Final_MVA

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring HTML, PDF, and MS Word documents. For more details on using R Markdown see http://rmarkdown.rstudio.com.

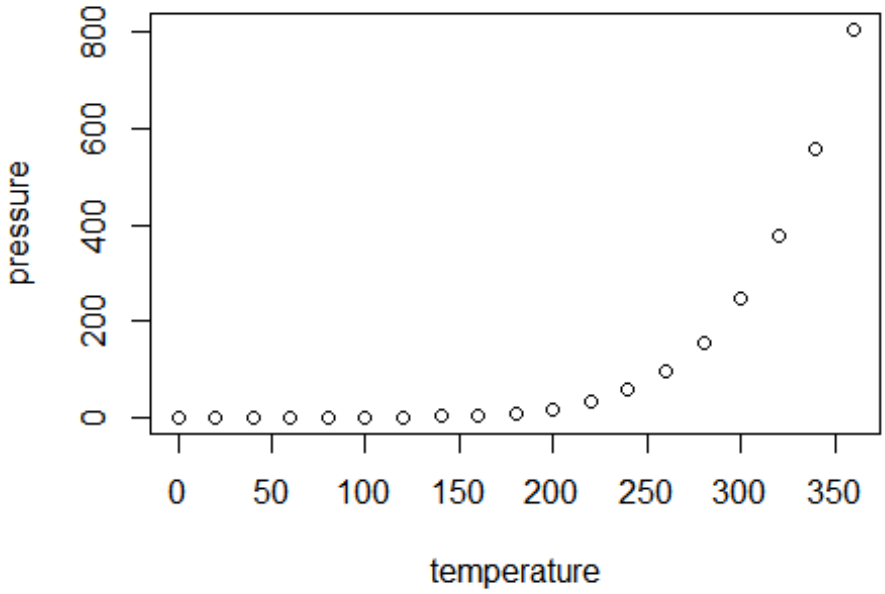
When you click the **Knit** button a document will be generated that includes both content as well as the output of any embedded R code chunks within the document. You can embed an R code chunk like this:

```
summary(cars)
```

```
##      speed           dist       
##  Min.   : 4.0   Min.   :  2.00  
##  1st Qu.:12.0   1st Qu.: 26.00  
##  Median :15.0   Median : 36.00  
##  Mean   :15.4   Mean   : 42.98  
##  3rd Qu.:19.0   3rd Qu.: 56.00  
##  Max.   :25.0   Max.   :120.00
```

Including Plots

You can also embed plots, for example:



Note that the `echo = FALSE` parameter was added to the code chunk to prevent printing of the R code that generated the plot.

```
#The data is related with direct marketing campaigns of a Portuguese banking institution. The marketing campaigns were based on phone calls. Often, more than one contact to the same client was required, in order to access if the product (bank term deposit) would be ('yes') or not ('no') subscribed.

#The classification goal is to predict if the client will subscribe (yes/no) a term deposit (variable y).

library(ggplot2)
library(dplyr)

##
## Attaching package: 'dplyr'

## The following objects are masked from 'package:stats':
##
##     filter, lag

## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union

library (stringr)
library(data.table)
```

```
##
## Attaching package: 'data.table'

## The following objects are masked from 'package:dplyr':
##
##     between, first, last

library(grid)
library(gridExtra)

##
## Attaching package: 'gridExtra'

## The following object is masked from 'package:dplyr':
##
##     combine

library(corrplot)

## corrplot 0.84 loaded

library(scales)
library(qqplotr)

##
## Attaching package: 'qqplotr'

## The following objects are masked from 'package:ggplot2':
##
##     stat_qq_line, StatQqLine

library(MASS)

##
## Attaching package: 'MASS'

## The following object is masked from 'package:dplyr':
##
##     select

library(DMwR)

## Loading required package: lattice

## Registered S3 method overwritten by 'quantmod':
##   method            from
##   as.zoo.data.frame zoo

library(car)

## Loading required package: carData

##
## Attaching package: 'car'
```

```
## The following object is masked from 'package:dplyr':
##
##     recode

library(e1071)
library(caret)
library(caTools)
library(pROC)

## Type 'citation("pROC")' for a citation.

##
## Attaching package: 'pROC'

## The following objects are masked from 'package:stats':
##
##     cov, smooth, var

library(tidyverse)

## -- Attaching packages ---------------------------------------
tidyverse 1.3.0 --

## v tibble  2.1.3     v purrr   0.3.3
## v tidyr   1.0.2     v forcats 0.5.0
## v readr   1.3.1

## -- Conflicts ------------------------------------------------
tidyverse_conflicts() --
## x data.table::between()   masks dplyr::between()
## x readr::col_factor()     masks scales::col_factor()
## x gridExtra::combine()    masks dplyr::combine()
## x purrr::discard()        masks scales::discard()
## x dplyr::filter()         masks stats::filter()
## x data.table::first()     masks dplyr::first()
## x dplyr::lag()            masks stats::lag()
## x data.table::last()      masks dplyr::last()
## x purrr::lift()           masks caret::lift()
## x car::recode()           masks dplyr::recode()
## x MASS::select()          masks dplyr::select()
## x purrr::some()           masks car::some()
## x qqplotr::stat_qq_line() masks ggplot2::stat_qq_line()
## x purrr::transpose()      masks data.table::transpose()

library(MVA)

## Loading required package: HSAUR2

## Loading required package: tools

library(GGally)
```

```
## Registered S3 method overwritten by 'GGally':
##   method from
##   +.gg   ggplot2

##
## Attaching package: 'GGally'

## The following object is masked from 'package:dplyr':
##
##     nasa

library(gvlma)
library(data.table)
library(tidyverse)  # data manipulation
library(data.table) # fast file reading
library(gridExtra)  # arranging ggplot in grid
library(rmarkdown)
library(tinytex)
library(latexpdf)

##
## Attaching package: 'latexpdf'

## The following object is masked from 'package:GGally':
##
##     wrap

library(latex2exp)

bank <-
read.csv("C:/Users/Shamali/Desktop/RutgersSpring/multivariat/project/Newfolde
r/abc/bank.csv")
dim(bank)

## [1] 11162    17

#Convert the data frame to data table
setDT(bank)
#Describe the columns and their data types
str(bank)

## Classes 'data.table' and 'data.frame':   11162 obs. of  17 variables:
##  $ age      : int  59 56 41 55 54 42 56 60 37 28 ...
##  $ job      : Factor w/ 12 levels "admin.","blue-collar",..: 1 1 10 8 1 5
5 6 10 8 ...
##  $ marital  : Factor w/ 3 levels "divorced","married",..: 2 2 2 2 2 3 2 1
2 3 ...
##  $ education: Factor w/ 4 levels "primary","secondary",..: 2 2 2 2 3 3 3 2
2 2 ...
##  $ default  : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
##  $ balance  : int  2343 45 1270 2476 184 0 830 545 1 5090 ...
##  $ housing  : Factor w/ 2 levels "no","yes": 2 1 2 2 1 2 2 2 2 2 ...
```

```
##  $ loan     : Factor w/ 2 levels "no","yes": 1 1 1 1 1 2 2 1 1 1 ...
##  $ contact  : Factor w/ 3 levels "cellular","telephone",..: 3 3 3 3 3 3 3
3 3 3 ...
##  $ day      : int  5 5 5 5 5 5 6 6 6 6 ...
##  $ month    : Factor w/ 12 levels "apr","aug","dec",..: 9 9 9 9 9 9 9 9 9
9 ...
##  $ duration : int  1042 1467 1389 579 673 562 1201 1030 608 1297 ...
##  $ campaign : int  1 1 1 1 2 2 1 1 1 3 ...
##  $ pdays    : int  -1 -1 -1 -1 -1 -1 -1 -1 -1 -1 ...
##  $ previous : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ poutcome : Factor w/ 4 levels "failure","other",..: 4 4 4 4 4 4 4 4 4 4
...
##  $ deposit  : Factor w/ 2 levels "no","yes": 2 2 2 2 2 2 2 2 2 2 ...
##  - attr(*, ".internal.selfref")=<externalptr>
```

```
#By head we get to know first n rows to get grasp of the data
head(bank)
```

```
##    age        job marital education default balance housing loan contact
day
## 1:  59     admin. married secondary      no    2343     yes   no unknown
5
## 2:  56     admin. married secondary      no      45      no   no unknown
5
## 3:  41 technician married secondary      no    1270     yes   no unknown
5
## 4:  55   services married secondary      no    2476     yes   no unknown
5
## 5:  54     admin. married  tertiary      no     184      no   no unknown
5
## 6:  42 management  single  tertiary      no       0     yes  yes unknown
5
##    month duration campaign pdays previous poutcome deposit
## 1:   may     1042        1    -1        0  unknown     yes
## 2:   may     1467        1    -1        0  unknown     yes
## 3:   may     1389        1    -1        0  unknown     yes
## 4:   may      579        1    -1        0  unknown     yes
## 5:   may      673        2    -1        0  unknown     yes
## 6:   may      562        2    -1        0  unknown     yes
```

```
#Find NA In the data table.

table(is.na(bank))
```

```
##
##  FALSE
## 189754
```

```
#Find NA in Columns.
bank[is.na(age),NROW(age)]
```

```
## [1] 0
```

```
bank[is.na(job),NROW(job)]
```

```
## [1] 0
```

```
bank[is.na(education),NROW(education)]
```

```
## [1] 0
```

```
grep('NA',bank)
```

```
## integer(0)
```

```
#To omit NA
bank[bank=="unknown"] <- NA

bank=na.omit(bank)
bank
```

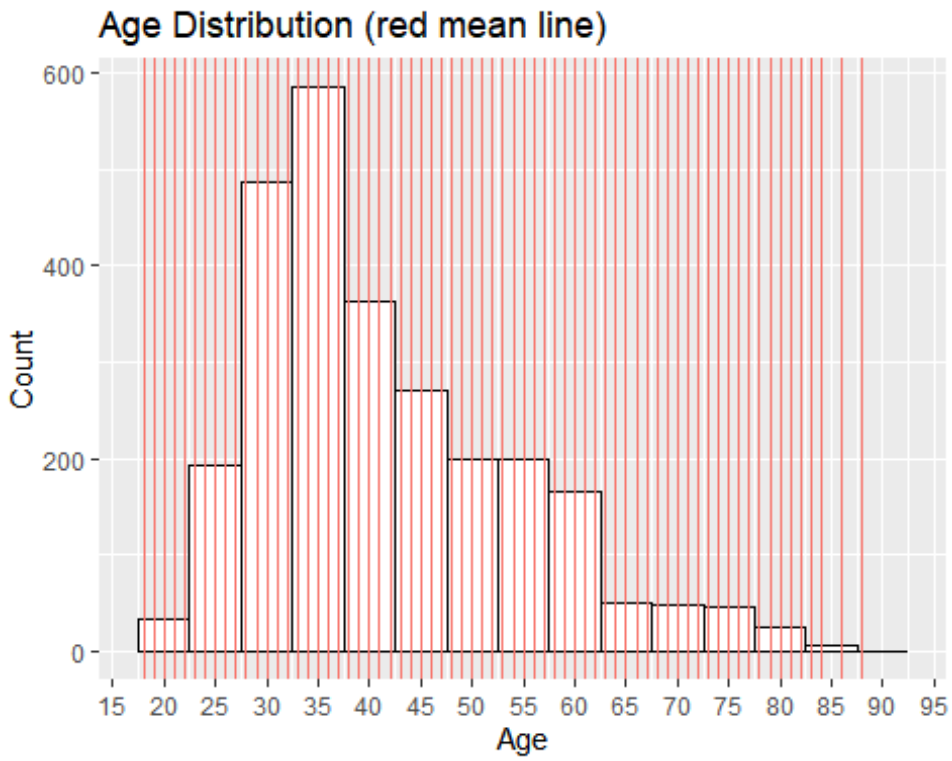
```
##       age          job  marital education default balance housing loan
##    1:  42       admin.   single secondary      no    -247     yes  yes
##    2:  33     services  married secondary      no    3444     yes   no
##    3:  53      retired  married  tertiary      no    2269      no   no
##    4:  37   technician  married secondary      no    5115     yes   no
##    5:  45 entrepreneur  married secondary      no     781      no  yes
##   ---
## 2671:  40  blue-collar divorced   primary      no      54     yes   no
## 2672:  37   management  married  tertiary      no    1594     yes   no
## 2673:  60      retired divorced  tertiary      no    -134      no   no
## 2674:  35  blue-collar  married secondary      no      80     yes  yes
## 2675:  43   technician  married secondary      no       0      no  yes
##         contact day month duration campaign pdays previous poutcome
deposit
##    1: telephone  21   oct      519        1   166        1    other
yes
##    2: telephone  21   oct      144        1    91        4  failure
yes
##    3:  cellular  17   nov     1091        2   150        1  success
yes
##    4:  cellular  17   nov     1210        2   171        4  failure
yes
##    5:  cellular  17   nov      652        2   126        2  failure
yes
##   ---
## 2671:  cellular  13   may       10        5   362        3    other
no
## 2672:  cellular  17   apr      110        1   260        5  failure
no
## 2673:  cellular  12   may      243        1   271        4  failure
no
## 2674:  cellular  21   nov       38        2   172        2  failure
```

```
no
## 2675:  cellular   8   may        9        2   172        5  failure
no

#is.na(bank)

str(bank)

## Classes 'data.table' and 'data.frame':   2675 obs. of  17 variables:
##  $ age      : int  42 33 53 37 45 34 46 43 33 46 ...
##  $ job      : Factor w/ 12 levels "admin.","blue-collar",..: 1 8 6 10 3 5
5 5 10 11 ...
##  $ marital  : Factor w/ 3 levels "divorced","married",..: 3 2 2 2 2 3 2 2
3 1 ...
##  $ education: Factor w/ 4 levels "primary","secondary",..: 2 2 3 2 2 3 3 3
3 2 ...
##  $ default  : Factor w/ 2 levels "no","yes": 1 1 1 1 1 1 1 1 1 1 ...
##  $ balance  : int  -247 3444 2269 5115 781 1494 0 1429 149 3354 ...
##  $ housing  : Factor w/ 2 levels "no","yes": 2 2 1 2 1 2 1 2 2 2 ...
##  $ loan     : Factor w/ 2 levels "no","yes": 2 1 1 1 2 1 1 1 1 1 ...
##  $ contact  : Factor w/ 3 levels "cellular","telephone",..: 2 2 1 1 1 1 1
1 1 1 ...
##  $ day      : int  21 21 17 17 17 18 18 19 19 19 ...
##  $ month    : Factor w/ 12 levels "apr","aug","dec",..: 11 11 10 10 10 10
10 10 10 10 ...
##  $ duration : int  519 144 1091 1210 652 596 716 1015 424 522 ...
##  $ campaign : int  1 1 2 2 2 1 2 1 2 1 ...
##  $ pdays    : int  166 91 150 171 126 182 110 198 182 174 ...
##  $ previous : int  1 4 1 4 2 1 3 2 1 1 ...
##  $ poutcome : Factor w/ 4 levels "failure","other",..: 2 1 3 1 1 2 2 2 2 3
...
##  $ deposit  : Factor w/ 2 levels "no","yes": 2 2 2 2 2 2 2 2 2 2 ...
##  - attr(*, ".internal.selfref")=<externalptr>

#Replace dependent variable with yes with 1 and no with 0

bank$deposit<-ifelse(bank$deposit =='yes', 1,0)
bank$deposit<-as.factor(bank$deposit)

levels(bank$default) <- c("0", "1")
levels(bank$housing) <- c("0", "1")
levels(bank$loan) <- c("0", "1")
levels(bank$job) <- c("1","2","3","4","5","6","7","8","9","10","11","12")
levels(bank$marital) <- c("0", "1","2")
levels(bank$education) <- c("0", "1","2","3")
levels(bank$contact) <- c("0", "1","2")
#levels(bank$age) <- c("0", "1","2","3")
levels(bank$poutcome) <- c("0", "1","2","3")
levels(bank$month) <- c("1","2","3","4","5","6","7","8","9","10","11","12")
```

