [490,] -0.0657399357 0.0605750522 -3.704814e-03 -3.061750e-02
## [491,] 0.0989654491 -0.0140864165 4.367477e-03 2.171240e-03
## [492,] 0.0282618964 -0.0680236124 8.422818e-02 -2.374215e-02
## [493,] 0.2172752231 0.0082839891 1.938583e-02 1.442880e-03
## [494,] -0.0123190204 -0.0095134802 -9.186819e-03 3.113970e-03
## [495,] -0.2199572217 -0.0294567698 1.576101e-02 -5.252938e-03
## [496,] 0.0634010466 -0.0082540868 1.922416e-02 -1.087247e-02
## [497,] -0.0533707600 -0.0089322195 3.592632e-03 -3.646989e-03
## [498,] 0.0480566608 0.0142425925 7.108301e-02 1.083214e-02
## [499,] 0.1442753476 -0.0422424796 -1.782818e-02 4.751815e-02
## [500,] 0.0165308656 -0.0083255759 -2.727051e-02 5.957476e-03
## [501,] -0.0100329601 -0.0372407659 2.363354e-02 -9.646078e-03
## [502,] 0.0171915088 -0.0178647571 1.050801e-03 -8.568039e-03
## [503,] 0.0756534229 0.0607336581 9.157892e-03 1.261060e-02
## [504,] 0.0297769033 0.0973985283 3.350919e-02 -2.770049e-02
## [505,] 0.0350448873 0.0275088283 1.063655e-02 2.760851e-05
## [506,] -0.0285875298 -0.0016575587 -1.182673e-03 -4.053176e-03
## [507,] 0.0189829021 0.0207446755 -7.102198e-03 -1.406710e-02
## [508,] -0.0172826029 0.0125580405 -9.707108e-03 -9.199495e-03
## [509,] -0.1441724544 -0.0394471024 -6.987832e-02 -7.615465e-03
## [510,] 0.0875496770 -0.0391355476 8.573809e-03 8.449619e-03
## [511,] 0.0981611536 -0.0150404803 1.875760e-02 1.130911e-02
## [512,] 0.0260553682 -0.0198184704 2.964767e-02 -1.229652e-02
## [513,] 0.2306612233 -0.1768569002 7.487201e-02 1.145739e-03
## [514,] 0.0443660379 -0.0127577223 1.385273e-02 5.862815e-04
## [515,] 0.0244686942 0.0136171599 -3.015268e-02 3.004115e-02
## [516,] -0.0464406428 -0.0461814081 7.006575e-03 -2.118240e-02
## [517,] -0.1804905504 0.0326011719 5.896892e-03 -1.843209e-03
## [518,] -0.0498431167 0.0469805320 -3.286808e-03 7.346996e-04
## [519,] 0.0216068656 -0.0476515075 -3.416270e-02 -1.304970e-02
## [520,] 0.1523810055 -0.0451309386 -3.033061e-02 1.749013e-02
## [521,] -0.0591849335 -0.0255713138 1.596715e-02 -1.397577e-04
## [522,] -0.0395616001 0.0091315682 3.740507e-02 1.008395e-02
## [523,] 0.0513025394 0.0081396144 -1.686257e-03 -1.284561e-03
## [524,] -0.1277410469 -0.0095049270 6.099755e-02 -1.943908e-02
## [525,] -0.1521848402 -0.0408818910 4.394310e-02 1.438141e-03
## [526,] -0.0241695923 0.0197707678 -2.631440e-02 4.108005e-03
## [527,] -0.0502031636 0.0248580682 -2.886409e-02 1.869812e-02
## [528,] -0.0157216742 0.0417373451 6.411718e-03 -3.945196e-02
## [529,] 0.0226840232 -0.0011725978 1.220802e-02 2.561845e-04
## [530,] -0.0128800796 0.0008940912 4.154574e-04 -2.483717e-03
```

```
## [531,] 0.0142770079 0.0250853629 -3.624568e-03 -3.363374e-03
## [532,] -0.0065668831 0.0016770508 5.785196e-02 -3.674048e-02
## [533,] 0.0776102509 0.0225164413 -5.199929e-03 -1.656424e-03
## [534,] 0.0328960130 -0.0287557957 -4.530040e-02 -6.688662e-03
## [535,] -0.0730291458 0.0153900883 -5.554195e-03 -3.353871e-02
## [536,] 0.1253022047 0.0006555599 1.231382e-03 4.937076e-03
## [537,] -0.0282099570 0.0141624831 -2.623194e-03 1.917073e-03
## [538,] 0.0033372312 -0.0091753971 -4.953264e-03 6.203430e-04
## [539,] 0.0828029895 -0.0089573807 -1.291559e-02 -4.762266e-03
## [540,] 0.1346756425 0.0092818155 -4.752541e-03 3.466008e-03
## [541,] 0.0686944450 -0.0043570810 1.903166e-02 -1.182699e-02
## [542,] -0.0958839897 -0.0266441447 3.100822e-02 5.635812e-03
## [543,] 0.0391931001 0.0061086959 -2.330714e-03 -6.398906e-06
## [544,] -0.0884505800 0.0230539154 -5.910469e-02 -6.112608e-03
## [545,] 0.0461121057 0.0512587241 -3.534171e-02 7.330315e-02
## [546,] -0.0181344013 -0.0079308291 -5.151052e-02 -9.360687e-03
## [547,] -0.1284012027 0.0731570237 2.171499e-02 3.565962e-03
## [548,] -0.0652554774 0.0267267995 -1.453407e-02 1.372139e-03
## [549,] 0.0144803135 0.0290173096 -1.418995e-03 -4.295967e-03
## [550,] 0.0020030080 0.0038173956 1.280350e-02 8.471746e-04
## [551,] -0.0460309869 -0.0698233075 2.414560e-04 1.845563e-03
## [552,] -0.0306835658 0.0147021330 -5.820844e-03 -1.138799e-03
## [553,] 0.0013530758 0.1356038629 -3.808346e-02 3.787346e-03
## [554,] -0.0092761156 -0.0162335677 -6.313714e-03 8.823042e-04
## [555,] 0.0583525074 0.0104867651 -7.650307e-03 -7.688319e-03
## [556,] 0.0365396314 0.1285384513 -1.926274e-02 -3.420722e-03
## [557,] -0.0825366557 0.0120057039 -9.118959e-04 2.230323e-03
## [558,] 0.0596863336 0.0432872298 -3.428184e-03 -7.399596e-03
## [559,] 0.2118838404 -0.0181142975 3.600294e-02 2.217638e-04
## [560,] -0.0265311428 0.0214659480 -5.356050e-03 9.112897e-03
## [561,] 0.0612930701 -0.1122543797 -6.714921e-02 -1.368662e-02
## [562,] 0.0536497985 -0.0177312339 -1.023821e-02 -3.139075e-03
## [563,] 0.0572798895 0.0130302469 -1.209907e-02 -5.552985e-03
## [564,] -0.0318972163 -0.0229019521 -3.253642e-02 -9.340876e-04
## [565,] 0.0048045501 0.0281111851 4.728344e-03 -5.899725e-04
## [566,] 0.0068911201 -0.0175118860 -2.580188e-04 5.826148e-03
## [567,] 0.0471706437 0.0507946253 1.250840e-03 3.425887e-03
## [568,] 0.1477176175 0.0013794388 -1.939084e-03 -1.131610e-02
## [569,] -0.0426995400 -0.0728970801 3.245528e-02 -6.532395e-03
```

```
plot(cancer_pca)
```



```
summary(cancer_pca)
```

```
## Importance of components:
##          PC1      PC2      PC3      PC4      PC5      PC6
## Standard deviation  3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion 0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##          PC7      PC8      PC9      PC10     PC11     PC12
## Standard deviation  0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion 0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##          PC13     PC14     PC15     PC16     PC17     PC18
## Standard deviation  0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion 0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##          PC19     PC20     PC21     PC22     PC23     PC24
## Standard deviation  0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion 0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##          PC25     PC26     PC27     PC28     PC29     PC30
## Standard deviation  0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion 0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##          PC31
## Standard deviation  0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion 1.00000
```

```
#View(cancer_pca)
head(cancer_pca$x)
```

```
##          PC1          PC2          PC3          PC4          PC5          PC6
## [1,] 2.501946 -0.09694805 -0.4489597 2.3341176 0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059 1.1542039 0.3362109 0.45962538 1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828 0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592 1.1172876 2.0502761 0.25303846 -1.5539634
## [5,] 2.500252 2.01035097 -0.7584035 1.9862169 -1.13537096 0.5940361
## [6,] 2.018308 -0.78242095 0.1125197 -0.6532280 0.01841577 0.6914453
##          PC7          PC8          PC9          PC10          PC11          PC12
## [1,] 0.5092015 -1.11423307 0.2840243 0.32463197 -0.3245353 0.04981306
## [2,] 0.2937434 0.10000461 -0.0668399 0.42612180 0.4564029 1.19357566
## [3,] -0.3303385 0.03599041 0.8734350 0.02222192 0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134 0.6254396 0.05666470 -0.0691646 0.97082409
## [5,] 0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533 0.03266208
## [6,] 0.1454026 0.06214539 0.2342454 0.73681239 -0.3671239 -0.77029743
##          PC13          PC14          PC15          PC16          PC17
## [1,] -0.19760220 0.1134403 -0.059302558 0.16637723 -0.04286656
## [2,] 0.01807424 -0.2824292 -0.204858888 -0.07067959 0.03088787
## [3,] 0.37435458 0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379 0.2179117 -0.665825669 0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881 0.22273309
## [6,] -0.49542291 -0.2992431 0.049952835 -0.20161083 0.14920422
##          PC18          PC19          PC20          PC21          PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170 0.05868642
## [3,] 0.327711259 0.15937793 -0.13804895 -0.13489743 0.10080029
## [4,] 0.197085181 0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054 0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568 0.18970936 -0.06872875 0.09669594
##          PC23          PC24          PC25          PC26          PC27
## [1,] -0.038971937 0.062212075 0.088438866 0.04872948 -0.007000724
## [2,] 0.070978613 -0.030822339 -0.016741580 0.04173030 -0.059332996
## [3,] 0.053909008 0.085484364 0.038277664 -0.04151896 -0.035546410
## [4,] 0.182045907 0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,] 0.043591030 0.008165322 0.002738052 0.05983731 0.046167735
## [6,] -0.001458054 -0.031338348 0.042784223 -0.08646068 -0.030944690
##          PC28          PC29          PC30          PC31
## [1,] 0.05356131 0.015184882 0.015985406 0.001396101
## [2,] -0.18696553 0.027011311 -0.000803330 0.008096490
## [3,] -0.07653067 -0.014640388 0.010307894 0.009074601
## [4,] -0.01711665 -0.047828494 0.023862995 0.000265075
## [5,] 0.03835364 0.032450800 -0.002312178 -0.002563269
## [6,] 0.00955434 -0.004403431 0.003869919 -0.002931194
```