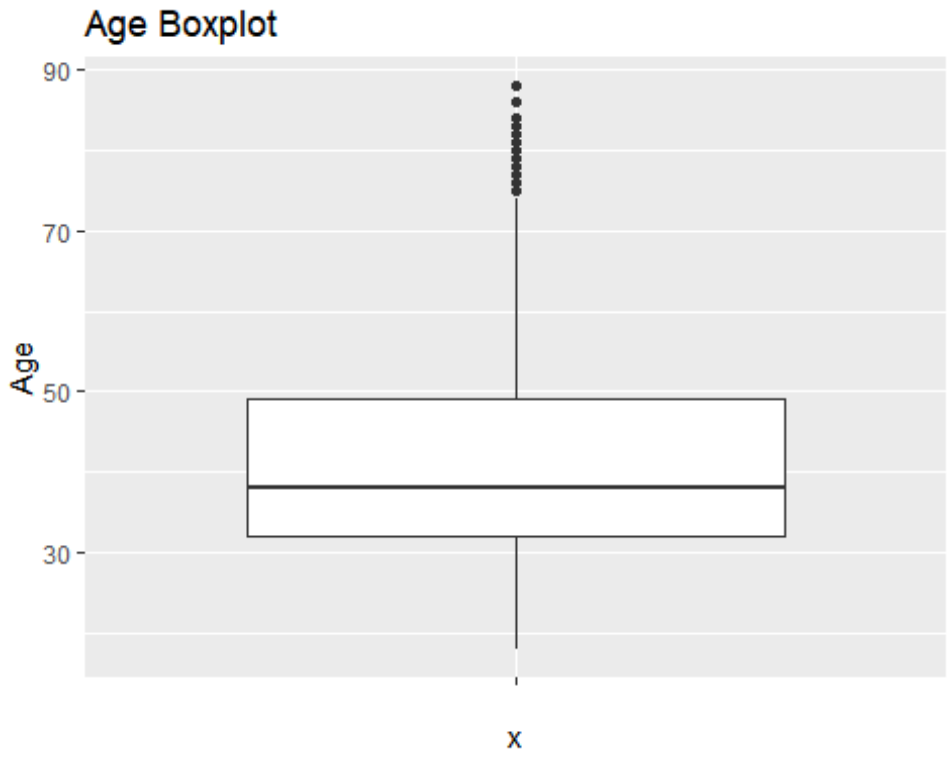
```
bank$poutcome<- as.factor(bank$poutcome)
bank$month<- as.factor(bank$month)

bank$default <- as.factor(bank$default)
bank$housing <- as.factor(bank$housing)
bank$loan <- as.factor(bank$loan)
bank$job <- as.factor(bank$job)
bank$marital <- as.factor(bank$marital)
bank$education <- as.factor(bank$education)
bank$contact <- as.factor(bank$contact)

head(bank)

##    age job marital education default balance housing loan contact day
month
## 1:  42   1       2         1       0    -247       1    1       1  21
11
## 2:  33   8       1         1       0    3444       1    0       1  21
11
## 3:  53   6       1         2       0    2269       0    0       0  17
10
## 4:  37  10       1         1       0    5115       1    0       0  17
10
## 5:  45   3       1         1       0     781       0    1       0  17
10
## 6:  34   5       2         2       0    1494       1    0       0  18
10
##    duration campaign pdays previous poutcome deposit
## 1:      519        1   166        1        1       1
## 2:      144        1    91        4        0       1
## 3:     1091        2   150        1        2       1
## 4:     1210        2   171        4        0       1
## 5:      652        2   126        2        0       1
## 6:      596        1   182        1        1       1

str(bank)

## Classes 'data.table' and 'data.frame':   2675 obs. of  17 variables:
##  $ age      : int  42 33 53 37 45 34 46 43 33 46 ...
##  $ job      : Factor w/ 12 levels "1","2","3","4",..: 1 8 6 10 3 5 5 5 10
11 ...
##  $ marital  : Factor w/ 3 levels "0","1","2": 3 2 2 2 2 3 2 2 3 1 ...
##  $ education: Factor w/ 4 levels "0","1","2","3": 2 2 3 2 2 3 3 3 3 2 ...
##  $ default  : Factor w/ 2 levels "0","1": 1 1 1 1 1 1 1 1 1 1 ...
##  $ balance  : int  -247 3444 2269 5115 781 1494 0 1429 149 3354 ...
##  $ housing  : Factor w/ 2 levels "0","1": 2 2 1 2 1 2 1 2 2 2 ...
##  $ loan     : Factor w/ 2 levels "0","1": 2 1 1 1 2 1 1 1 1 1 ...
##  $ contact  : Factor w/ 3 levels "0","1","2": 2 2 1 1 1 1 1 1 1 1 ...
##  $ day      : int  21 21 17 17 17 18 18 19 19 19 ...
##  $ month    : Factor w/ 12 levels "1","2","3","4",..: 11 11 10 10 10 10 10
10 10 10 ...
```

```
##  $ duration : int  519 144 1091 1210 652 596 716 1015 424 522 ...
##  $ campaign : int  1 1 2 2 2 1 2 1 2 1 ...
##  $ pdays    : int  166 91 150 171 126 182 110 198 182 174 ...
##  $ previous : int  1 4 1 4 2 1 3 2 1 1 ...
##  $ poutcome : Factor w/ 4 levels "0","1","2","3": 2 1 3 1 1 2 2 2 2 3 ...
##  $ deposit  : Factor w/ 2 levels "0","1": 2 2 2 2 2 2 2 2 2 2 ...
##  - attr(*, ".internal.selfref")=<externalptr>
```

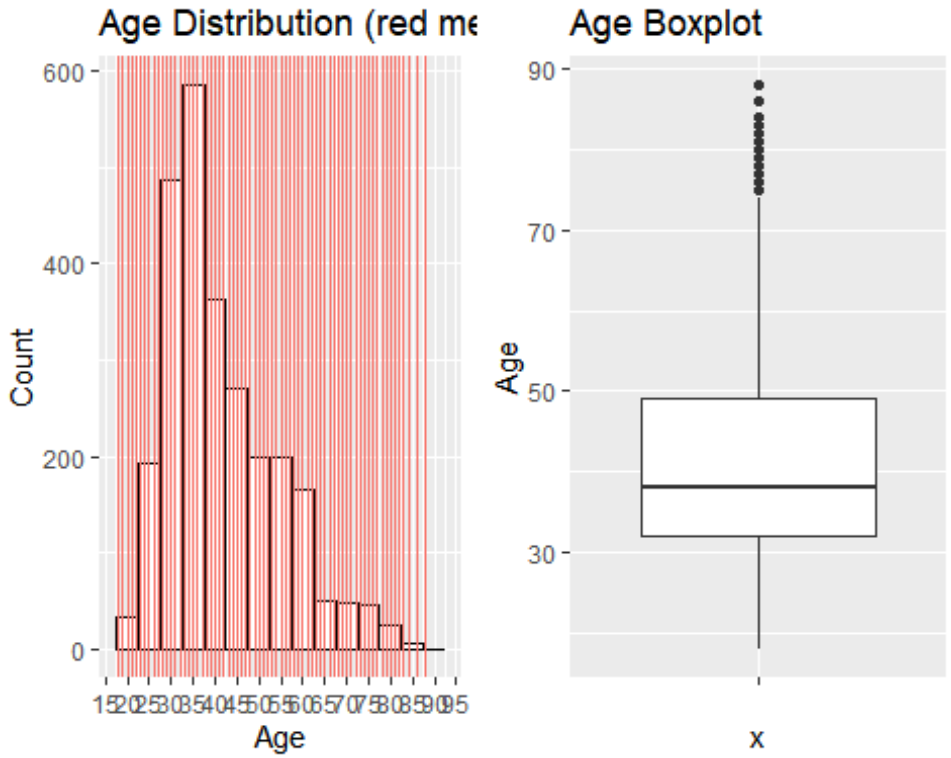
```
library(ggplot2)

gg = ggplot (bank)
graph1 = gg + geom_histogram(aes(x=age),color="black", fill="white", binwidth
= 5) +
  ggtitle('Age Distribution (red mean line)') +
  ylab('Count') +
  xlab('Age') +
  geom_vline(aes(xintercept = age, color = "red")) +
  scale_x_continuous(breaks = seq(0,100,5)) +
  theme(legend.position = "none")
graph1
```



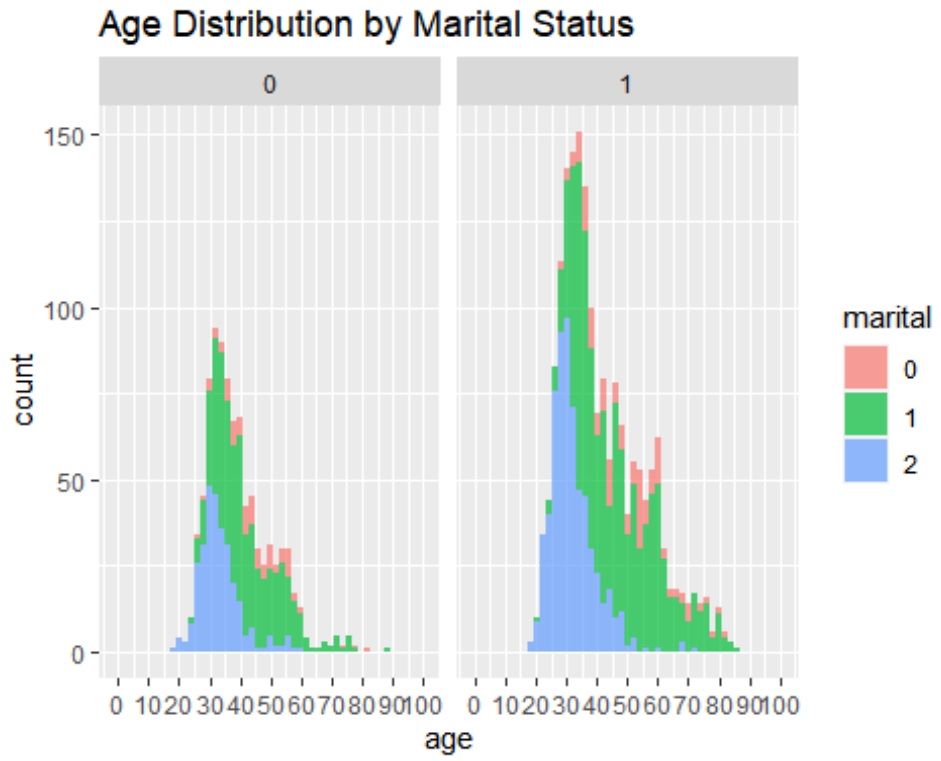

```
graph2 = gg + geom_boxplot(aes(x='', y=age)) +
  ggtitle('Age Boxplot') +
  ylab('Age')
graph2
```



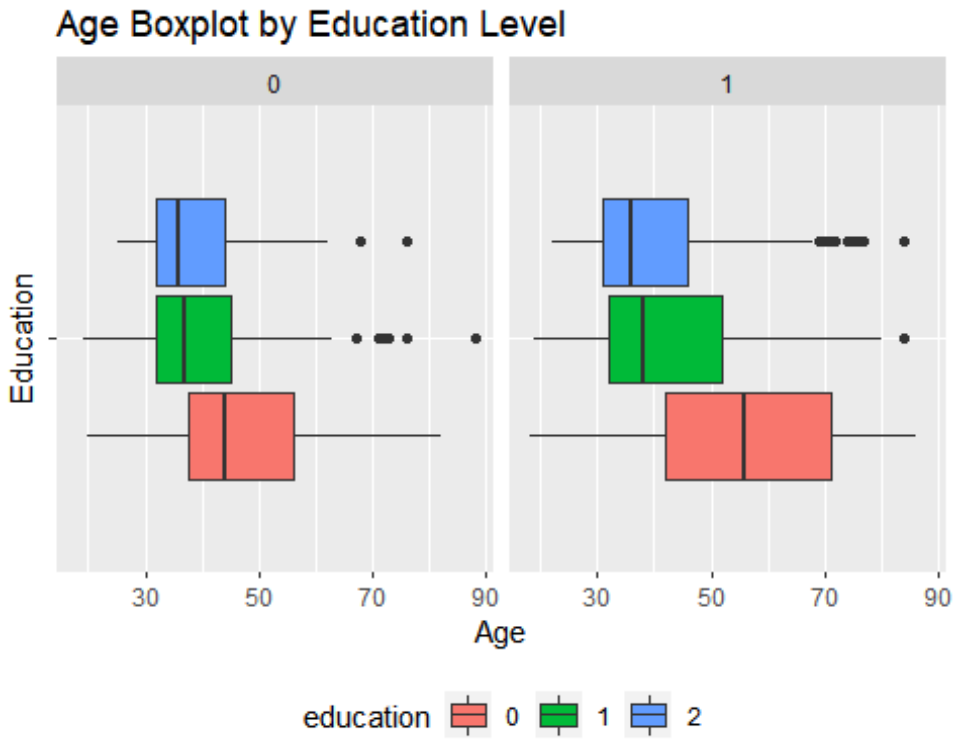

```
library(gridExtra)
grid.arrange(graph1, graph2, ncol = 2)
```



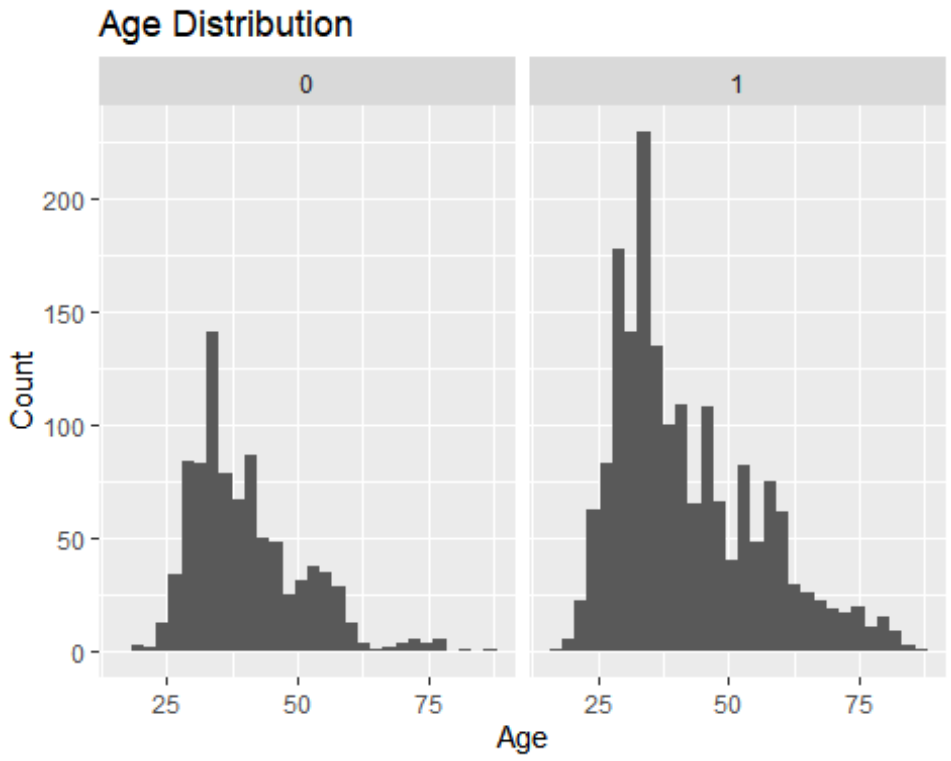
```r
#Age Distribution vs Marital Status That Subscribes Term Deposit

graph3 <- ggplot(bank, aes(x=age, fill=marital)) +
  geom_histogram(binwidth = 2, alpha=0.7) +
  facet_grid(cols = vars(deposit)) +
  expand_limits(x=c(0,100)) +
  scale_x_continuous(breaks = seq(0,100,10)) +
  ggtitle("Age Distribution by Marital Status")

graph3
```



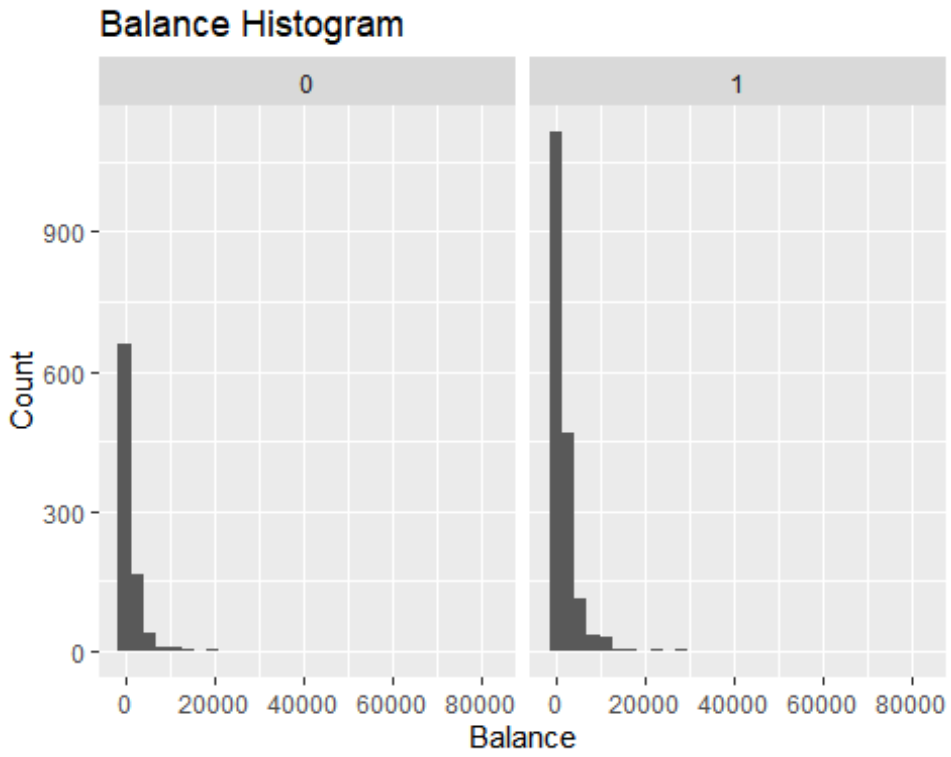

```r
#Age Boxplot vs Education Level That Subscribes Term Deposit

graph4 <- ggplot(bank, aes(x='', y=age, fill=education)) +
  geom_boxplot() +
  facet_grid(cols = vars(deposit)) +
  coord_flip() +
  ggtitle("Age Boxplot by Education Level") +
  ylab("Age") +
  xlab("Education") +
  theme(legend.position = "bottom")
graph4
```



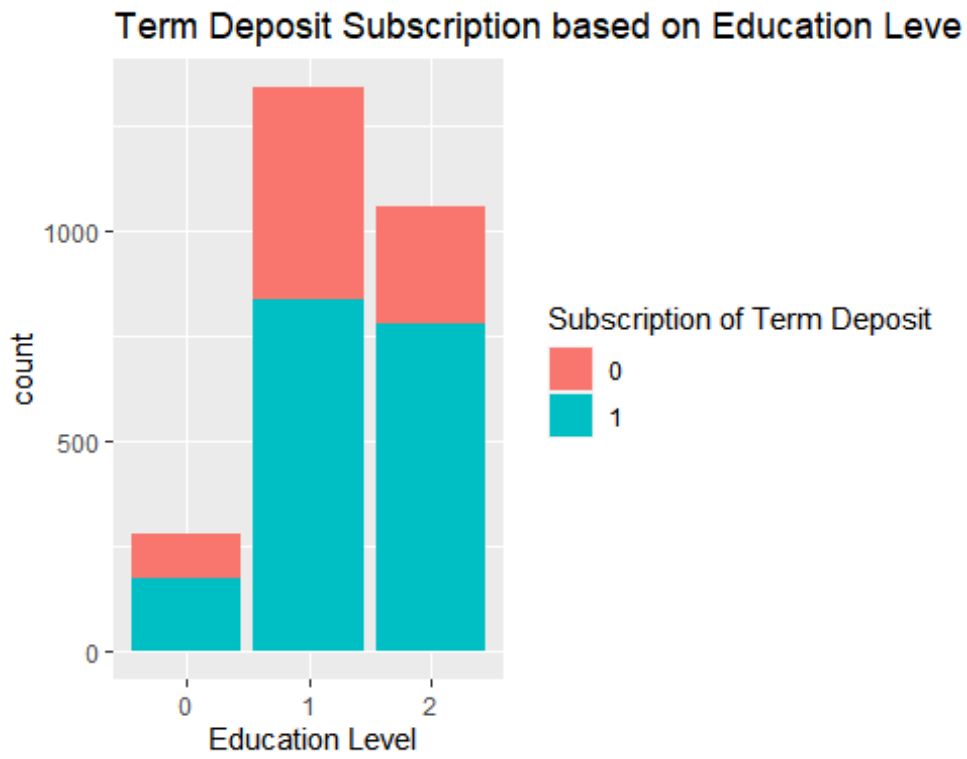

```
#Age vs Subscription
ggplot (bank, aes(x=age)) + geom_histogram() +
  facet_grid(cols=vars(deposit)) +
  ggtitle('Age Distribution') + ylab('Count') + xlab('Age')

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



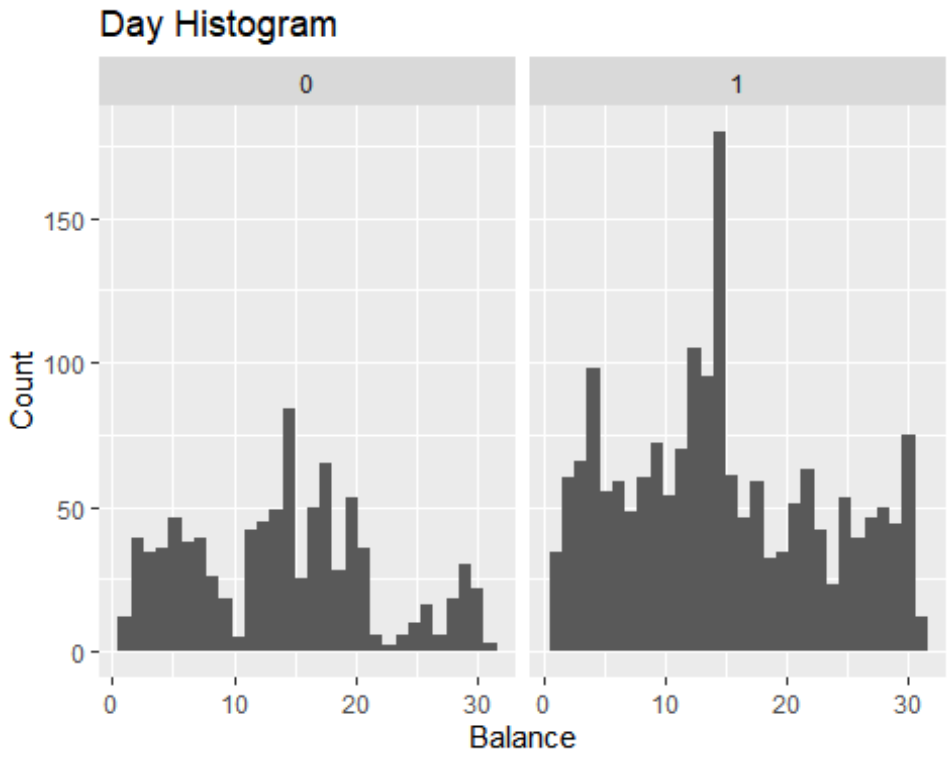

```
#Balance vs Subscription
ggplot (bank, aes(x=balance)) + geom_histogram() +
  facet_grid(cols=vars(deposit)) +
  ggtitle('Balance Histogram') + ylab('Count') + xlab('Balance')

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



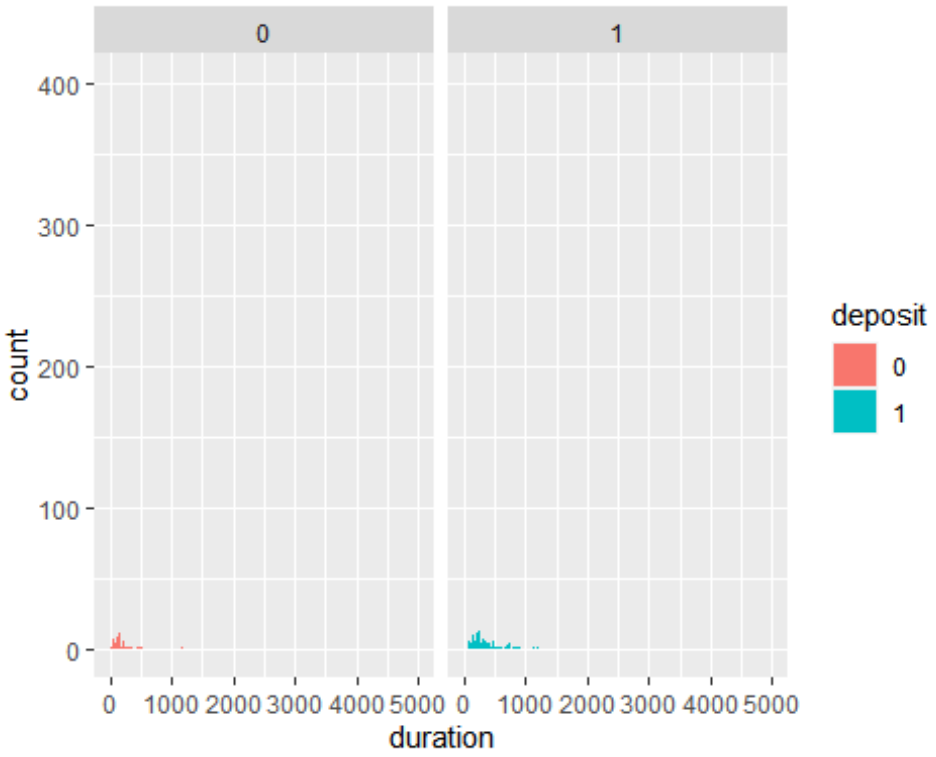

```r
#Education vs Subscription
ggplot(data = bank, aes(x=education, fill=deposit)) +
  geom_bar() +
  ggtitle("Term Deposit Subscription based on Education Level") +
  xlab(" Education Level") +
  guides(fill=guide_legend(title="Subscription of Term Deposit"))
```



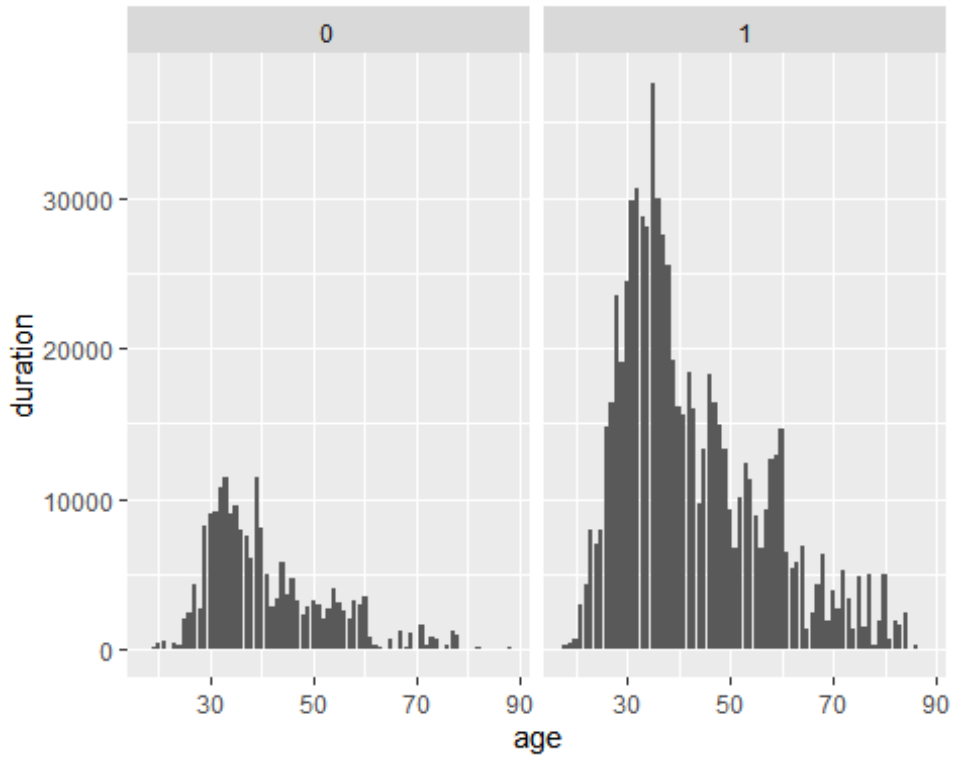

```
#Day vs Subscription

ggplot (bank, aes(x=day)) + geom_histogram() +
  facet_grid(cols=vars(deposit)) +
  ggtitle('Day Histogram') + ylab('Count') + xlab('Balance')

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```



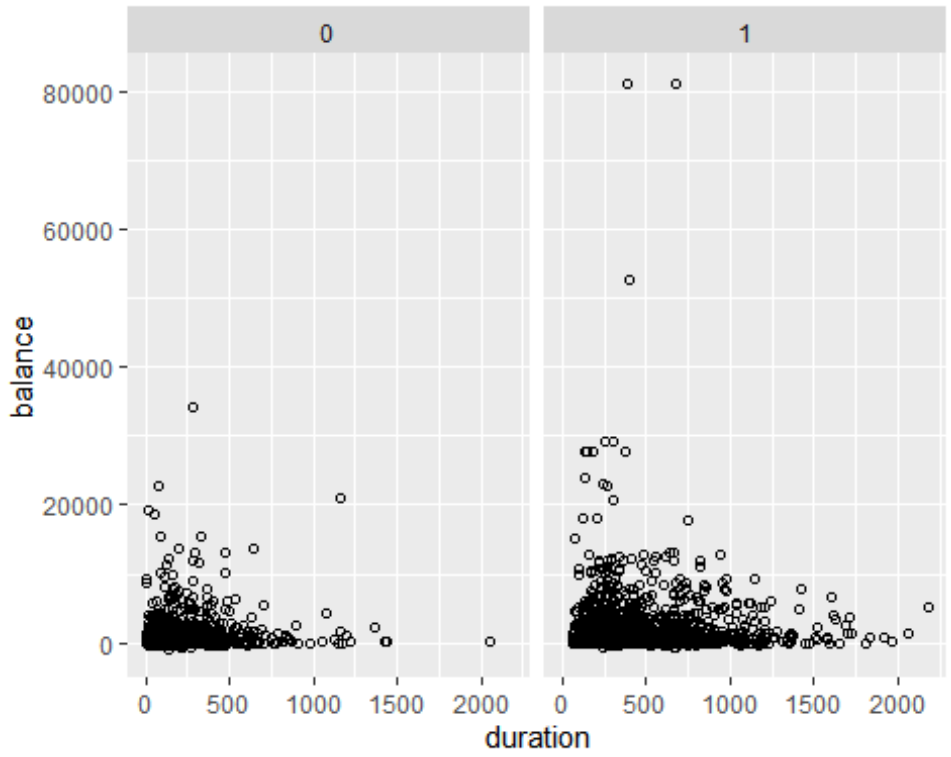

```
#duration


graph5 <- ggplot(bank, aes(x=duration, fill = deposit)) +
  geom_histogram(binwidth = 2) +
  facet_grid(cols = vars(deposit)) +
  coord_cartesian(xlim = c(0,5000), ylim = c(0,400))
graph5
```



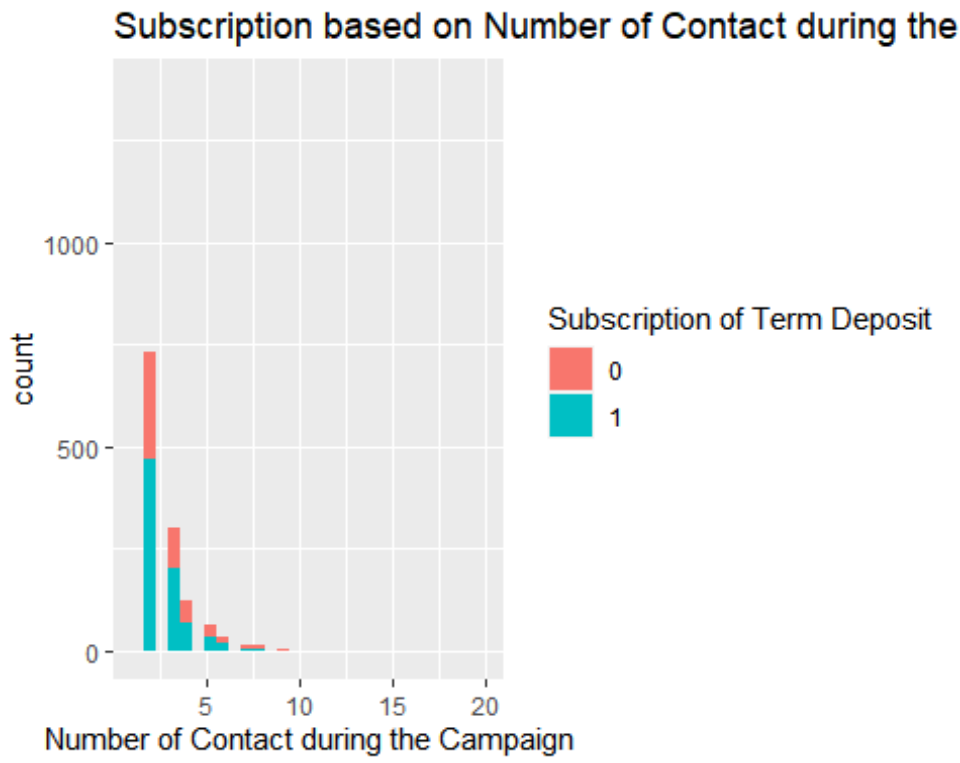

```r
#Barplot of Duration by Age
ggplot(bank, aes(age, duration)) +
  geom_col() +
  facet_grid(cols = vars(deposit))
```



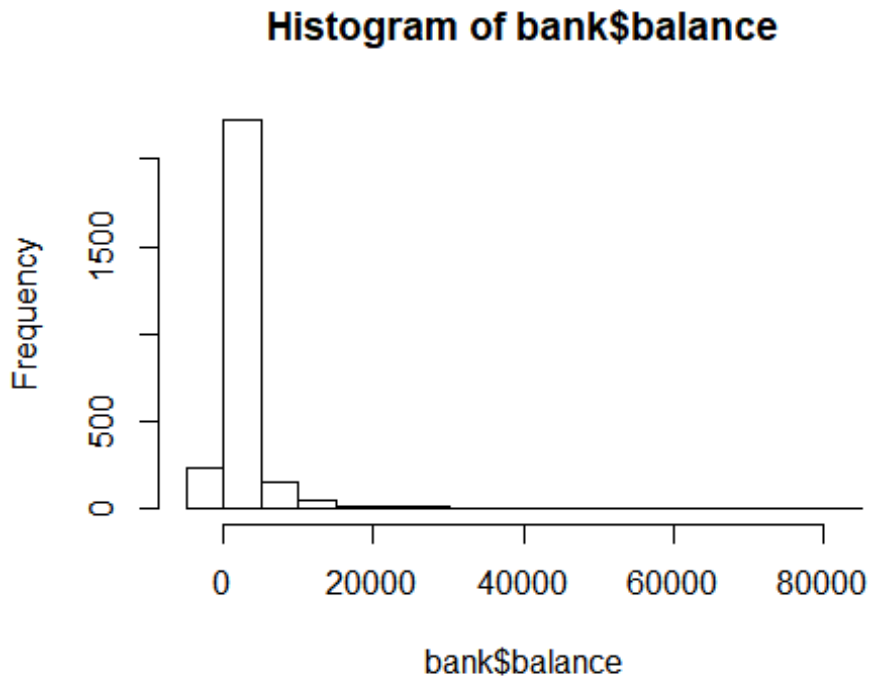