```
# sample scores stored in cancer_pca$x
# singular values (square roots of eigenvalues) stored in cancer_pca$sdev
# loadings (eigenvectors) are stored in cancer_pca$rotation
# variable means stored in cancer_pca$center
# variable standard deviations stored in sparrows_pca$scale
# A table containing eigenvalues and %'s accounted, follows
# Eigenvalues are sdev^2
(eigen_cancer <- cancer_pca$sdev^2) ## brackets for print
```

```
## [1] 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
## [6] 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
## [11] 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
## [16] 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
## [21] 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
## [26] 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
## [31] 1.330402e-04
```

```
names(eigen_cancer) <- paste("PC",1:31,sep="")
eigen_cancer
```



```
##          PC1          PC2          PC3          PC4          PC5
## 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
##          PC6          PC7          PC8          PC9          PC10
## 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
##          PC11          PC12          PC13          PC14          PC15
## 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
##          PC16          PC17          PC18          PC19          PC20
## 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
##          PC21          PC22          PC23          PC24          PC25
## 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
##          PC26          PC27          PC28          PC29          PC30
## 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
##          PC31
## 1.330402e-04
```

```
sumlambdas <- sum(eigen_cancer)
sumlambdas
```

```
## [1] 31
```

```
propvar <- eigen_cancer/sumlambdas
propvar
```

```
##          PC1          PC2          PC3          PC4          PC5
## 4.286470e-01 1.837679e-01 9.146436e-02 6.391475e-02 5.318759e-02
##          PC6          PC7          PC8          PC9          PC10
## 3.982815e-02 3.155720e-02 2.166945e-02 1.486427e-02 1.300429e-02
##          PC11          PC12          PC13          PC14          PC15
## 1.126306e-02 9.480337e-03 8.424094e-03 7.784846e-03 5.063666e-03
##          PC16          PC17          PC18          PC19          PC20
## 3.036404e-03 2.574514e-03 1.904718e-03 1.696490e-03 1.584578e-03
##          PC21          PC22          PC23          PC24          PC25
## 1.002283e-03 9.658453e-04 8.848556e-04 7.822265e-04 5.819149e-04
##          PC26          PC27          PC28          PC29          PC30
## 4.993461e-04 2.636032e-04 2.225194e-04 5.126895e-05 2.414116e-05
##          PC31
## 4.291620e-06
```

```
summary(eigen_cancer)
```

```
##      Min.   1st Qu.   Median     Mean   3rd Qu.     Max.
## 0.000133 0.025840 0.094129 1.000000 0.566273 13.288057
```

```
summary(cancer_pca)
```

```
## Importance of components:
##          PC1      PC2      PC3      PC4      PC5      PC6
## Standard deviation  3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion 0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##          PC7      PC8      PC9     PC10     PC11     PC12
## Standard deviation  0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion 0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##          PC13     PC14     PC15     PC16     PC17     PC18
## Standard deviation  0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion 0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##          PC19     PC20     PC21     PC22     PC23     PC24
## Standard deviation  0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion 0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##          PC25     PC26     PC27     PC28     PC29     PC30
## Standard deviation  0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion 0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##          PC31
## Standard deviation  0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion 1.00000
```

```
cumvar_cancer <- cumsum(propvar)
cumvar_cancer
```

```
##          PC1      PC2      PC3      PC4      PC5      PC6      PC7
## 0.4286470 0.6124149 0.7038793 0.7677940 0.8209816 0.8608098 0.8923670
##          PC8      PC9      PC10     PC11     PC12     PC13     PC14
## 0.9140364 0.9289007 0.9419050 0.9531681 0.9626484 0.9710725 0.9788573
##          PC15     PC16     PC17     PC18     PC19     PC20     PC21
## 0.9839210 0.9869574 0.9895319 0.9914366 0.9931331 0.9947177 0.9957200
##          PC22     PC23     PC24     PC25     PC26     PC27     PC28
## 0.9966858 0.9975707 0.9983529 0.9989348 0.9994342 0.9996978 0.9999203
##          PC29     PC30     PC31
## 0.9999716 0.9999957 1.0000000
```

```
matlambdas <- rbind(eigen_cancer,propvar,cumvar_cancer)
rownames(matlambdas) <- c("Eigenvalues","Prop. variance","Cum. prop. variance")
# Sample scores stored in cancer_pca$x
head(cancer_pca$x)
```

```
##          PC1          PC2          PC3          PC4          PC5          PC6
## [1,] 2.501946 -0.09694805 -0.4489597 2.3341176 0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059 1.1542039 0.3362109 0.45962538 1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828 0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592 1.1172876 2.0502761 0.25303846 -1.5539634
## [5,] 2.500252 2.01035097 -0.7584035 1.9862169 -1.13537096 0.5940361
## [6,] 2.018308 -0.78242095 0.1125197 -0.6532280 0.01841577 0.6914453
##          PC7          PC8          PC9          PC10          PC11          PC12
## [1,] 0.5092015 -1.11423307 0.2840243 0.32463197 -0.3245353 0.04981306
## [2,] 0.2937434 0.10000461 -0.0668399 0.42612180 0.4564029 1.19357566
## [3,] -0.3303385 0.03599041 0.8734350 0.02222192 0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134 0.6254396 0.05666470 -0.0691646 0.97082409
## [5,] 0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533 0.03266208
## [6,] 0.1454026 0.06214539 0.2342454 0.73681239 -0.3671239 -0.77029743
##          PC13          PC14          PC15          PC16          PC17
## [1,] -0.19760220 0.1134403 -0.059302558 0.16637723 -0.04286656
## [2,] 0.01807424 -0.2824292 -0.204858888 -0.07067959 0.03088787
## [3,] 0.37435458 0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379 0.2179117 -0.665825669 0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881 0.22273309
## [6,] -0.49542291 -0.2992431 0.049952835 -0.20161083 0.14920422
##          PC18          PC19          PC20          PC21          PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170 0.05868642
## [3,] 0.327711259 0.15937793 -0.13804895 -0.13489743 0.10080029
## [4,] 0.197085181 0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054 0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568 0.18970936 -0.06872875 0.09669594
##          PC23          PC24          PC25          PC26          PC27
## [1,] -0.038971937 0.062212075 0.088438866 0.04872948 -0.007000724
## [2,] 0.070978613 -0.030822339 -0.016741580 0.04173030 -0.059332996
## [3,] 0.053909008 0.085484364 0.038277664 -0.04151896 -0.035546410
## [4,] 0.182045907 0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,] 0.043591030 0.008165322 0.002738052 0.05983731 0.046167735
## [6,] -0.001458054 -0.031338348 0.042784223 -0.08646068 -0.030944690
##          PC28          PC29          PC30          PC31
## [1,] 0.05356131 0.015184882 0.015985406 0.001396101
## [2,] -0.18696553 0.027011311 -0.000803330 0.008096490
## [3,] -0.07653067 -0.014640388 0.010307894 0.009074601
## [4,] -0.01711665 -0.047828494 0.023862995 0.000265075
## [5,] 0.03835364 0.032450800 -0.002312178 -0.002563269
## [6,] 0.00955434 -0.004403431 0.003869919 -0.002931194
```

```
# Identifying the scores by their diagnosis
diag_pca <- cbind(data.frame(diagnosis),cancer_pca$x)
head(diag_pca)
```

```
##      diagnosis      PC1      PC2      PC3      PC4      PC5
## 1      B 2.501946 -0.09694805 -0.4489597 2.3341176 0.69771548
## 2      B 1.467439 -1.68630059 1.1542039 0.3362109 0.45962538
## 3      B 2.929028 -0.38319924 -0.8955891 -0.1164828 0.98441377
## 4      B 1.995342 -1.33046592 1.1172876 2.0502761 0.25303846
## 5      B 2.500252 2.01035097 -0.7584035 1.9862169 -1.13537096
## 6      B 2.018308 -0.78242095 0.1125197 -0.6532280 0.01841577
##      PC6      PC7      PC8      PC9      PC10      PC11
## 1 -0.2430058 0.5092015 -1.11423307 0.2840243 0.32463197 -0.3245353
## 2 1.2308248 0.2937434 0.10000461 -0.0668399 0.42612180 0.4564029
## 3 -0.2587872 -0.3303385 0.03599041 0.8734350 0.02222192 0.4208602
## 4 -1.5539634 -0.9692185 -1.31852134 0.6254396 0.05666470 -0.0691646
## 5 0.5940361 0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533
## 6 0.6914453 0.1454026 0.06214539 0.2342454 0.73681239 -0.3671239
##      PC12      PC13      PC14      PC15      PC16      PC17
## 1 0.04981306 -0.19760220 0.1134403 -0.059302558 0.16637723 -0.04286656
## 2 1.19357566 0.01807424 -0.2824292 -0.204858888 -0.07067959 0.03088787
## 3 -0.06687286 0.37435458 0.2585457 -0.330274216 -0.13000189 -0.24616091
## 4 0.97082409 -0.90968379 0.2179117 -0.665825669 0.10213387 -0.10289446
## 5 0.03266208 -0.35547138 -0.1480140 -0.005540503 -0.06495881 0.22273309
## 6 -0.77029743 -0.49542291 -0.2992431 0.049952835 -0.20161083 0.14920422
##      PC18      PC19      PC20      PC21      PC22
## 1 -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## 2 -0.405534243 -0.02886103 -0.05262226 -0.05987170 0.05868642
## 3 0.327711259 0.15937793 -0.13804895 -0.13489743 0.10080029
## 4 0.197085181 0.36251771 -0.40018239 -0.10302093 -0.28821708
## 5 -0.129129156 -0.35877054 0.08515543 -0.08500541 -0.06332008
## 6 -0.002229379 -0.08178568 0.18970936 -0.06872875 0.09669594
##      PC23      PC24      PC25      PC26      PC27
## 1 -0.038971937 0.062212075 0.088438866 0.04872948 -0.007000724
## 2 0.070978613 -0.030822339 -0.016741580 0.04173030 -0.059332996
## 3 0.053909008 0.085484364 0.038277664 -0.04151896 -0.035546410
## 4 0.182045907 0.222848059 -0.115720065 -0.03676948 -0.148171674
## 5 0.043591030 0.008165322 0.002738052 0.05983731 0.046167735
## 6 -0.001458054 -0.031338348 0.042784223 -0.08646068 -0.030944690
##      PC28      PC29      PC30      PC31
## 1 0.05356131 0.015184882 0.015985406 0.001396101
## 2 -0.18696553 0.027011311 -0.000803330 0.008096490
## 3 -0.07653067 -0.014640388 0.010307894 0.009074601
## 4 -0.01711665 -0.047828494 0.023862995 0.000265075
## 5 0.03835364 0.032450800 -0.002312178 -0.002563269
## 6 0.00955434 -0.004403431 0.003869919 -0.002931194
```