```
#Scatterplot of Duration s Balance

ggplot(bank, aes(x=duration, y=balance)) +
  facet_grid(cols = vars(deposit)) +
  geom_point(shape=1)
```



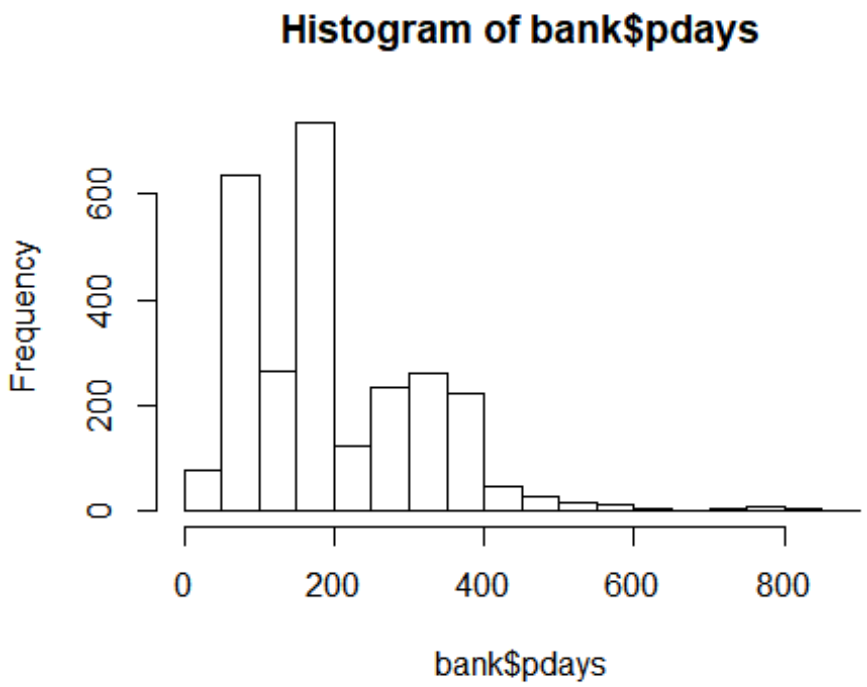

```
#Subscription based on Number of Contact during Campaign
ggplot(data=bank, aes(x=campaign, fill=deposit))+
  geom_histogram()+
  ggtitle("Subscription based on Number of Contact during the Campaign")+
  xlab("Number of Contact during the Campaign")+
  xlim(c(min=1,max=20)) +
  guides(fill=guide_legend(title="Subscription of Term Deposit"))

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.

## Warning: Removed 4 rows containing missing values (geom_bar).
```




```r
hist(bank$balance)
```




```r
hist(bank$pdays)
```




```
#T-test

setDT(bank)
with(data=bank,t.test(age[deposit=="1"],age[deposit=="0"],var.equal=TRUE))

##
##  Two Sample t-test
##
## data:  age[deposit == "1"] and age[deposit == "0"]
## t = 3.8186, df = 2673, p-value = 0.0001373
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.9715075 3.0224008
## sample estimates:
## mean of x mean of y
##  42.17693  40.17998

with(data=bank,t.test(balance[deposit=="1"],balance[deposit=="0"],var.equal=T
RUE))

##
##  Two Sample t-test
##
## data:  balance[deposit == "1"] and balance[deposit == "0"]
## t = 4.0939, df = 2673, p-value = 4.368e-05
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
```

```
##  328.5031 932.4763
## sample estimates:
## mean of x mean of y
##  2001.788  1371.298
```

```
with(data=bank,t.test(duration[deposit=="1"],duration[deposit=="0"],var.equal
=TRUE))
```

```
##
##  Two Sample t-test
##
## data:  duration[deposit == "1"] and duration[deposit == "0"]
## t = 17.35, df = 2673, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  169.1148 212.2122
## sample estimates:
## mean of x mean of y
##  411.9222  221.2587
```

```
#with(data=bank,t.test(housing[deposit=="1"],housing[deposit=="0"],var.equal=
TRUE))
#with(data=bank,t.test(job[deposit=="1"],job[deposit=="0"],var.equal=TRUE))
```

```
with(data=bank,t.test(pdays[deposit=="1"],pdays[deposit=="0"],var.equal=TRUE)
)
```

```
##
##  Two Sample t-test
##
## data:  pdays[deposit == "1"] and pdays[deposit == "0"]
## t = -7.2262, df = 2673, p-value = 6.453e-13
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -44.59370 -25.55776
## sample estimates:
## mean of x mean of y
##  192.0817  227.1575
```

```
#PCA
grep("[a-z]", bank)
```

```
##  [1]  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17
```

```
bank=read.csv("C:/Users/Shamali/Desktop/RutgersSpring/multivariat/project/New
folder/abc/a/bank.csv",row.names=1,fill=TRUE)
```

```
# Performing PCA

# Using prcomp to compute the principal components (eigenvalues and
eigenvectors).
```

```r
# With scale=TRUE, variable means are set to zero, and variances set to one
bank_pca <- prcomp(bank,scale=FALSE)
bank_pca
```

```
## Standard deviations (1, .., p=17):
##  [1] 3763.1447099  282.2750915  118.9807804   12.6440167    8.1996276
##  [6]    3.5635153    3.5385887    3.1639289    1.2938767    0.8896911
## [11]    0.6203462    0.5421585    0.4555564    0.3653231    0.2881822
## [16]    0.2460310    0.0608452
##
## Rotation (n x k) = (17 x 17):
##                      PC1           PC2           PC3           PC4
PC5
## age       -4.246045e-04 -2.912006e-03  4.956424e-03  9.987451e-01 -
3.950139e-02
## job       -4.239149e-05 -9.428562e-05  1.942221e-03 -1.024973e-02
2.329562e-02
## marital    4.852664e-06  6.422933e-05  1.188835e-04 -2.325526e-02
2.821855e-03
## education -7.959943e-06  6.824184e-05  6.082818e-04 -1.254198e-02
3.941601e-04
## default    3.520219e-07 -8.961645e-07 -2.700962e-05 -7.220405e-05
2.439469e-06
## balance   -9.999948e-01  2.548759e-03 -1.914717e-03 -4.092869e-04 -
4.280563e-05
## housing    1.056274e-05 -5.355979e-05 -1.251615e-03 -5.792159e-03 -
5.028540e-03
## loan       5.620533e-06  2.491388e-05 -1.604612e-04 -2.217435e-04 -
6.174754e-04
## contact   -6.380668e-06 -1.767771e-05 -1.582917e-05  3.934823e-03 -
4.533120e-04
## day       -6.200748e-05 -2.707441e-05  1.957619e-03  3.984299e-02
9.986654e-01
## month     -6.276130e-06  2.199981e-04  3.193290e-04  3.559813e-03 -
1.908501e-02
## duration  -2.598792e-03 -9.996194e-01  2.728678e-02 -3.048086e-03
3.242611e-05
## campaign   2.588866e-06  1.328353e-04 -6.064601e-04 -2.086764e-03
3.378175e-04
## pdays      1.842155e-03 -2.730710e-02 -9.996057e-01  4.936841e-03
1.803105e-03
## previous  -4.896757e-06 -6.450065e-05  7.051805e-04  4.906925e-04 -
1.247550e-02
## poutcome  -1.223906e-05 -5.902963e-05  2.170490e-03  3.938921e-03
1.776392e-03
## deposit   -9.891411e-06 -5.238248e-04  6.126579e-04  1.403136e-03
2.003062e-03
##                      PC6           PC7           PC8           PC9
PC10
## age        2.737720e-03 -4.094194e-03  1.126310e-02  2.530767e-03 -
```

```
2.645935e-03
## job        5.217137e-02 -1.346551e-02  9.976762e-01  4.075665e-03 -
1.999565e-02
## marital    3.248239e-03 -9.234649e-04  1.076289e-02  8.457150e-03
5.549560e-02
## education -1.833932e-03 -7.779289e-03  1.685692e-02 -8.172416e-03
9.722767e-02
## default   -1.461667e-04 -4.636890e-05 -3.480031e-04 -9.175924e-04 -
2.303227e-03
## balance   -1.458899e-06 -5.915365e-06 -4.222492e-05  1.002910e-06 -
9.458797e-06
## housing    3.360890e-03  3.814445e-03 -1.956994e-02  7.173408e-03 -
1.836577e-01
## loan       1.309510e-03  2.842910e-03 -4.556916e-03  3.558909e-03 -
5.313905e-02
## contact    2.731013e-03  3.464619e-03 -8.194125e-04  1.700987e-02
5.433453e-03
## day       -3.762026e-03  2.281801e-02 -2.254522e-02 -1.100444e-03 -
2.904097e-03
## month     -6.383772e-01  7.681530e-01  4.441887e-02 -1.630723e-03
6.467894e-03
## duration  -2.067071e-04  1.294710e-04 -1.738255e-04  1.761519e-04 -
2.102634e-04
## campaign   5.679070e-02  4.918137e-02 -5.118407e-03  9.947560e-01
5.726411e-02
## pdays      4.121407e-04  6.486906e-04  2.010121e-03 -7.780222e-04
2.400208e-03
## previous   7.657877e-01  6.377248e-01 -3.071438e-02 -7.520704e-02 -
4.317772e-03
## poutcome   6.346126e-03 -3.450397e-03  1.176863e-02 -4.720063e-02
9.427305e-01
## deposit   -3.770759e-04 -1.462520e-03  1.083661e-02 -4.534667e-02
2.416128e-01
##                   PC11          PC12          PC13          PC14
PC15
## age       -1.699538e-02  1.681716e-02 -1.219529e-02  3.553968e-03 -
7.653781e-04
## job        1.972019e-02 -1.045063e-02 -1.282740e-02  2.217497e-03 -
1.334500e-03
## marital   -2.226042e-01  9.234960e-01 -2.913212e-01  6.846313e-02 -
4.695174e-02
## education -9.536952e-01 -2.585818e-01 -9.231317e-02 -5.216874e-02
1.082018e-02
## default    4.789698e-04 -1.694041e-03 -3.332769e-03  1.111484e-04 -
1.180001e-03
## balance    1.181846e-05 -2.412944e-06 -3.649186e-06 -1.709742e-06 -
3.867727e-06
## housing    9.926429e-02 -2.451149e-01 -7.873883e-01  5.167633e-01
6.799293e-02
## loan       1.650741e-02 -6.580430e-02 -9.610790e-02 -7.508875e-02 -
```

```
9.879191e-01
## contact    3.345554e-02  6.905785e-02  1.739740e-02 -7.473439e-02
4.078329e-02
## day        1.255958e-04 -2.768063e-03 -3.813019e-03  9.118480e-04
1.947995e-04
## month     -3.603072e-03  6.768510e-04 -2.383019e-03 -2.926333e-04
9.299315e-04
## duration   6.745453e-06 -2.125360e-05 -1.890129e-04 -4.541150e-04
3.670430e-05
## campaign  -4.166354e-03 -1.137925e-02  1.694803e-02  2.906565e-02 -
3.036205e-03
## pdays     -5.009088e-04  1.635814e-04  5.404860e-04 -4.095396e-04 -
2.292124e-05
## previous  -7.194884e-03 -7.690922e-04  4.541345e-03 -3.458478e-03
2.580394e-03
## poutcome   1.517886e-01 -9.122755e-02 -2.518483e-01 -1.178571e-01 -
9.165108e-03
## deposit   -7.660063e-02  4.748179e-02  4.615303e-01  8.363955e-01 -
1.237071e-01
##                   PC16          PC17
## age       -4.072612e-03 -5.928167e-05
## job        1.325821e-03 -2.420572e-04
## marital   -4.488945e-02 -6.858862e-04
## education  4.706119e-02 -4.409779e-05
## default   -1.990184e-03 -9.999871e-01
## balance   -4.920431e-06 -2.010191e-07
## housing    6.446341e-02  3.358923e-03
## loan       4.084096e-02  1.636234e-03
## contact    9.930765e-01 -2.220491e-03
## day        5.606473e-04  3.075609e-05
## month     -8.620264e-04  3.417591e-05
## duration  -3.829409e-05  1.437035e-06
## campaign  -1.473109e-02 -1.056390e-03
## pdays     -7.049491e-05  1.887158e-05
## previous  -3.202078e-03 -6.628108e-05
## poutcome  -7.212957e-03 -1.054559e-03
## deposit    5.867760e-02 -2.051807e-03



#In the first principle component PC1 increases with balance & deposit.

#In the second principle component PC2 increases with job & duration.
```

```r
#In the third principle component PC3 increases with pdays.
```

```r
summary(bank_pca)
```

```
## Importance of components:
##                             PC1       PC2      PC3      PC4 PC5   PC6
PC7
## Standard deviation     3763.1447 282.27509 1.19e+02 12.64402 8.2 3.564
3.539
## Proportion of Variance    0.9934   0.00559 9.90e-04  0.00001 0.0 0.000
0.000
## Cumulative Proportion     0.9934   0.99899 1.00e+00  0.99999 1.0 1.000
1.000
##                           PC8   PC9   PC10   PC11   PC12   PC13   PC14
PC15
## Standard deviation     3.164 1.294 0.8897 0.6203 0.5422 0.4556 0.3653
0.2882
## Proportion of Variance 0.000 0.000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000
## Cumulative Proportion  1.000 1.000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000
##                           PC16    PC17
## Standard deviation     0.246 0.06085
## Proportion of Variance 0.000 0.00000
## Cumulative Proportion  1.000 1.00000
```

```r
(eigen_bank <- bank_pca$sdev^2)
```

```
##  [1] 1.416126e+07 7.967923e+04 1.415643e+04 1.598712e+02 6.723389e+01
##  [6] 1.269864e+01 1.252161e+01 1.001045e+01 1.674117e+00 7.915503e-01
## [11] 3.848294e-01 2.939358e-01 2.075316e-01 1.334610e-01 8.304896e-02
## [16] 6.053128e-02 3.702138e-03
```

```r
names(eigen_bank) <- paste("PC",1:17,sep="")
eigen_bank
```

```
##          PC1          PC2          PC3          PC4          PC5
PC6
## 1.416126e+07 7.967923e+04 1.415643e+04 1.598712e+02 6.723389e+01
1.269864e+01
##          PC7          PC8          PC9         PC10         PC11
PC12
## 1.252161e+01 1.001045e+01 1.674117e+00 7.915503e-01 3.848294e-01
2.939358e-01
##         PC13         PC14         PC15         PC16         PC17
## 2.075316e-01 1.334610e-01 8.304896e-02 6.053128e-02 3.702138e-03
```

```
sumlambdas <- sum(eigen_bank)
sumlambdas

## [1] 14255360

propvar <- eigen_bank/sumlambdas
propvar

##          PC1          PC2          PC3          PC4          PC5
PC6
## 9.933989e-01 5.589422e-03 9.930599e-04 1.121481e-05 4.716394e-06
8.907977e-07
##          PC7          PC8          PC9         PC10         PC11
PC12
## 8.783791e-07 7.022233e-07 1.174377e-07 5.552651e-08 2.699542e-08
2.061932e-08
##         PC13         PC14         PC15         PC16         PC17
## 1.455815e-08 9.362162e-09 5.825806e-09 4.246212e-09 2.597015e-10

cumvar_bank <- cumsum(propvar)
cumvar_bank

##       PC1       PC2       PC3       PC4       PC5       PC6       PC7
PC8
## 0.9933989 0.9989883 0.9999813 0.9999926 0.9999973 0.9999982 0.9999990
0.9999997
##       PC9      PC10      PC11      PC12      PC13      PC14      PC15
PC16
## 0.9999999 0.9999999 0.9999999 1.0000000 1.0000000 1.0000000 1.0000000
1.0000000
##      PC17
## 1.0000000

matlambdas <- rbind(eigen_bank,propvar,cumvar_bank)
rownames(matlambdas) <- c("Eigenvalues","Prop. variance","Cum. prop.
variance")
round(matlambdas,4)

##                              PC1        PC2       PC3      PC4     PC5
PC6
## Eigenvalues         1.416126e+07 79679.2273 14156.426 159.8712 67.2339
12.6986
## Prop. variance      9.934000e-01     0.0056     0.001   0.0000  0.0000
0.0000
## Cum. prop. variance 9.934000e-01     0.9990     1.000   1.0000  1.0000
1.0000
##                         PC7     PC8    PC9   PC10   PC11   PC12   PC13
PC14
## Eigenvalues         12.5216 10.0104 1.6741 0.7916 0.3848 0.2939 0.2075
0.1335
## Prop. variance       0.0000  0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
```

```
0.0000
## Cum. prop. variance  1.0000  1.0000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000
##                        PC15   PC16   PC17
## Eigenvalues           0.083 0.0605 0.0037
## Prop. variance        0.000 0.0000 0.0000
## Cum. prop. variance 1.000 1.0000 1.0000
```

```
summary(bank_pca)
```

```
## Importance of components:
##                              PC1       PC2      PC3      PC4 PC5   PC6
PC7
## Standard deviation     3763.1447 282.27509 1.19e+02 12.64402 8.2 3.564
3.539
## Proportion of Variance    0.9934   0.00559 9.90e-04  0.00001 0.0 0.000
0.000
## Cumulative Proportion     0.9934   0.99899 1.00e+00  0.99999 1.0 1.000
1.000
##                           PC8   PC9   PC10   PC11   PC12   PC13   PC14
PC15
## Standard deviation     3.164 1.294 0.8897 0.6203 0.5422 0.4556 0.3653
0.2882
## Proportion of Variance 0.000 0.000 0.0000 0.0000 0.0000 0.0000 0.0000
0.0000
## Cumulative Proportion  1.000 1.000 1.0000 1.0000 1.0000 1.0000 1.0000
1.0000
##                          PC16    PC17
## Standard deviation     0.246 0.06085
## Proportion of Variance 0.000 0.00000
## Cumulative Proportion  1.000 1.00000
```

```
bank_pca$rotation
```

```
##                      PC1           PC2           PC3           PC4
PC5
## age       -4.246045e-04 -2.912006e-03  4.956424e-03  9.987451e-01 -
3.950139e-02
## job       -4.239149e-05 -9.428562e-05  1.942221e-03 -1.024973e-02
2.329562e-02
## marital    4.852664e-06  6.422933e-05  1.188835e-04 -2.325526e-02
2.821855e-03
## education -7.959943e-06  6.824184e-05  6.082818e-04 -1.254198e-02
3.941601e-04
## default    3.520219e-07 -8.961645e-07 -2.700962e-05 -7.220405e-05
2.439469e-06
## balance   -9.999948e-01  2.548759e-03 -1.914717e-03 -4.092869e-04 -
4.280563e-05
## housing    1.056274e-05 -5.355979e-05 -1.251615e-03 -5.792159e-03 -
5.028540e-03
## loan       5.620533e-06  2.491388e-05 -1.604612e-04 -2.217435e-04 -
```

```
6.174754e-04
## contact   -6.380668e-06 -1.767771e-05 -1.582917e-05  3.934823e-03 -
4.533120e-04
## day       -6.200748e-05 -2.707441e-05  1.957619e-03  3.984299e-02
9.986654e-01
## month     -6.276130e-06  2.199981e-04  3.193290e-04  3.559813e-03 -
1.908501e-02
## duration  -2.598792e-03 -9.996194e-01  2.728678e-02 -3.048086e-03
3.242611e-05
## campaign   2.588866e-06  1.328353e-04 -6.064601e-04 -2.086764e-03
3.378175e-04
## pdays      1.842155e-03 -2.730710e-02 -9.996057e-01  4.936841e-03
1.803105e-03
## previous  -4.896757e-06 -6.450065e-05  7.051805e-04  4.906925e-04 -
1.247550e-02
## poutcome  -1.223906e-05 -5.902963e-05  2.170490e-03  3.938921e-03
1.776392e-03
## deposit   -9.891411e-06 -5.238248e-04  6.126579e-04  1.403136e-03
2.003062e-03
##                    PC6           PC7           PC8           PC9
PC10
## age        2.737720e-03 -4.094194e-03  1.126310e-02  2.530767e-03 -
2.645935e-03
## job        5.217137e-02 -1.346551e-02  9.976762e-01  4.075665e-03 -
1.999565e-02
## marital    3.248239e-03 -9.234649e-04  1.076289e-02  8.457150e-03
5.549560e-02
## education -1.833932e-03 -7.779289e-03  1.685692e-02 -8.172416e-03
9.722767e-02
## default   -1.461667e-04 -4.636890e-05 -3.480031e-04 -9.175924e-04 -
2.303227e-03
## balance   -1.458899e-06 -5.915365e-06 -4.222492e-05  1.002910e-06 -
9.458797e-06
## housing    3.360890e-03  3.814445e-03 -1.956994e-02  7.173408e-03 -
1.836577e-01
## loan       1.309510e-03  2.842910e-03 -4.556916e-03  3.558909e-03 -
5.313905e-02
## contact    2.731013e-03  3.464619e-03 -8.194125e-04  1.700987e-02
5.433453e-03
## day       -3.762026e-03  2.281801e-02 -2.254522e-02 -1.100444e-03 -
2.904097e-03
## month     -6.383772e-01  7.681530e-01  4.441887e-02 -1.630723e-03
6.467894e-03
## duration  -2.067071e-04  1.294710e-04 -1.738255e-04  1.761519e-04 -
2.102634e-04
## campaign   5.679070e-02  4.918137e-02 -5.118407e-03  9.947560e-01
5.726411e-02
## pdays      4.121407e-04  6.486906e-04  2.010121e-03 -7.780222e-04
2.400208e-03
## previous   7.657877e-01  6.377248e-01 -3.071438e-02 -7.520704e-02 -
```

```
4.317772e-03
## poutcome   6.346126e-03 -3.450397e-03  1.176863e-02 -4.720063e-02
9.427305e-01
## deposit   -3.770759e-04 -1.462520e-03  1.083661e-02 -4.534667e-02
2.416128e-01
##                   PC11          PC12          PC13          PC14
PC15
## age       -1.699538e-02  1.681716e-02 -1.219529e-02  3.553968e-03 -
7.653781e-04
## job        1.972019e-02 -1.045063e-02 -1.282740e-02  2.217497e-03 -
1.334500e-03
## marital   -2.226042e-01  9.234960e-01 -2.913212e-01  6.846313e-02 -
4.695174e-02
## education -9.536952e-01 -2.585818e-01 -9.231317e-02 -5.216874e-02
1.082018e-02
## default    4.789698e-04 -1.694041e-03 -3.332769e-03  1.111484e-04 -
1.180001e-03
## balance    1.181846e-05 -2.412944e-06 -3.649186e-06 -1.709742e-06 -
3.867727e-06
## housing    9.926429e-02 -2.451149e-01 -7.873883e-01  5.167633e-01
6.799293e-02
## loan       1.650741e-02 -6.580430e-02 -9.610790e-02 -7.508875e-02 -
9.879191e-01
## contact    3.345554e-02  6.905785e-02  1.739740e-02 -7.473439e-02
4.078329e-02
## day        1.255958e-04 -2.768063e-03 -3.813019e-03  9.118480e-04
1.947995e-04
## month     -3.603072e-03  6.768510e-04 -2.383019e-03 -2.926333e-04
9.299315e-04
## duration   6.745453e-06 -2.125360e-05 -1.890129e-04 -4.541150e-04
3.670430e-05
## campaign  -4.166354e-03 -1.137925e-02  1.694803e-02  2.906565e-02 -
3.036205e-03
## pdays     -5.009088e-04  1.635814e-04  5.404860e-04 -4.095396e-04 -
2.292124e-05
## previous  -7.194884e-03 -7.690922e-04  4.541345e-03 -3.458478e-03
2.580394e-03
## poutcome   1.517886e-01 -9.122755e-02 -2.518483e-01 -1.178571e-01 -
9.165108e-03
## deposit   -7.660063e-02  4.748179e-02  4.615303e-01  8.363955e-01 -
1.237071e-01
##                   PC16          PC17
## age       -4.072612e-03 -5.928167e-05
## job        1.325821e-03 -2.420572e-04
## marital   -4.488945e-02 -6.858862e-04
## education  4.706119e-02 -4.409779e-05
## default   -1.990184e-03 -9.999871e-01
## balance   -4.920431e-06 -2.010191e-07
## housing    6.446341e-02  3.358923e-03
## loan       4.084096e-02  1.636234e-03
```

```
## contact    9.930765e-01 -2.220491e-03
## day        5.606473e-04  3.075609e-05
## month     -8.620264e-04  3.417591e-05
## duration  -3.829409e-05  1.437035e-06
## campaign  -1.473109e-02 -1.056390e-03
## pdays     -7.049491e-05  1.887158e-05
## previous  -3.202078e-03 -6.628108e-05
## poutcome  -7.212957e-03 -1.054559e-03
## deposit    5.867760e-02 -2.051807e-03

print(bank_pca)

## Standard deviations (1, .., p=17):
##  [1] 3763.1447099  282.2750915  118.9807804   12.6440167    8.1996276
##  [6]    3.5635153    3.5385887    3.1639289    1.2938767    0.8896911
## [11]    0.6203462    0.5421585    0.4555564    0.3653231    0.2881822
## [16]    0.2460310    0.0608452
##
## Rotation (n x k) = (17 x 17):
##                      PC1           PC2           PC3           PC4
PC5
## age       -4.246045e-04 -2.912006e-03  4.956424e-03  9.987451e-01 -
3.950139e-02
## job       -4.239149e-05 -9.428562e-05  1.942221e-03 -1.024973e-02
2.329562e-02
## marital    4.852664e-06  6.422933e-05  1.188835e-04 -2.325526e-02
2.821855e-03
## education -7.959943e-06  6.824184e-05  6.082818e-04 -1.254198e-02
3.941601e-04
## default    3.520219e-07 -8.961645e-07 -2.700962e-05 -7.220405e-05
2.439469e-06
## balance   -9.999948e-01  2.548759e-03 -1.914717e-03 -4.092869e-04 -
4.280563e-05
## housing    1.056274e-05 -5.355979e-05 -1.251615e-03 -5.792159e-03 -
5.028540e-03
## loan       5.620533e-06  2.491388e-05 -1.604612e-04 -2.217435e-04 -
6.174754e-04
## contact   -6.380668e-06 -1.767771e-05 -1.582917e-05  3.934823e-03 -
4.533120e-04
## day       -6.200748e-05 -2.707441e-05  1.957619e-03  3.984299e-02
9.986654e-01
## month     -6.276130e-06  2.199981e-04  3.193290e-04  3.559813e-03 -
1.908501e-02
## duration  -2.598792e-03 -9.996194e-01  2.728678e-02 -3.048086e-03
3.242611e-05
## campaign   2.588866e-06  1.328353e-04 -6.064601e-04 -2.086764e-03
3.378175e-04
## pdays      1.842155e-03 -2.730710e-02 -9.996057e-01  4.936841e-03
1.803105e-03
## previous  -4.896757e-06 -6.450065e-05  7.051805e-04  4.906925e-04 -
```

```
1.247550e-02
## poutcome  -1.223906e-05 -5.902963e-05  2.170490e-03  3.938921e-03
1.776392e-03
## deposit   -9.891411e-06 -5.238248e-04  6.126579e-04  1.403136e-03
2.003062e-03
##                    PC6           PC7           PC8           PC9
PC10
## age        2.737720e-03 -4.094194e-03  1.126310e-02  2.530767e-03 -
2.645935e-03
## job        5.217137e-02 -1.346551e-02  9.976762e-01  4.075665e-03 -
1.999565e-02
## marital    3.248239e-03 -9.234649e-04  1.076289e-02  8.457150e-03
5.549560e-02
## education -1.833932e-03 -7.779289e-03  1.685692e-02 -8.172416e-03
9.722767e-02
## default   -1.461667e-04 -4.636890e-05 -3.480031e-04 -9.175924e-04 -
2.303227e-03
## balance   -1.458899e-06 -5.915365e-06 -4.222492e-05  1.002910e-06 -
9.458797e-06
## housing    3.360890e-03  3.814445e-03 -1.956994e-02  7.173408e-03 -
1.836577e-01
## loan       1.309510e-03  2.842910e-03 -4.556916e-03  3.558909e-03 -
5.313905e-02
## contact    2.731013e-03  3.464619e-03 -8.194125e-04  1.700987e-02
5.433453e-03
## day       -3.762026e-03  2.281801e-02 -2.254522e-02 -1.100444e-03 -
2.904097e-03
## month     -6.383772e-01  7.681530e-01  4.441887e-02 -1.630723e-03
6.467894e-03
## duration  -2.067071e-04  1.294710e-04 -1.738255e-04  1.761519e-04 -
2.102634e-04
## campaign   5.679070e-02  4.918137e-02 -5.118407e-03  9.947560e-01
5.726411e-02
## pdays      4.121407e-04  6.486906e-04  2.010121e-03 -7.780222e-04
2.400208e-03
## previous   7.657877e-01  6.377248e-01 -3.071438e-02 -7.520704e-02 -
4.317772e-03
## poutcome   6.346126e-03 -3.450397e-03  1.176863e-02 -4.720063e-02
9.427305e-01
## deposit   -3.770759e-04 -1.462520e-03  1.083661e-02 -4.534667e-02
2.416128e-01
##                   PC11          PC12          PC13          PC14
PC15
## age       -1.699538e-02  1.681716e-02 -1.219529e-02  3.553968e-03 -
7.653781e-04
## job        1.972019e-02 -1.045063e-02 -1.282740e-02  2.217497e-03 -
1.334500e-03
## marital   -2.226042e-01  9.234960e-01 -2.913212e-01  6.846313e-02 -
4.695174e-02
## education -9.536952e-01 -2.585818e-01 -9.231317e-02 -5.216874e-02
```

```
1.082018e-02
## default    4.789698e-04 -1.694041e-03 -3.332769e-03  1.111484e-04 -
1.180001e-03
## balance    1.181846e-05 -2.412944e-06 -3.649186e-06 -1.709742e-06 -
3.867727e-06
## housing    9.926429e-02 -2.451149e-01 -7.873883e-01  5.167633e-01
6.799293e-02
## loan       1.650741e-02 -6.580430e-02 -9.610790e-02 -7.508875e-02 -
9.879191e-01
## contact    3.345554e-02  6.905785e-02  1.739740e-02 -7.473439e-02
4.078329e-02
## day        1.255958e-04 -2.768063e-03 -3.813019e-03  9.118480e-04
1.947995e-04
## month     -3.603072e-03  6.768510e-04 -2.383019e-03 -2.926333e-04
9.299315e-04
## duration   6.745453e-06 -2.125360e-05 -1.890129e-04 -4.541150e-04
3.670430e-05
## campaign  -4.166354e-03 -1.137925e-02  1.694803e-02  2.906565e-02 -
3.036205e-03
## pdays     -5.009088e-04  1.635814e-04  5.404860e-04 -4.095396e-04 -
2.292124e-05
## previous  -7.194884e-03 -7.690922e-04  4.541345e-03 -3.458478e-03
2.580394e-03
## poutcome   1.517886e-01 -9.122755e-02 -2.518483e-01 -1.178571e-01 -
9.165108e-03
## deposit   -7.660063e-02  4.748179e-02  4.615303e-01  8.363955e-01 -
1.237071e-01
##                    PC16          PC17
## age       -4.072612e-03 -5.928167e-05
## job        1.325821e-03 -2.420572e-04
## marital   -4.488945e-02 -6.858862e-04
## education  4.706119e-02 -4.409779e-05
## default   -1.990184e-03 -9.999871e-01
## balance   -4.920431e-06 -2.010191e-07
## housing    6.446341e-02  3.358923e-03
## loan       4.084096e-02  1.636234e-03
## contact    9.930765e-01 -2.220491e-03
## day        5.606473e-04  3.075609e-05
## month     -8.620264e-04  3.417591e-05
## duration  -3.829409e-05  1.437035e-06
## campaign  -1.473109e-02 -1.056390e-03
## pdays     -7.049491e-05  1.887158e-05
## previous  -3.202078e-03 -6.628108e-05
## poutcome  -7.212957e-03 -1.054559e-03
## deposit    5.867760e-02 -2.051807e-03

# Sample scores stored in bank_pca$x
head(bank_pca$x)
```

```
##          PC1       PC2       PC3        PC4      PC5       PC6      PC7
## 1  2038.7297 -174.5448  46.28534  0.9264348 6.396723 -4.854070 2.018462
## 2 -1651.4114  211.7933 103.92498 -8.8509176 6.568509 -2.185831 3.756719
## 3  -478.7780 -739.5100  73.12920  8.8608344 1.990894 -3.987521 1.124221
## 4 -3325.0272 -851.7383  49.85970 -8.5836204 2.589596 -1.552868 3.079730
## 5  1010.3145 -303.7906  87.94006  2.7352004 2.226164 -3.326674 1.789015
## 6   297.5714 -247.4921  29.02191 -8.1121500 3.787292 -4.035359 1.156709
##          PC8        PC9        PC10        PC11        PC12        PC13
## 1 -4.4538872 -0.6815554 -0.03817750  0.09817847  0.69427832 -0.60371164
## 2  2.0769336 -0.8702427 -1.24845327  0.50056240 -0.31220664  0.08602984
## 3  0.5040122  0.3916081  0.92850510 -0.67815691 -0.22625920 -0.08009977
## 4  4.0637551  0.2590223 -1.28997896  0.42436663 -0.34948281 -0.13556708
## 5 -2.5638893  0.3299100 -0.98171062  0.04955084  0.05401371  0.63582297
## 6 -0.5625735 -0.7064466  0.05593032 -0.67432870  0.26051033 -0.56949897
##           PC14        PC15        PC16          PC17
## 1  0.398994321 -0.87321063  0.98445605  6.188665e-03
## 2  0.691336297  0.14979260  1.03353162  2.236950e-03
## 3 -0.388045634  0.04633247 -0.11662453 -6.047163e-05
## 4  0.290725718  0.12936358 -0.04397848  5.228311e-03
## 5 -0.002064658 -0.93117757 -0.05719290  4.078462e-03
## 6  0.430147907  0.07974183  0.02202101  6.171027e-03
```