```
head(round(matlambdas,4))
```

```
##      PC1      PC2      PC3      PC4      PC5      PC6      PC7
## Eigenvalues 13.2881 5.6968 2.8354 1.9814 1.6488 1.2347 0.9783
## Prop. variance 0.4286 0.1838 0.0915 0.0639 0.0532 0.0398 0.0316
## Cum. prop. variance 0.4286 0.6124 0.7039 0.7678 0.8210 0.8608 0.8924
##      PC8      PC9      PC10      PC11      PC12      PC13      PC14
## Eigenvalues 0.6718 0.4608 0.4031 0.3492 0.2939 0.2611 0.2413
## Prop. variance 0.0217 0.0149 0.0130 0.0113 0.0095 0.0084 0.0078
## Cum. prop. variance 0.9140 0.9289 0.9419 0.9532 0.9626 0.9711 0.9789
##      PC15      PC16      PC17      PC18      PC19      PC20      PC21
## Eigenvalues 0.1570 0.0941 0.0798 0.0590 0.0526 0.0491 0.0311
## Prop. variance 0.0051 0.0030 0.0026 0.0019 0.0017 0.0016 0.0010
## Cum. prop. variance 0.9839 0.9870 0.9895 0.9914 0.9931 0.9947 0.9957
##      PC22      PC23      PC24      PC25      PC26      PC27      PC28
## Eigenvalues 0.0299 0.0274 0.0242 0.0180 0.0155 0.0082 0.0069
## Prop. variance 0.0010 0.0009 0.0008 0.0006 0.0005 0.0003 0.0002
## Cum. prop. variance 0.9967 0.9976 0.9984 0.9989 0.9994 0.9997 0.9999
##      PC29      PC30      PC31
## Eigenvalues 0.0016 7e-04 1e-04
## Prop. variance 0.0001 0e+00 0e+00
## Cum. prop. variance 1.0000 1e+00 1e+00
```

```
summary(cancer_pca)
```

```
## Importance of components:
##          PC1      PC2      PC3      PC4      PC5      PC6
## Standard deviation  3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion 0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##          PC7      PC8      PC9     PC10     PC11     PC12
## Standard deviation  0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion 0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##          PC13     PC14     PC15     PC16     PC17     PC18
## Standard deviation  0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion 0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##          PC19     PC20     PC21     PC22     PC23     PC24
## Standard deviation  0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion 0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##          PC25     PC26     PC27     PC28     PC29     PC30
## Standard deviation  0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion 0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##          PC31
## Standard deviation  0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion 1.00000
```

```
head(cancer_pca$rotation)
```

##	PC1	PC2	PC3	PC4
## id	-0.02291216	0.03406849	0.09693844	-0.02659805
## radius_mean	-0.21891302	0.23327140	-0.01139379	0.04218795
## texture_mean	-0.10384388	0.06004420	0.06689234	-0.60295431
## perimeter_mean	-0.22753491	0.21458900	-0.01212479	0.04275280
## area_mean	-0.22104577	0.23066882	0.02629315	0.05411472
## smoothness_mean	-0.14241471	-0.18642221	-0.10318240	0.15809818
##	PC5	PC6	PC7	PC8
## id	0.01132759	-0.316733438	0.90711563	-0.096362415
## radius_mean	-0.03812986	0.029588521	-0.04229878	-0.116427419
## texture_mean	0.04909145	-0.031394323	0.01499356	0.001875482
## perimeter_mean	-0.03771559	0.028394008	-0.04358882	-0.106272097
## area_mean	-0.01056223	0.006113155	-0.02892567	-0.047414568
## smoothness_mean	0.36575006	-0.262508993	-0.14034036	-0.123541189
##	PC9	PC10	PC11	PC12
## id	0.14911564	-0.16926751	0.05818900	-0.006721252
## radius_mean	-0.04627083	-0.22402704	-0.07946608	-0.042213788
## texture_mean	-0.08872717	0.11945674	-0.25325809	0.304032359
## perimeter_mean	-0.03623074	-0.22634517	-0.06986593	-0.017573055
## area_mean	-0.08064986	-0.18600385	-0.06279537	-0.110760120
## smoothness_mean	0.27899640	-0.06133822	0.08466155	0.135321954
##	PC13	PC14	PC15	PC16
## id	-0.004841084	-0.006500099	0.006885943	-0.002753492
## radius_mean	0.050603927	-0.012496988	-0.059054553	0.050789156
## texture_mean	0.256273666	-0.201876125	0.020701124	0.108089530
## perimeter_mean	0.038470392	-0.044684430	-0.048019221	0.039590476
## area_mean	0.065047550	-0.067879244	-0.010152279	-0.014636050
## smoothness_mean	0.315872261	-0.046461624	-0.444044654	0.117493291
##	PC17	PC18	PC19	PC20
## id	-0.007779983	-0.01970737	0.005442248	0.02045491
## radius_mean	0.150008977	0.20990800	-0.156773206	0.21182139
## texture_mean	0.159152972	-0.03416176	0.040048687	0.02993171
## perimeter_mean	0.113792993	0.20123366	-0.168413120	0.22707927
## area_mean	0.130173978	0.25146046	-0.269145594	-0.04549963
## smoothness_mean	0.203117911	0.16817161	0.354463321	-0.16035826
##	PC21	PC22	PC23	PC24
## id	0.009870917	0.006195707	0.003190337	-0.010289027
## radius_mean	0.046009507	0.070394387	-0.073021974	-0.098704322
## texture_mean	0.264801220	-0.436269565	-0.095890704	0.001311285
## perimeter_mean	0.015122205	0.070963404	-0.074821704	-0.040500943
## area_mean	0.087345298	0.021672998	-0.097428804	0.009396470
## smoothness_mean	-0.023842011	0.117945821	-0.063741313	-0.020088204
##	PC25	PC26	PC27	PC28
## id	-0.004233388	-0.00132610	-0.002571324	-0.001623875
## radius_mean	-0.183664583	0.01859418	0.128713229	0.131697326
## texture_mean	0.099441545	-0.08442059	0.024821224	0.017622634
## perimeter_mean	-0.117262178	-0.02743488	0.124670225	0.115650274
## area_mean	0.070557041	0.21057100	-0.361014547	-0.467489167
## smoothness_mean	0.068940049	-0.02876100	0.037372832	-0.069482805
##	PC29	PC30	PC31	
## id	-1.891724e-05	-0.0006852263	-7.122581e-05	
## radius_mean	2.111968e-01	-0.2114371011	-7.024325e-01	
## texture_mean	-6.362507e-05	0.0106165839	-2.644366e-04	
## perimeter_mean	8.434280e-02	-0.3838889617	6.898676e-01	
## area_mean	-2.725167e-01	0.4227208085	3.297173e-02	
## smoothness_mean	1.480038e-03	0.0034638648	4.850746e-03	

```

#print(cancer_pca)
# Means of scores for all the PC's classified by diagnosis status
tabmeansPC <- aggregate(diag_pca[,2:31],by=list(diagnosis=cancer$diagnosis),mean)
tabmeansPC

```

```
##      diagnosis      PC1      PC2      PC3      PC4      PC5
## 1      B  2.204253 -0.3436398  0.2160542  0.1384470 -0.09800974
## 2      M -3.711879  0.5786765 -0.3638272 -0.2331395  0.16504470
##      PC6      PC7      PC8      PC9      PC10
## 1  0.004373132  0.01691799  0.04905754  0.03377092 -0.01002704
## 2 -0.007364189 -0.02848926 -0.08261104 -0.05686895  0.01688516
##      PC11      PC12      PC13      PC14      PC15
## 1 -0.0007888591  0.006017621  0.003305282 -0.03736471 -0.02453152
## 2  0.0013284090 -0.010133446 -0.005565970  0.06292076  0.04131016
##      PC16      PC17      PC18      PC19      PC20
## 1 -0.02516699  0.0001112917  0.006103777 -0.01307695 -0.009733891
## 2  0.04238026 -0.0001874111 -0.010278530  0.02202108  0.016391505
##      PC21      PC22      PC23      PC24      PC25
## 1 -0.008359794 -0.006225063 -0.003024993  0.002609428  0.007813479
## 2  0.014077577  0.010482771  0.005093974 -0.004394179 -0.013157604
##      PC26      PC27      PC28      PC29      PC30
## 1 -0.000879209 -0.003967725 -0.001909259 -0.0003418423 -0.0009838392
## 2  0.001480555  0.006681499  0.003215121  0.0005756496  0.0016567480
```

```
tabmeansPC <- tabmeansPC[rev(order(tabmeansPC$diagnosis)),]
tabmeansPC
```

```
##      diagnosis      PC1      PC2      PC3      PC4      PC5
## 2      M -3.711879  0.5786765 -0.3638272 -0.2331395  0.16504470
## 1      B  2.204253 -0.3436398  0.2160542  0.1384470 -0.09800974
##      PC6      PC7      PC8      PC9      PC10
## 2 -0.007364189 -0.02848926 -0.08261104 -0.05686895  0.01688516
## 1  0.004373132  0.01691799  0.04905754  0.03377092 -0.01002704
##      PC11      PC12      PC13      PC14      PC15
## 2  0.0013284090 -0.010133446 -0.005565970  0.06292076  0.04131016
## 1 -0.0007888591  0.006017621  0.003305282 -0.03736471 -0.02453152
##      PC16      PC17      PC18      PC19      PC20
## 2  0.04238026 -0.0001874111 -0.010278530  0.02202108  0.016391505
## 1 -0.02516699  0.0001112917  0.006103777 -0.01307695 -0.009733891
##      PC21      PC22      PC23      PC24      PC25
## 2  0.014077577  0.010482771  0.005093974 -0.004394179 -0.013157604
## 1 -0.008359794 -0.006225063 -0.003024993  0.002609428  0.007813479
##      PC26      PC27      PC28      PC29      PC30
## 2  0.001480555  0.006681499  0.003215121  0.0005756496  0.0016567480
## 1 -0.000879209 -0.003967725 -0.001909259 -0.0003418423 -0.0009838392
```

```
tabfmeans <- t(tabmeansPC[, -1])
tabfmeans
```

```
##          2          1
## PC1 -3.7118786952  2.2042528946
## PC2  0.5786764540 -0.3436397990
## PC3 -0.3638271826  0.2160542373
## PC4 -0.2331394896  0.1384469798
## PC5  0.1650447018 -0.0980097389
## PC6 -0.0073641886  0.0043731316
## PC7 -0.0284892608  0.0169179924
## PC8 -0.0826110415  0.0490575373
## PC9 -0.0568689505  0.0337709174
## PC10 0.0168851623 -0.0100270432
## PC11 0.0013284090 -0.0007888591
## PC12 -0.0101334459  0.0060176205
## PC13 -0.0055659702  0.0033052820
## PC14 0.0629207582 -0.0373647080
## PC15 0.0413101623 -0.0245315249
## PC16 0.0423802589 -0.0251669885
## PC17 -0.0001874111  0.0001112917
## PC18 -0.0102785304  0.0061037771
## PC19 0.0220210837 -0.0130769461
## PC20 0.0163915046 -0.0097338907
## PC21 0.0140775772 -0.0083597937
## PC22 0.0104827709 -0.0062250628
## PC23 0.0050939739 -0.0030249929
## PC24 -0.0043941787  0.0026094282
## PC25 -0.0131576035  0.0078134789
## PC26 0.0014805547 -0.0008792090
## PC27 0.0066814986 -0.0039677247
## PC28 0.0032151208 -0.0019092594
## PC29 0.0005756496 -0.0003418423
## PC30 0.0016567480 -0.0009838392
```

```
colnames(tabfmeans) <- t(as.vector(tabmeansPC[1]))
tabfmeans
```

```
##          M          B
## PC1 -3.7118786952  2.2042528946
## PC2  0.5786764540 -0.3436397990
## PC3 -0.3638271826  0.2160542373
## PC4 -0.2331394896  0.1384469798
## PC5  0.1650447018 -0.0980097389
## PC6 -0.0073641886  0.0043731316
## PC7 -0.0284892608  0.0169179924
## PC8 -0.0826110415  0.0490575373
## PC9 -0.0568689505  0.0337709174
## PC10 0.0168851623 -0.0100270432
## PC11 0.0013284090 -0.0007888591
## PC12 -0.0101334459  0.0060176205
## PC13 -0.0055659702  0.0033052820
## PC14 0.0629207582 -0.0373647080
## PC15 0.0413101623 -0.0245315249
## PC16 0.0423802589 -0.0251669885
## PC17 -0.0001874111  0.0001112917
## PC18 -0.0102785304  0.0061037771
## PC19 0.0220210837 -0.0130769461
## PC20 0.0163915046 -0.0097338907
## PC21 0.0140775772 -0.0083597937
## PC22 0.0104827709 -0.0062250628
## PC23 0.0050939739 -0.0030249929
## PC24 -0.0043941787  0.0026094282
## PC25 -0.0131576035  0.0078134789
## PC26 0.0014805547 -0.0008792090
## PC27 0.0066814986 -0.0039677247
## PC28 0.0032151208 -0.0019092594
## PC29 0.0005756496 -0.0003418423
## PC30 0.0016567480 -0.0009838392
```



```
# Standard deviations of scores for all the PC's classified by diagnosis status
tabsdsPC <- aggregate(diag_pca[,2:31],by=list(cancer$diagnosis),sd)
tabfsds <- t(tabsdsPC[, -1])
colnames(tabfsds) <- t(as.vector(tabsdsPC[1]))
tabfsds
```

```
##           B           M
## PC1  1.63956487 3.02839244
## PC2  2.08691418 2.72966952
## PC3  1.36038677 2.07323861
## PC4  1.39613539 1.39927526
## PC5  1.39777817 1.04807636
## PC6  0.95340249 1.33789147
## PC7  0.95140466 1.05116532
## PC8  0.64932787 1.04212370
## PC9  0.65881989 0.70917409
## PC10 0.57998076 0.71917808
## PC11 0.60269891 0.57186757
## PC12 0.54006502 0.54668527
## PC13 0.51222488 0.51016086
## PC14 0.37926601 0.63294179
## PC15 0.38070917 0.41867516
## PC16 0.26760334 0.36012377
## PC17 0.26627925 0.30856638
## PC18 0.17881651 0.32377631
## PC19 0.17193548 0.30152802
## PC20 0.17202337 0.28613872
## PC21 0.15015083 0.21280261
## PC22 0.15982321 0.19320204
## PC23 0.14579937 0.19476702
## PC24 0.12247334 0.19984615
## PC25 0.11050781 0.16637188
## PC26 0.09806381 0.15950557
## PC27 0.07202620 0.11477556
## PC28 0.06617618 0.10565982
## PC29 0.02588741 0.05609976
## PC30 0.01834069 0.03798219
```

```
t.test(PC1~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC1 by cancer$diagnosis
## t = 26.251, df = 285.72, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  5.472542 6.359721
## sample estimates:
## mean in group B mean in group M
##      2.204253      -3.711879
```

```
t.test(PC2~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC2 by cancer$diagnosis
## t = -4.2387, df = 357.38, p-value = 2.865e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -1.3502373 -0.4943952
## sample estimates:
## mean in group B mean in group M
##    -0.3436398      0.5786765
```

```
t.test(PC3~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC3 by cancer$diagnosis
## t = 3.6343, df = 320.28, p-value = 0.0003246
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## 0.2659658 0.8937970
## sample estimates:
## mean in group B mean in group M
## 0.2160542 -0.3638272
```

```
t.test(PC4~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC4 by cancer$diagnosis
## t = 3.0652, df = 442.55, p-value = 0.002308
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## 0.1333371 0.6098358
## sample estimates:
## mean in group B mean in group M
## 0.1384470 -0.2331395
```

```
t.test(PC5~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC5 by cancer$diagnosis
## t = -2.5485, df = 537.03, p-value = 0.0111
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.46581747 -0.06029141
## sample estimates:
## mean in group B mean in group M
## -0.09800974 0.16504470
```

```
t.test(PC6~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC6 by cancer$diagnosis
## t = 0.11197, df = 339.17, p-value = 0.9109
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.1944615 0.2179362
## sample estimates:
## mean in group B mean in group M
## 0.004373132 -0.007364189
```

```
t.test(PC7~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC7 by cancer$diagnosis
## t = 0.51587, df = 408.87, p-value = 0.6062
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.1276209 0.2184354
## sample estimates:
## mean in group B mean in group M
## 0.01691799 -0.02848926
```

```
t.test(PC8~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC8 by cancer$diagnosis
## t = 1.6584, df = 309.75, p-value = 0.09825
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.02455572 0.28789287
## sample estimates:
## mean in group B mean in group M
## 0.04905754 -0.08261104
```

```
t.test(PC9~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC9 by cancer$diagnosis
## t = 1.5132, df = 417.67, p-value = 0.131
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.0271048 0.2083845
## sample estimates:
## mean in group B mean in group M
## 0.03377092 -0.05686895
```

```
t.test(PC10~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC10 by cancer$diagnosis
## t = -0.46277, df = 372.52, p-value = 0.6438
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.14126432 0.08743991
## sample estimates:
## mean in group B mean in group M
## -0.01002704 0.01688516
```

```
t.test(PC11~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC11 by cancer$diagnosis
## t = -0.041845, df = 462.01, p-value = 0.9666
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.10154692 0.09731238
## sample estimates:
## mean in group B mean in group M
## -0.0007888591 0.0013284090
```

```
t.test(PC12~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC12 by cancer$diagnosis
## t = 0.34227, df = 439.04, p-value = 0.7323
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.07659212 0.10889425
## sample estimates:
## mean in group B mean in group M
## 0.006017621 -0.010133446
```

```
t.test(PC13~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC13 by cancer$diagnosis
## t = 0.20025, df = 444.77, p-value = 0.8414
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.07819457 0.09593708
## sample estimates:
## mean in group B mean in group M
## 0.003305282 -0.005565970
```

```
t.test(PC14~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC14 by cancer$diagnosis
## t = -2.0945, df = 302.42, p-value = 0.03705
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.194508096 -0.006062836
## sample estimates:
## mean in group B mean in group M
## -0.03736471 0.06292076
```

```
t.test(PC15~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC15 by cancer$diagnosis
## t = -1.8752, df = 410.43, p-value = 0.06147
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.134862771 0.003179396
## sample estimates:
## mean in group B mean in group M
## -0.02453152 0.04131016
```

```
t.test(PC16~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC16 by cancer$diagnosis
## t = -2.37, df = 349.77, p-value = 0.01833
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.12360307 -0.01149143
## sample estimates:
## mean in group B mean in group M
## -0.02516699 0.04238026
```

```
t.test(PC17~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC17 by cancer$diagnosis
## t = 0.011737, df = 393.3, p-value = 0.9906
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.04973747 0.05033487
## sample estimates:
## mean in group B mean in group M
## 0.0001112917 -0.0001874111
```