```
# Identifying the scores by their deposit status
deposit_pca <- cbind(data.frame(bank),bank_pca$x)
head(deposit_pca)
```

```
##   age job marital education default balance housing loan contact day month
## 1  42   1       2         1       0    -247       1    1       1  21    11
## 2  33   8       1         1       0    3444       1    0       1  21    11
## 3  53   6       1         2       0    2269       0    0       0  17    10
## 4  37  10       1         1       0    5115       1    0       0  17    10
## 5  45   3       1         1       0     781       0    1       0  17    10
## 6  34   5       2         2       0    1494       1    0       0  18    10
##   duration campaign pdays previous poutcome deposit        PC1       PC2
## 1      519        1   166        1        1       1  2038.7297 -174.5448
## 2      144        1    91        4        0       1 -1651.4114  211.7933
## 3     1091        2   150        1        2       1  -478.7780 -739.5100
## 4     1210        2   171        4        0       1 -3325.0272 -851.7383
## 5      652        2   126        2        0       1  1010.3145 -303.7906
## 6      596        1   182        1        1       1   297.5714 -247.4921
##         PC3        PC4      PC5       PC6      PC7        PC8        PC9
## 1  46.28534  0.9264348 6.396723 -4.854070 2.018462 -4.4538872 -0.6815554
## 2 103.92498 -8.8509176 6.568509 -2.185831 3.756719  2.0769336 -0.8702427
## 3  73.12920  8.8608344 1.990894 -3.987521 1.124221  0.5040122  0.3916081
## 4  49.85970 -8.5836204 2.589596 -1.552868 3.079730  4.0637551  0.2590223
## 5  87.94006  2.7352004 2.226164 -3.326674 1.789015 -2.5638893  0.3299100
## 6  29.02191 -8.1121500 3.787292 -4.035359 1.156709 -0.5625735 -0.7064466
##          PC10        PC11        PC12        PC13         PC14        PC15
## 1 -0.03817750  0.09817847  0.69427832 -0.60371164  0.398994321 -0.87321063
## 2 -1.24845327  0.50056240 -0.31220664  0.08602984  0.691336297  0.14979260
```

```
## 3  0.92850510 -0.67815691 -0.22625920 -0.08009977 -0.388045634  0.04633247
## 4 -1.28997896  0.42436663 -0.34948281 -0.13556708  0.290725718  0.12936358
## 5 -0.98171062  0.04955084  0.05401371  0.63582297 -0.002064658 -0.93117757
## 6  0.05593032 -0.67432870  0.26051033 -0.56949897  0.430147907  0.07974183
##          PC16          PC17
## 1  0.98445605  6.188665e-03
## 2  1.03353162  2.236950e-03
## 3 -0.11662453 -6.047163e-05
## 4 -0.04397848  5.228311e-03
## 5 -0.05719290  4.078462e-03
## 6  0.02202101  6.171027e-03

# Means of scores for all the PC's classified by Deposit status
tabmeansPC <-
aggregate(deposit_pca[,1:17],by=list(deposit=bank$deposit),mean)
tabmeansPC

##   deposit      age      job  marital education     default  balance
housing
## 1       0 40.17998 5.169854 1.242970  1.194601 0.006749156 1371.298
0.6827897
## 2       1 42.17693 5.755319 1.258679  1.338186 0.002239642 2001.788
0.3471445
##         loan    contact      day    month duration campaign    pdays
previous
## 1 0.16760405 0.07649044 13.93813 6.740157 221.2587 2.118110 227.1575
3.314961
## 2 0.06382979 0.06886898 14.68869 6.684770 411.9222 1.788914 192.0817
3.289474
##    poutcome deposit
## 1 0.4353206       0
## 2 1.1847704       1

tabmeansPC <- tabmeansPC[rev(order(tabmeansPC$deposit)),]
tabmeansPC

##   deposit      age      job  marital education     default  balance
housing
## 2       1 42.17693 5.755319 1.258679  1.338186 0.002239642 2001.788
0.3471445
## 1       0 40.17998 5.169854 1.242970  1.194601 0.006749156 1371.298
0.6827897
##         loan    contact      day    month duration campaign    pdays
previous
## 2 0.06382979 0.06886898 14.68869 6.684770 411.9222 1.788914 192.0817
3.289474
## 1 0.16760405 0.07649044 13.93813 6.740157 221.2587 2.118110 227.1575
3.314961
##    poutcome deposit
## 2 1.1847704       1
## 1 0.4353206       0
```

```r
tabfmeans <- t(tabmeansPC)
tabfmeans
```

```
##                         2            1
## deposit   1.000000e+00 0.000000e+00
## age       4.217693e+01 4.017998e+01
## job       5.755319e+00 5.169854e+00
## marital   1.258679e+00 1.242970e+00
## education 1.338186e+00 1.194601e+00
## default   2.239642e-03 6.749156e-03
## balance   2.001788e+03 1.371298e+03
## housing   3.471445e-01 6.827897e-01
## loan      6.382979e-02 1.676040e-01
## contact   6.886898e-02 7.649044e-02
## day       1.468869e+01 1.393813e+01
## month     6.684770e+00 6.740157e+00
## duration  4.119222e+02 2.212587e+02
## campaign  1.788914e+00 2.118110e+00
## pdays     1.920817e+02 2.271575e+02
## previous  3.289474e+00 3.314961e+00
## poutcome  1.184770e+00 4.353206e-01
## deposit   1.000000e+00 0.000000e+00
```

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

```
##                         1            0
## deposit   1.000000e+00 0.000000e+00
## age       4.217693e+01 4.017998e+01
## job       5.755319e+00 5.169854e+00
## marital   1.258679e+00 1.242970e+00
## education 1.338186e+00 1.194601e+00
## default   2.239642e-03 6.749156e-03
## balance   2.001788e+03 1.371298e+03
## housing   3.471445e-01 6.827897e-01
## loan      6.382979e-02 1.676040e-01
## contact   6.886898e-02 7.649044e-02
## day       1.468869e+01 1.393813e+01
## month     6.684770e+00 6.740157e+00
## duration  4.119222e+02 2.212587e+02
## campaign  1.788914e+00 2.118110e+00
## pdays     1.920817e+02 2.271575e+02
## previous  3.289474e+00 3.314961e+00
## poutcome  1.184770e+00 4.353206e-01
## deposit   1.000000e+00 0.000000e+00
```

```r
# Standard deviations of scores for all the PC's classified by Deposit status
tabsdsPC <- aggregate(deposit_pca[,1:17],by=list(deposit=bank$deposit),sd)
tabfsds <- t(tabsdsPC)
colnames(tabfsds) <- t(as.vector(tabsdsPC[1]))
tabfsds
```

```
##                      0            1
## deposit   0.000000e+00 1.000000e+00
## age       1.059594e+01 1.368321e+01
## job       3.285128e+00 3.114264e+00
## marital   6.091629e-01 6.201520e-01
## education 6.307922e-01 6.454910e-01
## default   8.192164e-02 4.728507e-02
## balance   2.679136e+03 4.184606e+03
## housing   4.656521e-01 4.761955e-01
## loan      3.737246e-01 2.445179e-01
## contact   2.659308e-01 2.533021e-01
## day       7.794777e+00 8.402244e+00
## month     3.405906e+00 3.623107e+00
## duration  2.110567e+02 2.918606e+02
## campaign  1.552605e+00 1.169984e+00
## pdays     1.083380e+02 1.228946e+02
## previous  3.792746e+00 3.418138e+00
## poutcome  6.614642e-01 8.972494e-01
## deposit   0.000000e+00 0.000000e+00

#T-test
t.test(PC1~bank$deposit,data=deposit_pca)

##
##  Welch Two Sample t-test
##
## data:  PC1 by bank$deposit
## t = 4.7195, df = 2511.6, p-value = 2.494e-06
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  368.8524 893.2426
## sample estimates:
## mean in group 0 mean in group 1
##        421.3274       -209.7201

t.test(PC2~bank$deposit,data=deposit_pca)

##
##  Welch Two Sample t-test
##
## data:  PC2 by bank$deposit
## t = 19.004, df = 2335.9, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  168.6299 207.4353
## sample estimates:
## mean in group 0 mean in group 1
##       125.54251       -62.49008

t.test(PC3~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC3 by bank$deposit
## t = -8.433, df = 1977.4, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -48.15945 -29.98599
## sample estimates:
## mean in group 0 mean in group 1
##       -26.08743        12.98529
```

```
t.test(PC4~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC4 by bank$deposit
## t = -2.1128, df = 2197.9, p-value = 0.03473
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.9485801 -0.0725848
## sample estimates:
## mean in group 0 mean in group 1
##      -0.6747291       0.3358534
```

```
t.test(PC5~bank$deposit,data=deposit_pca
```

```
##
##  Welch Two Sample t-test
##
## data:  PC5 by bank$deposit
## t = -1.8501, df = 1898.7, p-value = 0.06446
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.24987229  0.03644258
## sample estimates:
## mean in group 0 mean in group 1
##      -0.4050814       0.2016335
```

```
t.test(PC6~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC6 by bank$deposit
## t = 0.14495, df = 1695.3, p-value = 0.8848
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2703148  0.3134585
## sample estimates:
```

```
## mean in group 0 mean in group 1
##     0.014402757    -0.007169121


#From this we understand that  pc6 i.e balance is correlated with deposit


t.test(PC7~bank$deposit,data=deposit_pca)

##
##  Welch Two Sample t-test
##
## data:  PC7 by bank$deposit
## t = 0.56708, df = 1766.3, p-value = 0.5707
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2028393  0.3678432
## sample estimates:
## mean in group 0 mean in group 1
##      0.05508353     -0.02741840

t.test(PC8~bank$deposit,data=deposit_pca)

##
##  Welch Two Sample t-test
##
## data:  PC8 by bank$deposit
## t = -3.7194, df = 1708.4, p-value = 0.0002062
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.7464183 -0.2309960
## sample estimates:
## mean in group 0 mean in group 1
##      -0.3262920       0.1624152

t.test(PC9~bank$deposit,data=deposit_pca)

##
##  Welch Two Sample t-test
##
## data:  PC9 by bank$deposit
## t = 5.9939, df = 1450.1, p-value = 2.581e-09
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.2300789 0.4539322
## sample estimates:
## mean in group 0 mean in group 1
##       0.2283446      -0.1136609

t.test(PC10~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC10 by bank$deposit
## t = -28.956, df = 2237.9, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.9199395 -0.8032398
## sample estimates:
## mean in group 0 mean in group 1
##      -0.5752520       0.2863377
```

```
t.test(PC11~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC11 by bank$deposit
## t = 5.3057, df = 1832.1, p-value = 1.259e-07
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.08371071 0.18189204
## sample estimates:
## mean in group 0 mean in group 1
##      0.08866664     -0.04413474
```

```
t.test(PC12~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC12 by bank$deposit
## t = -2.8003, df = 1726, p-value = 0.005163
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.10691431 -0.01883674
## sample estimates:
## mean in group 0 mean in group 1
##     -0.04197970      0.02089583
```

```
t.test(PC13~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC13 by bank$deposit
## t = -26.359, df = 1881.4, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.4636115 -0.3993998
## sample estimates:
```

```
## mean in group 0 mean in group 1
##      -0.2881006       0.1434051
```

```
t.test(PC14~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC14 by bank$deposit
## t = -43.965, df = 1764.3, p-value < 2.2e-16
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.5253181 -0.4804502
## sample estimates:
## mean in group 0 mean in group 1
##      -0.3357574       0.1671267
```

```
t.test(PC15~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC15 by bank$deposit
## t = 3.4222, df = 1273.8, p-value = 0.0006408
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  0.01975106 0.07281696
## sample estimates:
## mean in group 0 mean in group 1
##      0.03090214     -0.01538186
```

```
t.test(PC16~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC16 by bank$deposit
## t = -1.5578, df = 1694.6, p-value = 0.1195
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.036147405  0.004144888
## sample estimates:
## mean in group 0 mean in group 1
##    -0.010683457     0.005317801
```

```
t.test(PC17~bank$deposit,data=deposit_pca)
```

```
##
##  Welch Two Sample t-test
##
## data:  PC17 by bank$deposit
## t = 0.011557, df = 1189.1, p-value = 0.9908
```

```
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.005774998  0.005843440
## sample estimates:
## mean in group 0 mean in group 1
##    2.284803e-05   -1.137284e-05

#F-test
var.test(PC1~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC1 by bank$deposit
## F = 0.40991, num df = 888, denom df = 1785, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.3661926 0.4598624
## sample estimates:
## ratio of variances
##          0.4099112

var.test(PC2~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC2 by bank$deposit
## F = 0.52045, num df = 888, denom df = 1785, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.4649459 0.5838762
## sample estimates:
## ratio of variances
##          0.5204543

var.test(PC3~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC3 by bank$deposit
## F = 0.78373, num df = 888, denom df = 1785, p-value = 3.659e-05
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7001421 0.8792342
## sample estimates:
## ratio of variances
##          0.7837299

var.test(PC4~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC4 by bank$deposit
## F = 0.61135, num df = 888, denom df = 1785, p-value = 2.319e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5461510 0.6858531
## sample estimates:
## ratio of variances
##          0.6113543
```

```
var.test(PC5~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC5 by bank$deposit
## F = 0.85856, num df = 888, denom df = 1785, p-value = 0.009442
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7669902 0.9631817
## sample estimates:
## ratio of variances
##          0.8585589
```

```
var.test(PC6~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC6 by bank$deposit
## F = 1.1074, num df = 888, denom df = 1785, p-value = 0.07623
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.9893215 1.2423840
## sample estimates:
## ratio of variances
##           1.107434
```

```
var.test(PC8~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC8 by bank$deposit
## F = 1.0882, num df = 888, denom df = 1785, p-value = 0.1421
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.9721163 1.2207778
## sample estimates:
```

```
## ratio of variances
##           1.088174

var.test(PC9~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC9 by bank$deposit
## F = 1.6182, num df = 888, denom df = 1785, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  1.445626 1.815408
## sample estimates:
## ratio of variances
##           1.618215

var.test(PC10~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC10 by bank$deposit
## F = 0.58408, num df = 888, denom df = 1785, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.5217849 0.6552544
## sample estimates:
## ratio of variances
##           0.5840792

var.test(PC11~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC11 by bank$deposit
## F = 0.92978, num df = 888, denom df = 1785, p-value = 0.2143
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.8306137 1.0430797
## sample estimates:
## ratio of variances
##           0.9297781

var.test(PC12~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC12 by bank$deposit
## F = 1.0631, num df = 888, denom df = 1785, p-value = 0.2878
```

```
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.9496915 1.1926169
## sample estimates:
## ratio of variances
##           1.063072
```

```
var.test(PC13~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC13 by bank$deposit
## F = 0.87623, num df = 888, denom df = 1785, p-value = 0.0244
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.7827763 0.9830057
## sample estimates:
## ratio of variances
##          0.8762296
```

```
var.test(PC14~bank$deposit,data=deposit_pca)
```

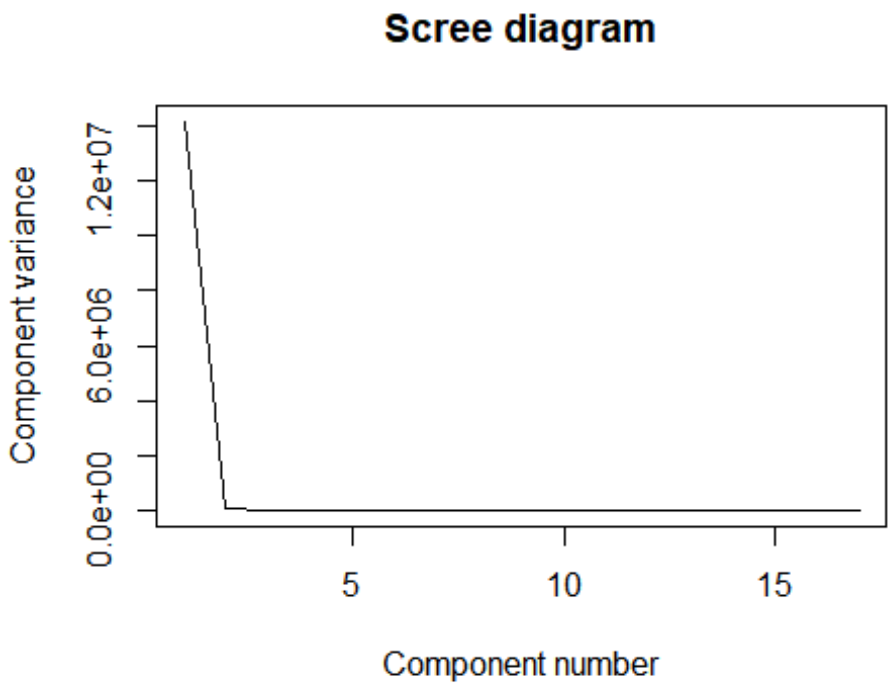
```
##
##  F test to compare two variances
##
## data:  PC14 by bank$deposit
## F = 1.0117, num df = 888, denom df = 1785, p-value = 0.8364
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.903775 1.134955
## sample estimates:
## ratio of variances
##           1.011674
```