```
t.test(PC18~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC18 by cancer$diagnosis
## t = 0.67787, df = 288.75, p-value = 0.4984
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.03118389 0.06394850
## sample estimates:
## mean in group B mean in group M
## 0.006103777 -0.010278530
```

```
t.test(PC19~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC19 by cancer$diagnosis
## t = -1.5516, df = 293.85, p-value = 0.1218
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.079616015 0.009419955
## sample estimates:
## mean in group B mean in group M
## -0.01307695 0.02202108
```

```
t.test(PC20~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC20 by cancer$diagnosis
## t = -1.2062, df = 303.02, p-value = 0.2287
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.06874572 0.01649493
## sample estimates:
## mean in group B mean in group M
## -0.009733891 0.016391505
```

```
t.test(PC21~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC21 by cancer$diagnosis
## t = -1.3487, df = 336.76, p-value = 0.1783
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.05516116 0.01028642
## sample estimates:
## mean in group B mean in group M
## -0.008359794 0.014077577
```

```
t.test(PC22~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC22 by cancer$diagnosis
## t = -1.0618, df = 380.13, p-value = 0.289
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.04764831 0.01423264
## sample estimates:
## mean in group B mean in group M
## -0.006225063 0.010482771
```

```
t.test(PC23~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC23 by cancer$diagnosis
## t = -0.52575, df = 351.71, p-value = 0.5994
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.03849078 0.02225285
## sample estimates:
## mean in group B mean in group M
## -0.003024993 0.005093974
```

```
t.test(PC24~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC24 by cancer$diagnosis
## t = 0.4614, df = 306.57, p-value = 0.6448
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.02286480 0.03687201
## sample estimates:
## mean in group B mean in group M
## 0.002609428 -0.004394179
```

```
t.test(PC25~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC25 by cancer$diagnosis
## t = 1.6337, df = 322.91, p-value = 0.1033
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.004282315 0.046224480
## sample estimates:
## mean in group B mean in group M
## 0.007813479 -0.013157604
```

```
t.test(PC26~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC26 by cancer$diagnosis
## t = -0.19467, df = 307.18, p-value = 0.8458
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.02621273 0.02149320
## sample estimates:
## mean in group B mean in group M
## -0.000879209 0.001480555
```

```
t.test(PC27~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC27 by cancer$diagnosis
## t = -1.2162, df = 311.14, p-value = 0.2248
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.027878004 0.006579557
## sample estimates:
## mean in group B mean in group M
## -0.003967725 0.006681499
```

```
t.test(PC28~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC28 by cancer$diagnosis
## t = -0.63596, df = 310.76, p-value = 0.5253
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.02097902 0.01073026
## sample estimates:
## mean in group B mean in group M
## -0.001909259 0.003215121
```

```
t.test(PC29~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC29 by cancer$diagnosis
## t = -0.22436, df = 265.22, p-value = 0.8226
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.008969119 0.007134135
## sample estimates:
## mean in group B mean in group M
## -0.0003418423 0.0005756496
```

```
t.test(PC30~cancer$diagnosis,data=diag_pca)
```

```
##
## Welch Two Sample t-test
##
## data: PC30 by cancer$diagnosis
## t = -0.9487, df = 270.4, p-value = 0.3436
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.008120430 0.002839256
## sample estimates:
## mean in group B mean in group M
## -0.0009838392 0.0016567480
```

```
t.test(PC31~cancer$diagnosis,data=diag_pca)
```



```
##
## Welch Two Sample t-test
##
## data: PC3l by cancer$diagnosis
## t = -0.54256, df = 278.74, p-value = 0.5879
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
## -0.002917016 0.001656473
## sample estimates:
## mean in group B mean in group M
## -0.0002348289 0.0003954429
```

```
# F ratio tests
var.test(PC1~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC1 by cancer$diagnosis
## F = 0.29311, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.2293890 0.3717204
## sample estimates:
## ratio of variances
## 0.2931115
```

```
var.test(PC2~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC2 by cancer$diagnosis
## F = 0.58451, num df = 356, denom df = 211, p-value = 8.474e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.4574343 0.7412633
## sample estimates:
## ratio of variances
## 0.5845061
```

```
var.test(PC3~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC3 by cancer$diagnosis
## F = 0.43055, num df = 356, denom df = 211, p-value = 2.327e-12
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3369504 0.5460214
## sample estimates:
## ratio of variances
## 0.4305526
```

```
var.test(PC4~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC4 by cancer$diagnosis
## F = 0.99552, num df = 356, denom df = 211, p-value = 0.9625
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.7790915 1.2625024
## sample estimates:
## ratio of variances
## 0.9955172
```

```
var.test(PC5~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC5 by cancer$diagnosis
## F = 1.7787, num df = 356, denom df = 211, p-value = 5.82e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 1.391972 2.255662
## sample estimates:
## ratio of variances
## 1.778651
```

```
var.test(PC6~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC6 by cancer$diagnosis
## F = 0.50782, num df = 356, denom df = 211, p-value = 1.795e-08
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3974207 0.6440124
## sample estimates:
## ratio of variances
## 0.5078212
```

```
var.test(PC7~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC7 by cancer$diagnosis
## F = 0.8192, num df = 356, denom df = 211, p-value = 0.1
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.6411036 1.0388957
## sample estimates:
## ratio of variances
## 0.8191973
```

```
var.test(PC8~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC8 by cancer$diagnosis
## F = 0.38823, num df = 356, denom df = 211, p-value = 3.319e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3038290 0.4923489
## sample estimates:
## ratio of variances
## 0.3882304
```

```
var.test(PC9~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC9 by cancer$diagnosis
## F = 0.86303, num df = 356, denom df = 211, p-value = 0.2243
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.6754099 1.0944883
## sample estimates:
## ratio of variances
## 0.8630336
```

```
var.test(PC10~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC10 by cancer$diagnosis
## F = 0.65036, num df = 356, denom df = 211, p-value = 0.0003698
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.5089722 0.8247793
## sample estimates:
## ratio of variances
## 0.6503607
```

```
var.test(PC11~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC11 by cancer$diagnosis
## F = 1.1107, num df = 356, denom df = 211, p-value = 0.4012
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.8692598 1.4086183
## sample estimates:
## ratio of variances
## 1.110734
```

```
var.test(PC12~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC12 by cancer$diagnosis
## F = 0.97593, num df = 356, denom df = 211, p-value = 0.8346
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7637603 1.2376584
## sample estimates:
## ratio of variances
##      0.975927
```

```
var.test(PC13~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC13 by cancer$diagnosis
## F = 1.0081, num df = 356, denom df = 211, p-value = 0.956
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7889451 1.2784699
## sample estimates:
## ratio of variances
##      1.008108
```

```
var.test(PC14~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC14 by cancer$diagnosis
## F = 0.35905, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2809959 0.4553483
## sample estimates:
## ratio of variances
##      0.3590544
```

```
var.test(PC15~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC15 by cancer$diagnosis
## F = 0.82686, num df = 356, denom df = 211, p-value = 0.1169
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.6471009 1.0486142
## sample estimates:
## ratio of variances
##      0.8268605
```

```
var.test(PC16~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC16 by cancer$diagnosis
## F = 0.55218, num df = 356, denom df = 211, p-value = 8.26e-07
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4321348 0.7002658
## sample estimates:
## ratio of variances
##      0.5521785
```

```
var.test(PC17~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC17 by cancer$diagnosis
## F = 0.74469, num df = 356, denom df = 211, p-value = 0.01494
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5827968 0.9444106
## sample estimates:
## ratio of variances
##      0.7446933
```

```
var.test(PC18~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC18 by cancer$diagnosis
## F = 0.30502, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2387068 0.3868197
## sample estimates:
## ratio of variances
##      0.3050177
```

```
var.test(PC19~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC19 by cancer$diagnosis
## F = 0.32514, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.2544576 0.4123434
## sample estimates:
## ratio of variances
##      0.3251439
```

```
var.test(PC20~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC20 by cancer$diagnosis
## F = 0.36143, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.2828534 0.4583583
## sample estimates:
## ratio of variances
## 0.3614279
```

```
var.test(PC21~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC21 by cancer$diagnosis
## F = 0.49785, num df = 356, denom df = 211, p-value = 6.758e-09
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3896201 0.6313716
## sample estimates:
## ratio of variances
## 0.4978535
```

```
var.test(PC22~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC22 by cancer$diagnosis
## F = 0.68432, num df = 356, denom df = 211, p-value = 0.001709
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.5355451 0.8678402
## sample estimates:
## ratio of variances
## 0.6843154
```

```
var.test(PC23~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC23 by cancer$diagnosis
## F = 0.56038, num df = 356, denom df = 211, p-value = 1.542e-06
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.4385511 0.7106634
## sample estimates:
## ratio of variances
## 0.5603772
```

```
var.test(PC24~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC24 by cancer$diagnosis
## F = 0.37557, num df = 356, denom df = 211, p-value = 3.495e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.2939215 0.4762939
## sample estimates:
## ratio of variances
## 0.3755706
```

```
var.test(PC25~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC25 by cancer$diagnosis
## F = 0.44119, num df = 356, denom df = 211, p-value = 9.824e-12
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3452756 0.5595122
## sample estimates:
## ratio of variances
## 0.4411905
```

```
var.test(PC26~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC26 by cancer$diagnosis
## F = 0.37798, num df = 356, denom df = 211, p-value = 5.423e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.2958050 0.4793461
## sample estimates:
## ratio of variances
## 0.3779774
```

```
var.test(PC27~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC27 by cancer$diagnosis
## F = 0.39381, num df = 356, denom df = 211, p-value = 8.544e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3081924 0.4994196
## sample estimates:
## ratio of variances
## 0.3938058
```

```
var.test(PC28~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC28 by cancer$diagnosis
## F = 0.39227, num df = 356, denom df = 211, p-value = 6.601e-15
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.3069894 0.4974701
## sample estimates:
## ratio of variances
## 0.3922686
```

```
var.test(PC29~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC29 by cancer$diagnosis
## F = 0.21294, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.1666460 0.2700465
## sample estimates:
## ratio of variances
## 0.2129389
```

```
var.test(PC30~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC30 by cancer$diagnosis
## F = 0.23317, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.1824782 0.2957024
## sample estimates:
## ratio of variances
## 0.2331693
```

```
var.test(PC31~cancer$diagnosis,data=diag_pca)
```

```
##
## F test to compare two variances
##
## data: PC31 by cancer$diagnosis
## F = 0.26577, num df = 356, denom df = 211, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
## 0.2079951 0.3370519
## sample estimates:
## ratio of variances
## 0.2657746
```

```
# Levene's tests (one-sided)
library(car)
(LTPC1 <- leveneTest(PC1~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group 1  62.132 1.654e-14 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```



```
(p_PC1_1sided <- LTPC1[[3]][1]/2)
```

```
## [1] 8.268824e-15
```

```
(LTPC2 <- leveneTest(PC2~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  18.786 1.73e-05 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC2_1sided=LTPC2[[3]][1]/2)
```

```
## [1] 8.651441e-06
```

```
(LTPC3 <- leveneTest(PC3~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1   27.65 2.063e-07 ***
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC3_1sided <- LTPC3[[3]][1]/2)
```

```
## [1] 1.031266e-07
```

```
(LTPC4 <- leveneTest(PC4~cancer$diagnosis,data=diag_pca))
```

```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value Pr(>F)
## group  1  2e-04  0.989
##      567
```

```
(p_PC4_1sided <- LTPC4[[3]][1]/2)
```

```
## [1] 0.4944984
```

```
(LTPC5 <- leveneTest(PC5~cancer$diagnosis,data=diag_pca))
```

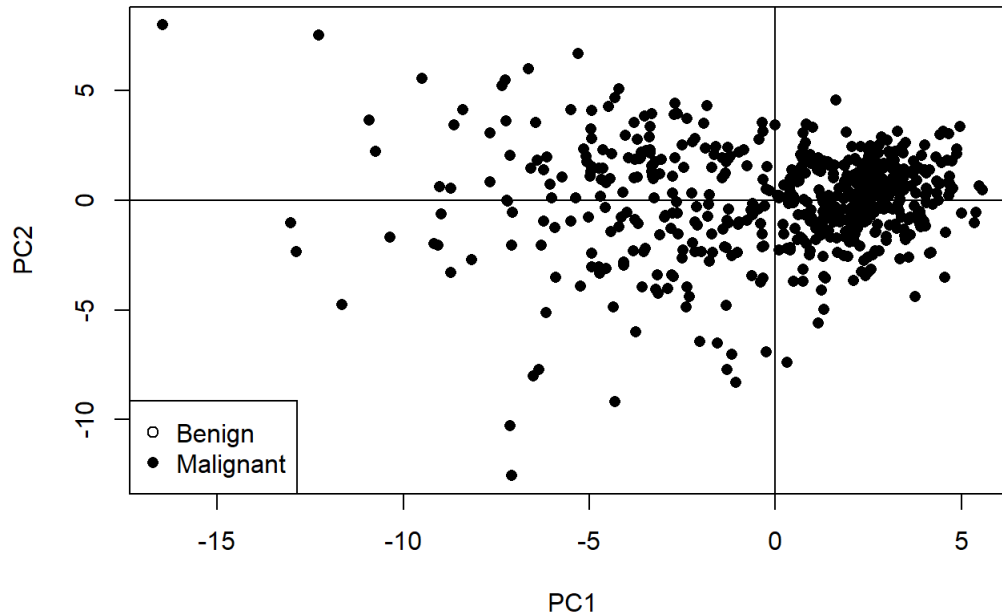
```
## Levene's Test for Homogeneity of Variance (center = median)
##      Df F value    Pr(>F)
## group  1  6.8535 0.009083 **
##      567
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
(p_PC5_1sided <- LTPC5[[3]][1]/2)
```

```
## [1] 0.004541533
```

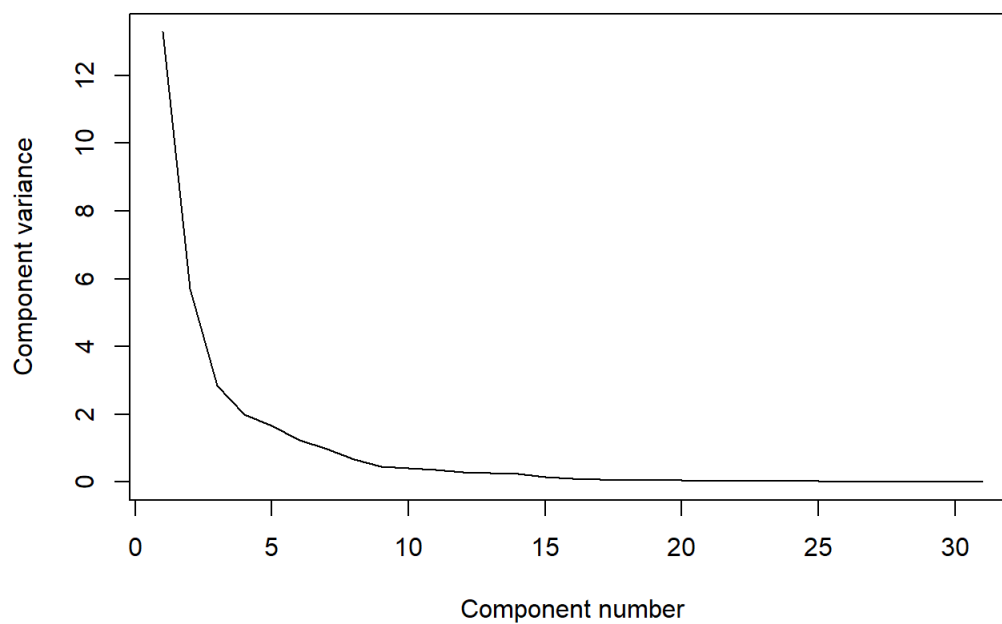
```
# Plotting the scores for the first and second components
plot(diag_pca$PC1, diag_pca$PC2, pch=ifelse(diag_pca$diagnosis == "S", 1, 16), xlab="PC1", ylab="PC2", main="569
entries against values for PC1 & PC2")
abline(h=0)
abline(v=0)
legend("bottomleft", legend=c("Benign", "Malignant"), pch=c(1, 16))
```

**569 entries against values for PC1 & PC2**



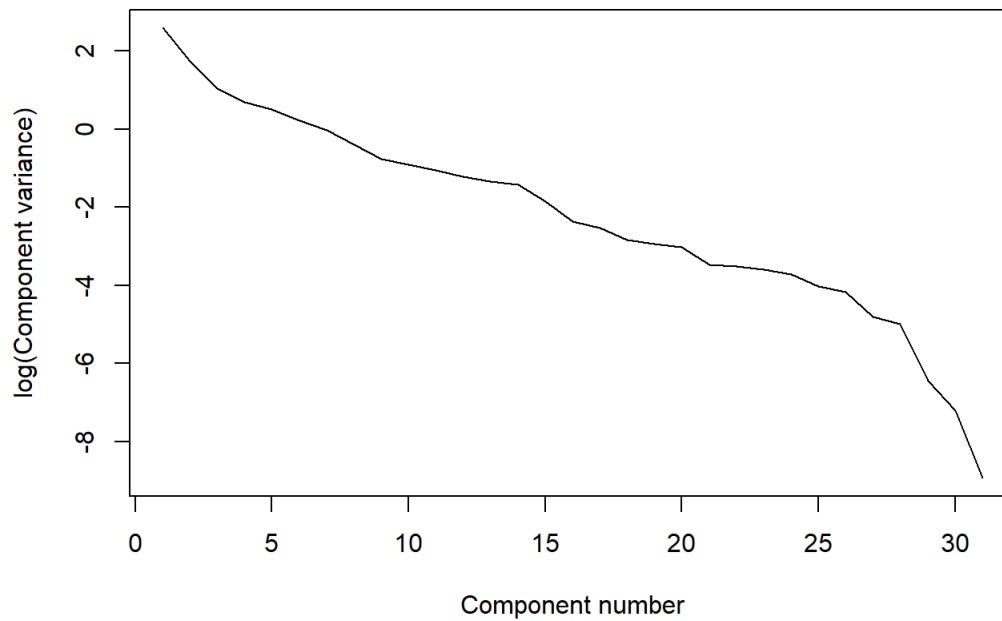
```
plot(eigen_cancer, xlab = "Component number", ylab = "Component variance", type = "l", main = "Scree diagram
")
```

**Scree diagram**



```
plot(log(eigen_cancer), xlab = "Component number", ylab = "log(Component variance)", type="l", main = "Log(eig
envalue) diagram")
```

**Log(eigenvalue) diagram**



```
print(summary(cancer_pca))
```

```
## Importance of components:
##               PC1      PC2      PC3      PC4      PC5      PC6
## Standard deviation    3.6453 2.3868 1.68386 1.40761 1.28406 1.11116
## Proportion of Variance 0.4286 0.1838 0.09146 0.06391 0.05319 0.03983
## Cumulative Proportion 0.4286 0.6124 0.70388 0.76779 0.82098 0.86081
##               PC7      PC8      PC9      PC10     PC11     PC12
## Standard deviation    0.98908 0.81961 0.67882 0.6349 0.59089 0.54212
## Proportion of Variance 0.03156 0.02167 0.01486 0.0130 0.01126 0.00948
## Cumulative Proportion 0.89237 0.91404 0.92890 0.9419 0.95317 0.96265
##               PC13     PC14     PC15     PC16     PC17     PC18
## Standard deviation    0.51103 0.49125 0.39620 0.30680 0.28251 0.2430
## Proportion of Variance 0.00842 0.00778 0.00506 0.00304 0.00257 0.0019
## Cumulative Proportion 0.97107 0.97886 0.98392 0.98696 0.98953 0.9914
##               PC19     PC20     PC21     PC22     PC23     PC24
## Standard deviation    0.2293 0.22163 0.1763 0.17304 0.16562 0.15572
## Proportion of Variance 0.0017 0.00158 0.0010 0.00097 0.00088 0.00078
## Cumulative Proportion 0.9931 0.99472 0.9957 0.99669 0.99757 0.99835
##               PC25     PC26     PC27     PC28     PC29     PC30
## Standard deviation    0.13431 0.1244 0.09040 0.08305 0.03987 0.02736
## Proportion of Variance 0.00058 0.0005 0.00026 0.00022 0.00005 0.00002
## Cumulative Proportion 0.99893 0.9994 0.99970 0.99992 0.99997 1.00000
##               PC31
## Standard deviation    0.01153
## Proportion of Variance 0.00000
## Cumulative Proportion 1.00000
```

```
#View(cancer_pca)
diag(cov(cancer_pca$x))
```

```
##          PC1          PC2          PC3          PC4          PC5
## 1.328806e+01 5.696805e+00 2.835395e+00 1.981357e+00 1.648815e+00
##          PC6          PC7          PC8          PC9          PC10
## 1.234673e+00 9.782732e-01 6.717530e-01 4.607924e-01 4.031331e-01
##          PC11          PC12          PC13          PC14          PC15
## 3.491550e-01 2.938904e-01 2.611469e-01 2.413302e-01 1.569736e-01
##          PC16          PC17          PC18          PC19          PC20
## 9.412853e-02 7.980995e-02 5.904627e-02 5.259119e-02 4.912193e-02
##          PC21          PC22          PC23          PC24          PC25
## 3.107078e-02 2.994121e-02 2.743052e-02 2.424902e-02 1.803936e-02
##          PC26          PC27          PC28          PC29          PC30
## 1.547973e-02 8.171699e-03 6.898103e-03 1.589338e-03 7.483761e-04
##          PC31
## 1.330402e-04
```