```
#From this we understand that  pc14 i.e pdays is correlated with deposit
```

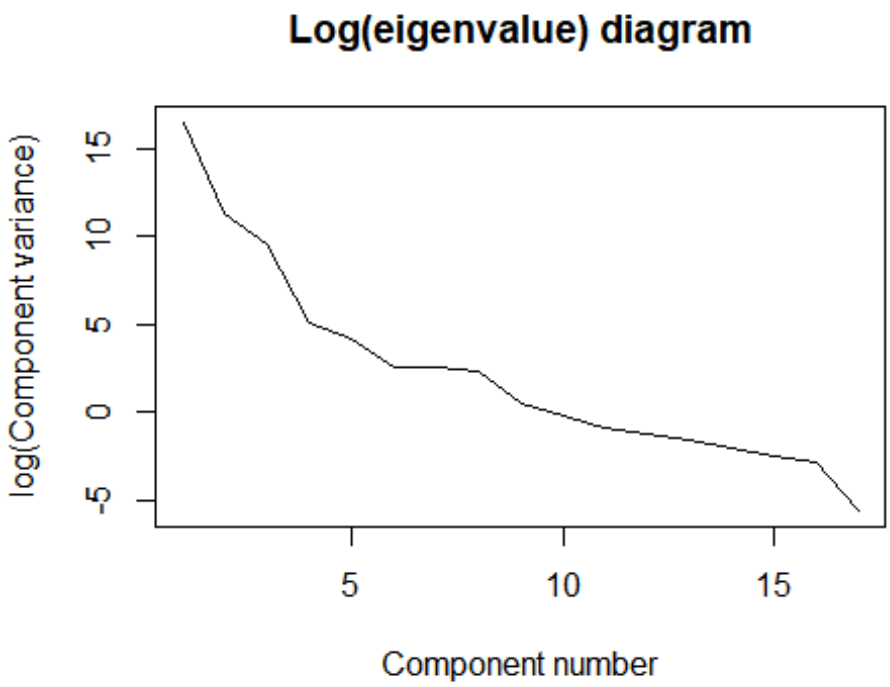
```
var.test(PC15~bank$deposit,data=deposit_pca)
```

```
##
##  F test to compare two variances
##
## data:  PC15 by bank$deposit
## F = 2.3606, num df = 888, denom df = 1785, p-value < 2.2e-16
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  2.108825 2.648250
## sample estimates:
```

```
## ratio of variances
##           2.360591

var.test(PC16~bank$deposit,data=deposit_pca)

##
##  F test to compare two variances
##
## data:  PC16 by bank$deposit
## F = 1.1085, num df = 888, denom df = 1785, p-value = 0.07354
## alternative hypothesis: true ratio of variances is not equal to 1
## 95 percent confidence interval:
##  0.9902556 1.2435570
## sample estimates:
## ratio of variances
##           1.108479

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

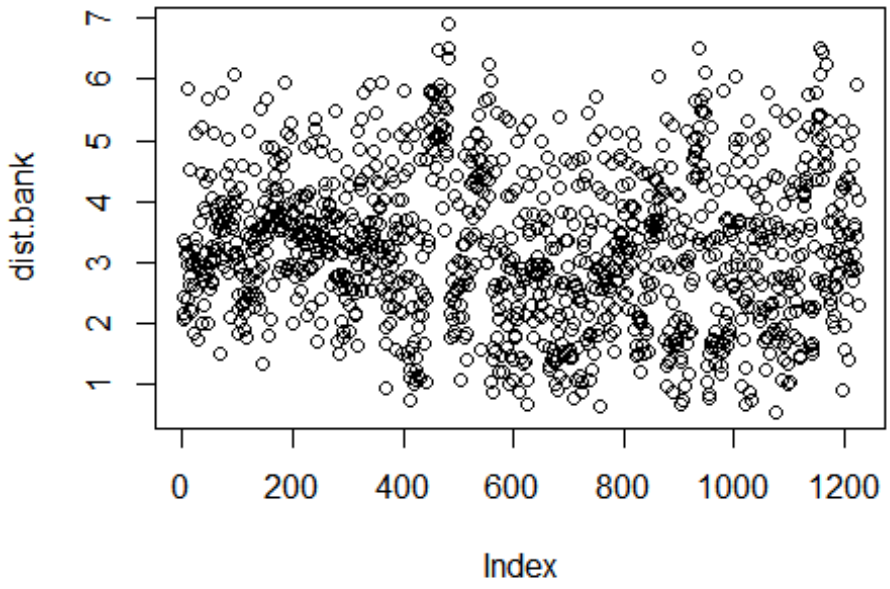



```
plot(log(eigen_bank), xlab = "Component number",ylab = "log(Component
variance)", type="l",main = "Log(eigenvalue) diagram")
```

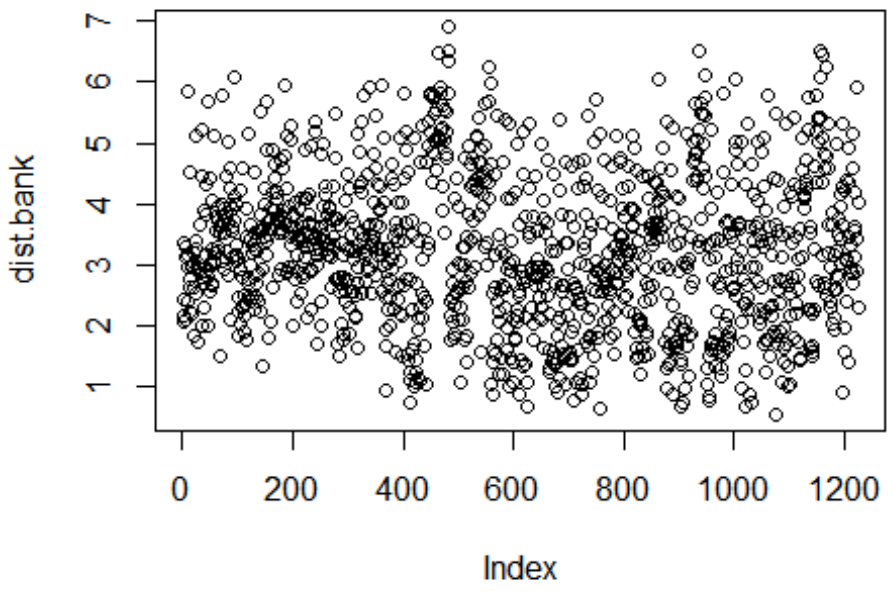



```
#Cluster Analysis

str(bank)

## 'data.frame':    2675 obs. of  17 variables:
##  $ age      : int  42 33 53 37 45 34 46 43 33 46 ...
##  $ job      : int  1 8 6 10 3 5 5 5 10 11 ...
##  $ marital  : int  2 1 1 1 1 2 1 1 2 0 ...
##  $ education: int  1 1 2 1 1 2 2 2 2 1 ...
##  $ default  : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ balance  : int  -247 3444 2269 5115 781 1494 0 1429 149 3354 ...
##  $ housing  : int  1 1 0 1 0 1 0 1 1 1 ...
##  $ loan     : int  1 0 0 0 1 0 0 0 0 0 ...
##  $ contact  : int  1 1 0 0 0 0 0 0 0 0 ...
##  $ day      : int  21 21 17 17 17 18 18 19 19 19 ...
##  $ month    : int  11 11 10 10 10 10 10 10 10 10 ...
##  $ duration : int  519 144 1091 1210 652 596 716 1015 424 522 ...
##  $ campaign : int  1 1 2 2 2 1 2 1 2 1 ...
##  $ pdays    : int  166 91 150 171 126 182 110 198 182 174 ...
##  $ previous : int  1 4 1 4 2 1 3 2 1 1 ...
##  $ poutcome : int  1 0 2 0 0 1 1 1 1 2 ...
##  $ deposit  : int  1 1 1 1 1 1 1 1 1 1 ...

library(reprex)
setDT(bank)
bank=bank[sample(.N,50)]
#bank
```

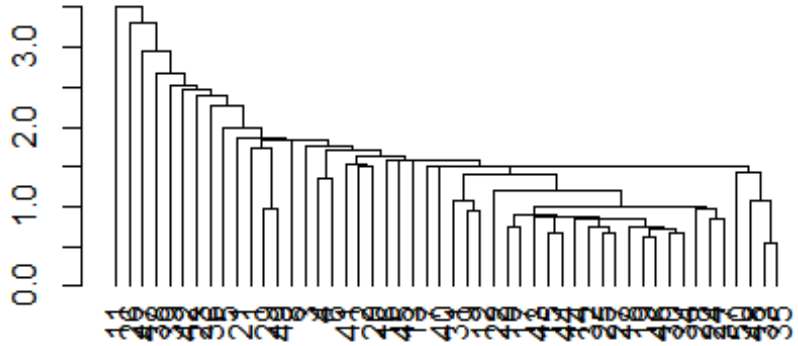
```r
#bank.cluster <- select(bank,age, job, marital, education, default, balance,
                       # housing, loan,pdays,duration,previous,campaign)
bank<-
scale(bank[,c("age","balance","pdays","duration","previous","campaign")])

library(cluster)
matstd.can <- scale(bank)

# Creating a (Euclidean) distance matrix of the standardized data
dist.bank <- dist(matstd.can, method="euclidean")

# Invoking hclust command (cluster analysis by single linkage method)
clusbank.nn <- hclust(dist.bank, method = "single")
plot(dist.bank)
```




```r
# Standardizing the data with scale()
matstd.bank <- scale(bank)
# Creating a (Euclidean) distance matrix of the standardized data
dist.bank <- dist(matstd.bank, method="euclidean")
plot(dist.bank)
```

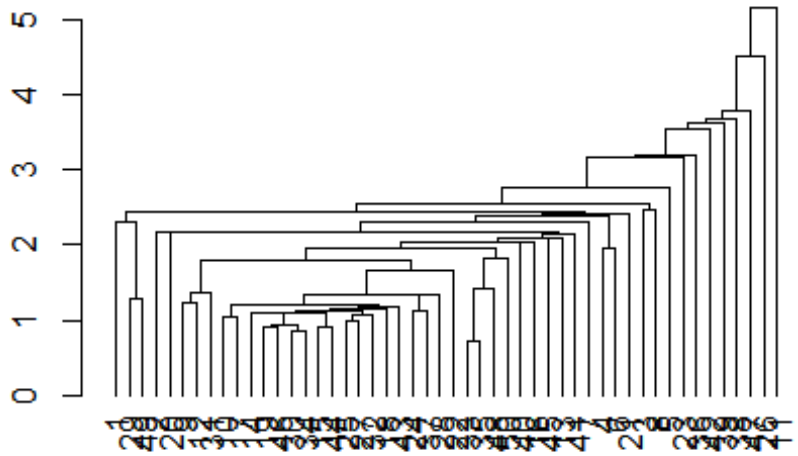



```
# Invoking hclust command (cluster analysis by single linkage method)
clusbank.nn <- hclust(dist.bank, method = "single")


#Plotting

# Create extra margin room in the dendrogram, on the bottom (Countries
labels)
par(mar=c(8, 4, 4, 2) + 0.1)
# Object "clusbank.nn" is converted into a object of class "dendrogram"
# in order to allow better flexibility in the (vertical) dendrogram plotting.

plot(as.dendrogram(clusbank.nn))
```




```
(agn.bank <- agnes(bank, metric="euclidean", stand=TRUE, method = "single"))

## Call:     agnes(x = bank, metric = "euclidean", stand = TRUE, method =
"single")
## Agglomerative coefficient:  0.6338219
## Order of objects:
##  [1]  1 29 49  2 20  9 12 31 10 17 14 19 46 30 34 15 44 25 27 32 18 43 24
37 28
## [26] 22 33 35 48 50 40 16 45 13 41  7  4  6 21  3  8  5 23 36 42 39 38 47
26 11
## Height (summary):
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##   0.712   1.162   1.966   1.995   2.419   5.156
##
## Available components:
## [1] "order"  "height" "ac"     "merge"  "diss"   "call"   "method" "data"

#View(agn.bank)

#  Description of cluster merging
agn.bank$merge

##       [,1] [,2]
##  [1,]  -33  -35
##  [2,]  -30  -34
##  [3,]  -15  -44
##  [4,]  -19  -46
```

```
##  [5,]    4    2
##  [6,]  -25  -27
##  [7,]  -10  -17
##  [8,]    6  -32
##  [9,]  -14    5
## [10,]    9    3
## [11,]   10    8
## [12,]  -24  -37
## [13,]   11  -18
## [14,]   13  -43
## [15,]    7   14
## [16,]   -9  -12
## [17,]  -29  -49
## [18,]   12  -28
## [19,]   15   18
## [20,]   16  -31
## [21,]    1  -48
## [22,]   19  -22
## [23,]   20   22
## [24,]   21  -50
## [25,]   -4   -6
## [26,]   23   24
## [27,]   26  -40
## [28,]   27  -16
## [29,]   28  -45
## [30,]   29  -13
## [31,]   30  -41
## [32,]   -2  -20
## [33,]   32   31
## [34,]   -1   17
## [35,]   33   -7
## [36,]   35   25
## [37,]   36  -21
## [38,]   34   37
## [39,]   -3   -8
## [40,]   38   39
## [41,]   40   -5
## [42,]   41  -23
## [43,]   42  -36
## [44,]   43  -42
## [45,]   44  -39
## [46,]   45  -38
## [47,]   46  -47
## [48,]   47  -26
## [49,]   48  -11

#Dendogram
plot(as.dendrogram(agn.bank))
```

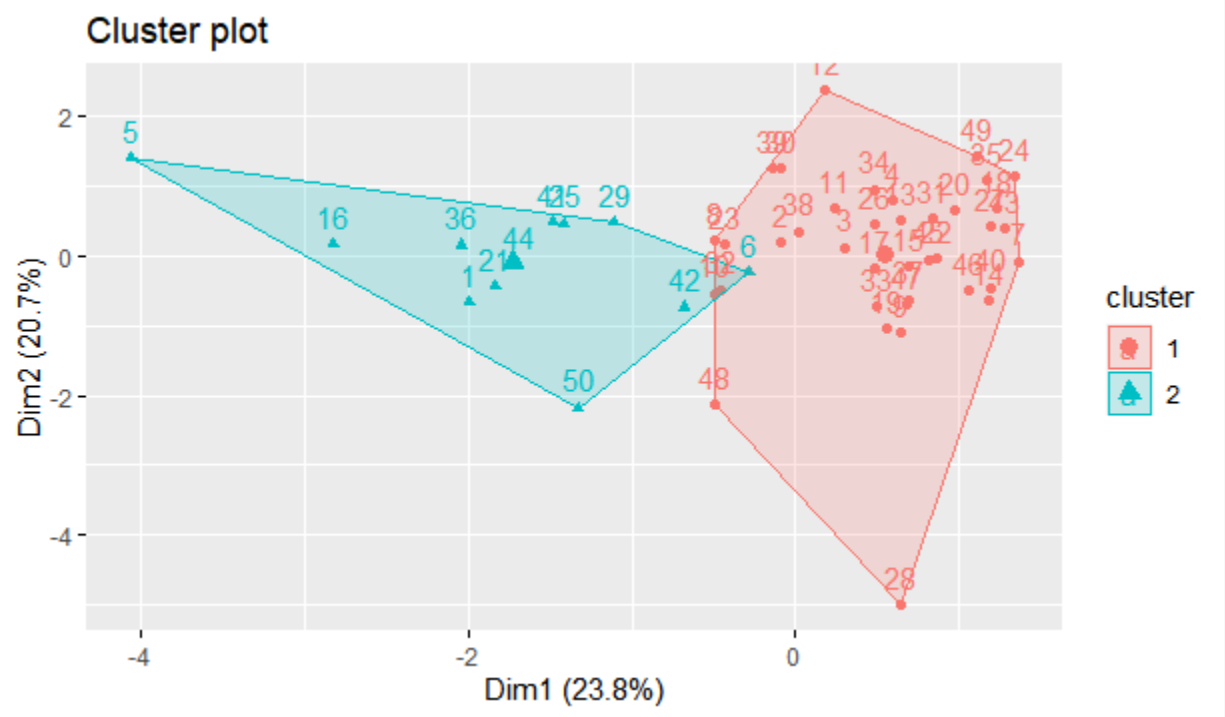



```
#, xlab= "Distance between Countries",xlim=c(8,0),
#horiz = TRUE,main="Dendrogram \n Bankment in nine industry groups in
European countries")

#Interactive Plots

#plot(agn.bank,ask=TRUE)
#plot(agn.bank, which.plots=2)

#K-Means Clustering


set.seed(15555)
pclusters <- kmeans(bank, 4, nstart=20, iter.max=100)

groups <- pclusters$cluster
clusterDF <- cbind(as.data.frame(bank), Cluster=as.factor(groups))

set.seed(15555)
pclusters <- kmeans(bank, 5, nstart=20, iter.max=100)

groups <- pclusters$cluster
clusterDF <- cbind(as.data.frame(bank), Cluster=as.factor(groups))
head(clusterDF)

##          age    balance      pdays   duration   previous   campaign
Cluster
```

```
## 1  0.05065802 -0.2820836 -1.0801010 -0.4968096  0.3634805  1.7041556
5
## 2  1.52137472  1.0192197 -0.8900878 -0.5664524 -0.5230573  1.7041556
5
## 3 -0.35787440  1.4518175 -1.1461926 -0.2548926 -0.0797884  0.1262337
5
## 4  0.13236450 -0.1833671 -1.3362057  0.3499000  2.5798248 -0.6627272
2
## 5 -0.19446143  0.1557791  0.0847624  0.4598623  1.6932871  1.7041556
5
## 6 -0.35787440  0.6840222 -1.0883625 -0.4051744  2.1365559 -0.6627272
2
```

library(factoextra)

fviz_cluster(kmeans5.bank, data= bank)