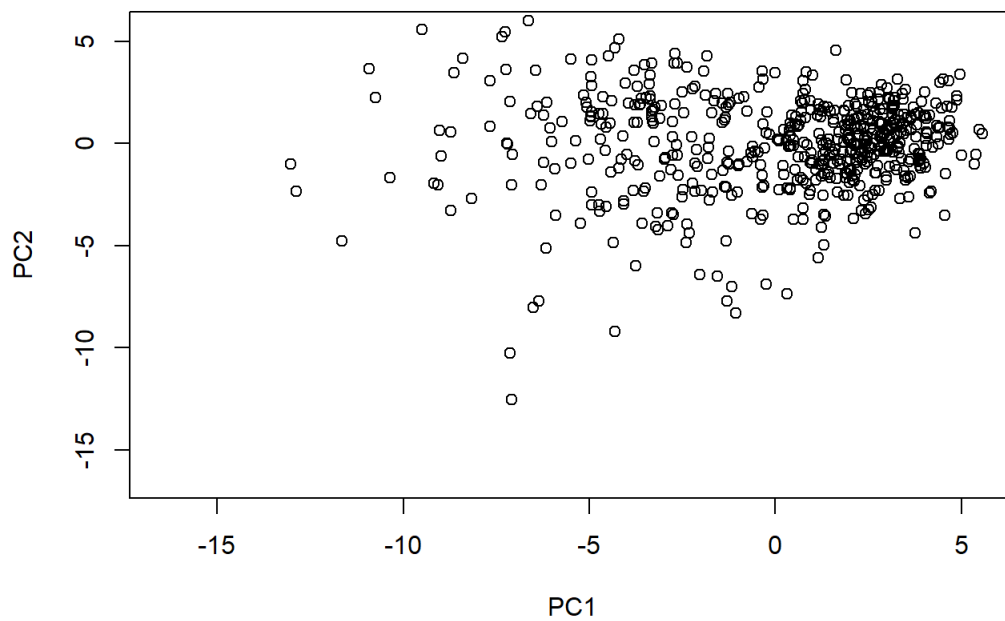
```
xlim <- range(cancer_pca$x[,1])
head(cancer_pca$x[,1])
```

```
## [1] 2.501946 1.467439 2.929028 1.995342 2.500252 2.018308
```

```
head(cancer_pca$x)
```

```
##          PC1          PC2          PC3          PC4          PC5          PC6
## [1,] 2.501946 -0.09694805 -0.4489597 2.3341176 0.69771548 -0.2430058
## [2,] 1.467439 -1.68630059 1.1542039 0.3362109 0.45962538 1.2308248
## [3,] 2.929028 -0.38319924 -0.8955891 -0.1164828 0.98441377 -0.2587872
## [4,] 1.995342 -1.33046592 1.1172876 2.0502761 0.25303846 -1.5539634
## [5,] 2.500252 2.01035097 -0.7584035 1.9862169 -1.13537096 0.5940361
## [6,] 2.018308 -0.78242095 0.1125197 -0.6532280 0.01841577 0.6914453
##          PC7          PC8          PC9          PC10          PC11          PC12
## [1,] 0.5092015 -1.11423307 0.2840243 0.32463197 -0.3245353 0.04981306
## [2,] 0.2937434 0.10000461 -0.0668399 0.42612180 0.4564029 1.19357566
## [3,] -0.3303385 0.03599041 0.8734350 0.02222192 0.4208602 -0.06687286
## [4,] -0.9692185 -1.31852134 0.6254396 0.05666470 -0.0691646 0.97082409
## [5,] 0.1198201 -0.48279704 -0.2727816 -0.29439485 -0.3577533 0.03266208
## [6,] 0.1454026 0.06214539 0.2342454 0.73681239 -0.3671239 -0.77029743
##          PC13          PC14          PC15          PC16          PC17
## [1,] -0.19760220 0.1134403 -0.059302558 0.16637723 -0.04286656
## [2,] 0.01807424 -0.2824292 -0.204858888 -0.07067959 0.03088787
## [3,] 0.37435458 0.2585457 -0.330274216 -0.13000189 -0.24616091
## [4,] -0.90968379 0.2179117 -0.665825669 0.10213387 -0.10289446
## [5,] -0.35547138 -0.1480140 -0.005540503 -0.06495881 0.22273309
## [6,] -0.49542291 -0.2992431 0.049952835 -0.20161083 0.14920422
##          PC18          PC19          PC20          PC21          PC22
## [1,] -0.104542766 -0.03484189 -0.09691187 -0.02846306 -0.00673628
## [2,] -0.405534243 -0.02886103 -0.05262226 -0.05987170 0.05868642
## [3,] 0.327711259 0.15937793 -0.13804895 -0.13489743 0.10080029
## [4,] 0.197085181 0.36251771 -0.40018239 -0.10302093 -0.28821708
## [5,] -0.129129156 -0.35877054 0.08515543 -0.08500541 -0.06332008
## [6,] -0.002229379 -0.08178568 0.18970936 -0.06872875 0.09669594
##          PC23          PC24          PC25          PC26          PC27
## [1,] -0.038971937 0.062212075 0.088438866 0.04872948 -0.007000724
## [2,] 0.070978613 -0.030822339 -0.016741580 0.04173030 -0.059332996
## [3,] 0.053909008 0.085484364 0.038277664 -0.04151896 -0.035546410
## [4,] 0.182045907 0.222848059 -0.115720065 -0.03676948 -0.148171674
## [5,] 0.043591030 0.008165322 0.002738052 0.05983731 0.046167735
## [6,] -0.001458054 -0.031338348 0.042784223 -0.08646068 -0.030944690
##          PC28          PC29          PC30          PC31
## [1,] 0.05356131 0.015184882 0.015985406 0.001396101
## [2,] -0.18696553 0.027011311 -0.000803330 0.008096490
## [3,] -0.07653067 -0.014640388 0.010307894 0.009074601
## [4,] -0.01711665 -0.047828494 0.023862995 0.000265075
## [5,] 0.03835364 0.032450800 -0.002312178 -0.002563269
## [6,] 0.00955434 -0.004403431 0.003869919 -0.002931194
```

```
plot(cancer_pca$x,xlim=xlim,ylim=xlim)
```



```
###
```

```
#Factor Analysis
```

```
library(psych)
```

```
##
```

```
## Attaching package: 'psych'
```

```
## The following object is masked from 'package:car':
```

```
##
```

```
## logit
```

```
## The following objects are masked from 'package:ggplot2':
```

```
##
```

```
## %+%, alpha
```

```
#install.packages("psych", lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
```

```
library(psych)
```

```
fit.pc <- principal(cancer[-2], nfactors=4, rotate="varimax")
```

```
fit.pc
```

```
## Principal Components Analysis
## Call: principal(r = cancer[-2], nfactors = 4, rotate = "varimax")
## Standardized loadings (pattern matrix) based upon correlation matrix
##
```

	RC1	RC2	RC3	RC4	h2	u2	com
## id	0.13	-0.10	0.10	0.07	0.042	0.958	3.3
## radius_mean	0.95	0.13	-0.14	0.10	0.951	0.049	1.1
## texture_mean	0.25	0.06	0.05	0.91	0.897	0.103	1.2
## perimeter_mean	0.95	0.17	-0.11	0.10	0.954	0.046	1.1
## area_mean	0.97	0.10	-0.08	0.09	0.960	0.040	1.1
## smoothness_mean	0.16	0.65	0.26	-0.19	0.547	0.453	1.6
## compactness_mean	0.46	0.77	0.32	0.05	0.910	0.090	2.0
## concavity_mean	0.66	0.61	0.31	0.10	0.908	0.092	2.5
## points_mean	0.80	0.51	0.15	0.05	0.921	0.079	1.8
## symmetry_mean	0.14	0.58	0.33	-0.06	0.474	0.526	1.7
## dimension_mean	-0.31	0.66	0.53	-0.10	0.826	0.174	2.4
## radius_se	0.83	0.00	0.40	0.03	0.850	0.150	1.4
## texture_se	-0.05	-0.21	0.60	0.54	0.693	0.307	2.3
## perimeter_se	0.82	0.04	0.42	0.04	0.855	0.145	1.5
## area_se	0.88	-0.02	0.26	0.01	0.836	0.164	1.2
## smoothness_se	-0.14	0.00	0.70	-0.05	0.518	0.482	1.1
## compactness_se	0.20	0.51	0.67	0.11	0.762	0.238	2.2
## concavity_se	0.22	0.41	0.63	0.07	0.622	0.378	2.0
## points_se	0.43	0.33	0.64	0.00	0.697	0.303	2.3
## symmetry_se	-0.04	0.06	0.67	-0.03	0.451	0.549	1.0
## dimension_se	-0.03	0.38	0.75	0.01	0.713	0.287	1.5
## radius_worst	0.94	0.21	-0.16	0.13	0.972	0.028	1.2
## texture_worst	0.20	0.19	-0.08	0.93	0.956	0.044	1.2
## perimeter_worst	0.94	0.25	-0.13	0.13	0.978	0.022	1.2
## area_worst	0.94	0.16	-0.12	0.12	0.947	0.053	1.1
## smoothness_worst	0.06	0.75	0.01	-0.01	0.572	0.428	1.0
## compactness_worst	0.31	0.86	0.06	0.19	0.877	0.123	1.4
## concavity_worst	0.45	0.77	0.10	0.19	0.845	0.155	1.8
## points_worst	0.68	0.67	-0.02	0.11	0.918	0.082	2.1
## symmetry_worst	0.07	0.72	-0.06	0.06	0.526	0.474	1.0
## dimension_worst	-0.09	0.88	0.18	0.10	0.825	0.175	1.1
##							
##		RC1	RC2	RC3	RC4		
## SS loadings		10.15	7.04	4.36	2.25		
## Proportion Var		0.33	0.23	0.14	0.07		
## Cumulative Var		0.33	0.55	0.70	0.77		
## Proportion Explained		0.43	0.30	0.18	0.09		
## Cumulative Proportion		0.43	0.72	0.91	1.00		
##							
## Mean item complexity =		1.6					
## Test of the hypothesis that 4 components are sufficient.							
##							
## The root mean square of the residuals (RMSR) is		0.06					
## with the empirical chi square		1923.24					
## with prob <		3.8e-216					
##							
## Fit based upon off diagonal values =		0.98					

```
round(fit.pc$values, 3)
```

```
## [1] 13.288 5.697 2.835 1.981 1.649 1.235 0.978 0.672 0.461 0.403
## [11] 0.349 0.294 0.261 0.241 0.157 0.094 0.080 0.059 0.053 0.049
## [21] 0.031 0.030 0.027 0.024 0.018 0.015 0.008 0.007 0.002 0.001
## [31] 0.000
```

```
fit.pc$loadings
```

```
##
## Loadings:
##          RC1    RC2    RC3    RC4
## id          0.133
## radius_mean 0.951  0.131 -0.139
## texture_mean 0.252                0.909
## perimeter_mean 0.950  0.175 -0.107
## area_mean     0.967  0.101
## smoothness_mean 0.159  0.649  0.255 -0.187
## compactness_mean 0.459  0.771  0.320
## concavity_mean 0.659  0.606  0.311  0.102
## points_mean   0.798  0.508  0.149
## symmetry_mean 0.137  0.585  0.332
## dimension_mean -0.314  0.660  0.532
## radius_se      0.832                0.395
## texture_se     -0.209  0.597  0.538
## perimeter_se   0.823                0.418
## area_se        0.876                0.262
## smoothness_se -0.138                0.705
## compactness_se 0.204  0.514  0.667  0.111
## concavity_se   0.218  0.408  0.635
## points_se      0.426  0.328  0.638
## symmetry_se           0.667
## dimension_se           0.384  0.751
## radius_worst   0.941  0.207 -0.164  0.131
## texture_worst  0.196  0.193                0.935
## perimeter_worst 0.937  0.253 -0.131  0.134
## area_worst     0.944  0.165 -0.118  0.120
## smoothness_worst 0.754
## compactness_worst 0.312  0.861                0.186
## concavity_worst 0.450  0.773  0.100  0.187
## points_worst   0.678  0.668                0.106
## symmetry_worst           0.717
## dimension_worst 0.880  0.181  0.104
##
##          RC1    RC2    RC3    RC4
## SS loadings 10.151  7.037  4.361  2.252
## Proportion Var 0.327  0.227  0.141  0.073
## Cumulative Var 0.327  0.554  0.695  0.768
```

```
# Loadings with more digits
for (i in c(1,3,2,4)) { print(fit.pc$loadings[[1,i]])}
```

```
## [1] 0.1330256
## [1] 0.0991346
## [1] -0.09752479
## [1] 0.06781887
```

```
# Communalities
fit.pc$communality
```

```
##          id          radius_mean          texture_mean          perimeter_mean
## 0.04163396          0.95069170          0.89684853          0.95431848
##          area_mean          smoothness_mean          compactness_mean          concavity_mean
## 0.96014950          0.54720158          0.90971908          0.90807129
##          points_mean          symmetry_mean          dimension_mean          radius_se
## 0.92076209          0.47390203          0.82580280          0.84993832
##          texture_se          perimeter_se          area_se          smoothness_se
## 0.69271471          0.85520824          0.83634402          0.51759585
##          compactness_se          concavity_se          points_se          symmetry_se
## 0.76240129          0.62241576          0.69650774          0.45095156
##          dimension_se          radius_worst          texture_worst          perimeter_worst
## 0.71272740          0.97219376          0.95565236          0.97796884
##          area_worst          smoothness_worst          compactness_worst          concavity_worst
## 0.94731995          0.57201913          0.87681767          0.84471615
##          points_worst          symmetry_worst          dimension_worst
## 0.91825491          0.52608733          0.82467896
```

```
# Rotated factor scores, Notice the columns ordering: RC1, RC3, RC2 and RC4
head(fit.pc$scores)
```

```
##           RC1          RC2          RC3          RC4
## [1,] -0.3200066 -0.20898001 -0.25160464 -1.75616620
## [2,] -0.5649931 -0.22081178  0.85830109 -0.28887483
## [3,] -0.8242652 -0.03734588 -0.52158508 -0.09098986
## [4,] -0.3869942 -0.38180634  0.79329588 -1.49911551
## [5,]  0.1145874 -0.61206123 -0.91421184 -1.46638605
## [6,] -0.6900800 -0.15424020  0.07996063  0.35700314
```

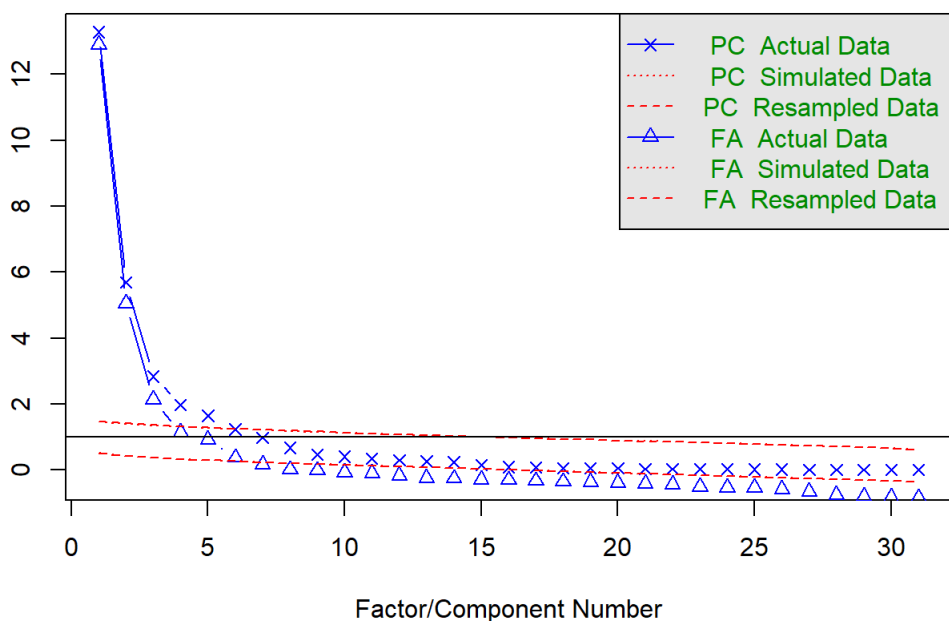
```
# Play with FA utilities
```

```
fa.parallel(cancer[-2]) # See factor recommendation
```

```
## Warning in fa.stats(r = r, f = f, phi = phi, n.obs = n.obs, np.obs
## = np.obs, : The estimated weights for the factor scores are probably
## incorrect. Try a different factor extraction method.
```

eigenvalues of principal components and factor analysis

### Parallel Analysis Scree Plots

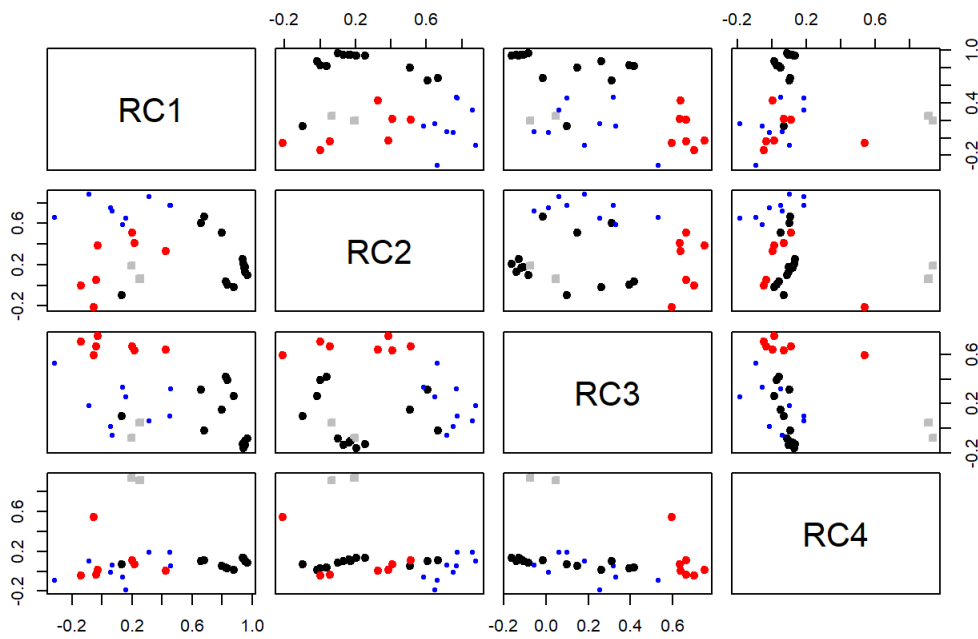


```
## Parallel analysis suggests that the number of factors = 6 and the number of components = 5
```

```
fa.plot(fit.pc) # See Correlations within Factors
```



## Principal Component Analysis



```
fa.diagram(fit.pc) # Visualize the relationship
```

## Components Analysis