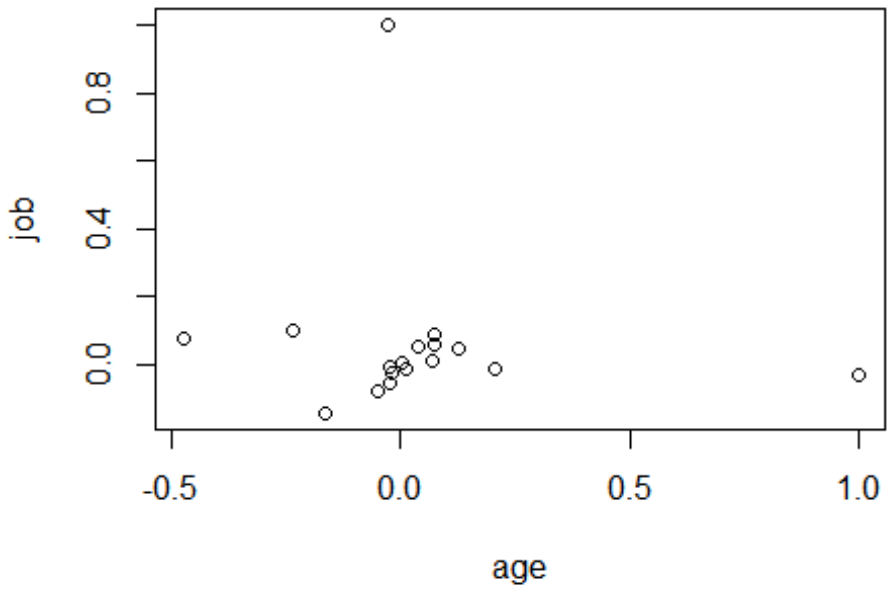
#From this we understand that 2 clusters are formed.

```
#Factor Analysis
```

```
bank=read.csv("C:/Users/Shamali/Desktop/RutgersSpring/multivariat/project/New
folder/abc/a/bank.csv",row.names=1,fill=TRUE)
attach(bank)

## The following object is masked from package:MASS:
##
##     housing

corrm.bank <- cor(bank)
corrm.bank

##                    age          job      marital    education      default
## age         1.000000000 -0.028785707 -0.476034836 -0.233592032 -0.019729760
## job        -0.028785707  1.000000000  0.075237748  0.098909347 -0.022339603
## marital    -0.476034836  0.075237748  1.000000000  0.176190447 -0.005313069
## education  -0.233592032  0.098909347  0.176190447  1.000000000 -0.008605557
## default    -0.019729760 -0.022339603 -0.005313069 -0.008605557  1.000000000
## balance     0.125077811  0.050105201 -0.029618303  0.046505968 -0.021700322
## housing    -0.165239106 -0.142378197 -0.046246371 -0.077360551  0.054251384
## loan       -0.022414698 -0.055020074 -0.066530992 -0.031961358  0.020919619
## contact     0.203827357 -0.012818683 -0.022166673 -0.134093910 -0.016986045
## day         0.040253885  0.051975721  0.007253870 -0.006738435 -0.002531235
## month       0.012599729 -0.011832809 -0.020624662 -0.023436530  0.001670141
## duration    0.069038449  0.010928574 -0.030088435 -0.026951284  0.002786614
## campaign   -0.024946108 -0.007437727  0.027119715 -0.017611971 -0.018509466
## pdays      -0.048589210 -0.074647149 -0.023277400 -0.116693385  0.053968379
## previous    0.004317163  0.008416691  0.007354743 -0.033645784 -0.008602670
## poutcome    0.075147299  0.060459906  0.012554236  0.076223684 -0.043345677
## deposit     0.073657845  0.086647348  0.012005982  0.105030051 -0.034807498
##                 balance      housing         loan       contact
day
## age         0.125077811 -0.165239106 -0.02241470  0.2038273570  4.025388e-
02
## job         0.050105201 -0.142378197 -0.05502007 -0.0128186829  5.197572e-
02
## marital    -0.029618303 -0.046246371 -0.06653099 -0.0221666730  7.253870e-
03
## education   0.046505968 -0.077360551 -0.03196136 -0.1340939100 -6.738435e-
03
## default    -0.021700322  0.054251384  0.02091962 -0.0169860454 -2.531235e-
03
## balance     1.000000000 -0.079743502 -0.07101548  0.0932289363  2.841452e-
02
## housing    -0.079743502  1.000000000  0.15713953 -0.0920980690 -1.006061e-
01
## loan       -0.071015482  0.157139527  1.00000000 -0.0281769705 -2.057261e-
02
## contact     0.093228936 -0.092098069 -0.02817697  1.0000000000  3.718471e-
04
## day         0.028414518 -0.100606065 -0.02057261  0.0003718471
```

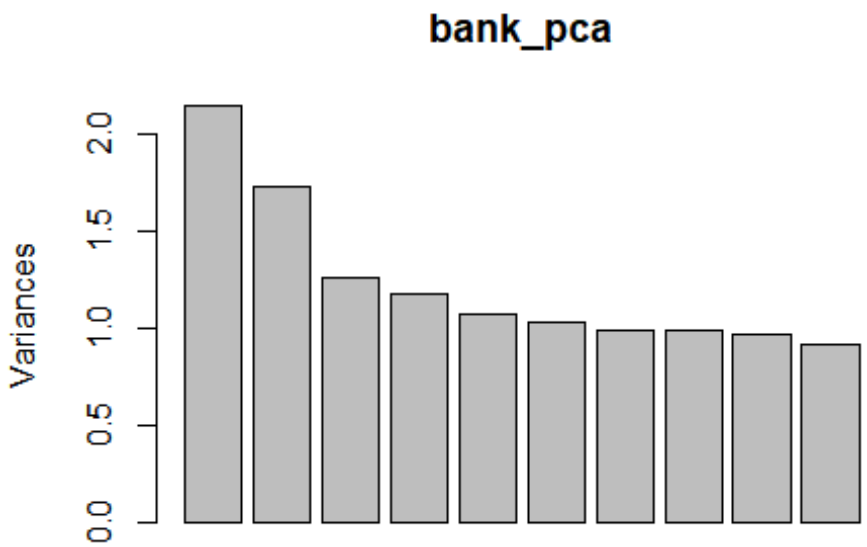
```
1.000000e+00
## month      0.006652155 -0.002492643  0.01345790  0.0150009109 -3.445607e-
02
## duration   0.034444092  0.024137357 -0.02679494  0.0224811960  2.233060e-
03
## campaign  -0.007380333  0.032874895  0.02070877  0.0874696511  5.100591e-
05
## pdays     -0.058018831  0.304161768  0.06645477  0.0032220904 -2.969249e-
02
## previous   0.005193710  0.033097481  0.03280477  0.0581809431 -2.259032e-
02
## poutcome   0.051236705 -0.309907330 -0.13848476  0.0246947310  2.841132e-
02
## deposit    0.078936584 -0.317296644 -0.16417792 -0.0139423883  4.306354e-
02
##                  month     duration      campaign       pdays     previous
## age        0.012599729  0.069038449 -2.494611e-02 -0.04858921  0.004317163
## job       -0.011832809  0.010928574 -7.437727e-03 -0.07464715  0.008416691
## marital   -0.020624662 -0.030088435  2.711971e-02 -0.02327740  0.007354743
## education -0.023436530 -0.026951284 -1.761197e-02 -0.11669339 -0.033645784
## default    0.001670141  0.002786614 -1.850947e-02  0.05396838 -0.008602670
## balance    0.006652155  0.034444092 -7.380333e-03 -0.05801883  0.005193710
## housing   -0.002492643  0.024137357  3.287490e-02  0.30416177  0.033097481
## loan       0.013457897 -0.026794937  2.070877e-02  0.06645477  0.032804767
## contact    0.015000911  0.022481196  8.746965e-02  0.00322209  0.058180943
## day       -0.034456066  0.002233060  5.100591e-05 -0.02969249 -0.022590322
## month      1.000000000 -0.017117801  1.218967e-03 -0.01216135 -0.005446028
## duration  -0.017117801  1.000000000 -2.930215e-02  0.05105616  0.005581394
## campaign   0.001218967 -0.029302148  1.000000e+00  0.05310032  0.174043381
## pdays     -0.012161355  0.051056159  5.310032e-02  1.00000000 -0.023522124
## previous  -0.005446028  0.005581394  1.740434e-01 -0.02352212  1.000000000
## poutcome  -0.020277945  0.023603327 -4.750468e-02 -0.28804889  0.017046077
## deposit   -0.007346862  0.318141135 -1.176348e-01 -0.13842247 -0.003386001
##              poutcome      deposit
## age        0.07514730  0.073657845
## job        0.06045991  0.086647348
## marital    0.01255424  0.012005982
## education  0.07622368  0.105030051
## default   -0.04334568 -0.034807498
## balance    0.05123671  0.078936584
## housing   -0.30990733 -0.317296644
## loan      -0.13848476 -0.164177915
## contact    0.02469473 -0.013942388
## day        0.02841132  0.043063537
## month     -0.02027794 -0.007346862
## duration   0.02360333  0.318141135
## campaign  -0.04750468 -0.117634800
## pdays     -0.28804889 -0.138422466
## previous   0.01704608 -0.003386001
```

```
## poutcome   1.00000000  0.392963262
## deposit    0.39296326  1.000000000

#high negative number is good #they will get grouped together for sure
plot(corrm.bank)
```




```
bank_pca <- prcomp(bank, scale=TRUE)#pca
summary(bank_pca)#see sCREe diagram

## Importance of components:
##                           PC1    PC2     PC3     PC4     PC5     PC6    PC7
## Standard deviation     1.463 1.3123 1.12287 1.08476 1.03192 1.01347 0.9947
## Proportion of Variance 0.126 0.1013 0.07417 0.06922 0.06264 0.06042 0.0582
## Cumulative Proportion  0.126 0.2273 0.30145 0.37067 0.43331 0.49373 0.5519
##                           PC8    PC9    PC10    PC11    PC12    PC13
PC14
## Standard deviation     0.99282 0.9835 0.95537 0.94502 0.90887 0.86224
0.84986
## Proportion of Variance 0.05798 0.0569 0.05369 0.05253 0.04859 0.04373
0.04249
## Cumulative Proportion  0.60992 0.6668 0.72050 0.77304 0.82163 0.86536
0.90785
##                           PC15    PC16    PC17
## Standard deviation     0.80893 0.68863 0.66184
## Proportion of Variance 0.03849 0.02789 0.02577
## Cumulative Proportion  0.94634 0.97423 1.00000
```

```r
plot(bank_pca)
```




```r
# A table containing eigenvalues and %'s accounted, follows. Eigenvalues are the sdev^2
(eigen_bank <- round(bank_pca$sdev^2,2))
```

```
##  [1] 2.14 1.72 1.26 1.18 1.06 1.03 0.99 0.99 0.97 0.91 0.89 0.83 0.74 0.72
0.65
## [16] 0.47 0.44
```

```r
names(eigen_bank) <- paste("PC",1:17,sep="")
eigen_bank
```

```
##  PC1  PC2  PC3  PC4  PC5  PC6  PC7  PC8  PC9 PC10 PC11 PC12 PC13 PC14 PC15
PC16
## 2.14 1.72 1.26 1.18 1.06 1.03 0.99 0.99 0.97 0.91 0.89 0.83 0.74 0.72 0.65
0.47
## PC17
## 0.44
```

```r
sumlambdas <- sum(eigen_bank)
sumlambdas
```

```
## [1] 16.99
```

```r
cumvar_bank <- cumsum(propvar)
propvar <- round(eigen_bank/sumlambdas,2)
propvar
```

```
##  PC1  PC2  PC3  PC4  PC5  PC6  PC7  PC8  PC9 PC10 PC11 PC12 PC13 PC14 PC15
PC16
## 0.13 0.10 0.07 0.07 0.06 0.06 0.06 0.06 0.06 0.05 0.05 0.05 0.04 0.04 0.04
0.03
## PC17
## 0.03
```

```
cumvar_bank <- cumsum(propvar)
cumvar_bank
```

```
##  PC1  PC2  PC3  PC4  PC5  PC6  PC7  PC8  PC9 PC10 PC11 PC12 PC13 PC14 PC15
PC16
## 0.13 0.23 0.30 0.37 0.43 0.49 0.55 0.61 0.67 0.72 0.77 0.82 0.86 0.90 0.94
0.97
## PC17
## 1.00
```

```
matlambdas <- rbind(eigen_bank,propvar,cumvar_bank)
matlambdas
```

```
##              PC1  PC2  PC3  PC4  PC5  PC6  PC7  PC8  PC9 PC10 PC11 PC12
PC13
## eigen_bank  2.14 1.72 1.26 1.18 1.06 1.03 0.99 0.99 0.97 0.91 0.89 0.83
0.74
## propvar     0.13 0.10 0.07 0.07 0.06 0.06 0.06 0.06 0.06 0.05 0.05 0.05
0.04
## cumvar_bank 0.13 0.23 0.30 0.37 0.43 0.49 0.55 0.61 0.67 0.72 0.77 0.82
0.86
##             PC14 PC15 PC16 PC17
## eigen_bank  0.72 0.65 0.47 0.44
## propvar     0.04 0.04 0.03 0.03
## cumvar_bank 0.90 0.94 0.97 1.00
```

```
rownames(matlambdas) <- c("Eigenvalues","Prop. variance","Cum. prop.
variance")
rownames(matlambdas)
```

```
## [1] "Eigenvalues"         "Prop. variance"      "Cum. prop. variance"
```

```
eigvec.bank<- bank_pca$rotation
print(bank_pca)#pc1=0.17*marital
```

```
## Standard deviations (1, .., p=17):
##  [1] 1.4634794 1.3122939 1.1228711 1.0847566 1.0319185 1.0134691 0.9947178
##  [8] 0.9928216 0.9835053 0.9553661 0.9450241 0.9088694 0.8622430 0.8498558
## [15] 0.8089303 0.6886257 0.6618384
##
## Rotation (n x k) = (17 x 17):
##                      PC1          PC2          PC3          PC4          PC5
## age       -0.161057681  0.608031079 -0.004531597 -0.119506274  0.025941107
## job       -0.176545995 -0.150400063  0.121809630  0.006149995  0.350983803
## marital   -0.004781394 -0.546478988  0.152630712  0.183933959  0.133145918
```

```
## education -0.130962240 -0.426703412 -0.009284554 -0.046530688  0.003034496
## default    0.084946470 -0.004213002 -0.152059403  0.018926545  0.072681876
## balance   -0.164470903  0.118446734  0.112193540  0.059436893  0.403174170
## housing    0.470473792 -0.007348542 -0.173613840  0.166731679 -0.025546494
## loan       0.246198024  0.054788800 -0.009853140 -0.088328590 -0.231169103
## contact   -0.066106211  0.294906280  0.352171157  0.177414811  0.207315508
## day       -0.102905827  0.016704397  0.046445821 -0.093376417  0.519798095
## month      0.015582128  0.047141839  0.035595372 -0.100578699 -0.260779455
## duration  -0.138036463  0.100369665 -0.414167747  0.622999054  0.007600076
## campaign   0.110654742  0.024684437  0.530174939  0.334377796 -0.043370645
## pdays      0.358087260  0.077893468 -0.213703251  0.312266341  0.266090562
## previous   0.023168222  0.045641022  0.437345179  0.402608664 -0.299586260
## poutcome  -0.460762830 -0.033118908  0.037410812 -0.018658309 -0.280841945
## deposit   -0.471089917 -0.021398531 -0.278213277  0.316214416 -0.118041310
##                    PC6         PC7          PC8         PC9         PC10
## age        0.049533270 -0.06741747  0.058283311  0.06197228  0.08202773
## job        0.044602946 -0.30766406  0.336054077 -0.13009488  0.73195109
## marital   -0.156248819  0.20372595 -0.154252015 -0.11201322 -0.07630174
## education -0.048564290 -0.25604282  0.208721216  0.25116107 -0.17498826
## default    0.031596822  0.68090133  0.647988006  0.26759078  0.04453973
## balance   -0.390239136 -0.31024049  0.196068689  0.42817378 -0.39301130
## housing   -0.029342672 -0.12440034  0.006941855  0.09691752 -0.06182345
## loan       0.270144271 -0.33197905  0.337508822 -0.05421270 -0.18786369
## contact   -0.271861897  0.24713523 -0.170567978 -0.01256688  0.02840336
## day        0.458197946  0.06839230  0.122989896 -0.48320972 -0.43823311
## month     -0.617818883 -0.02930478  0.366415582 -0.60435417 -0.11192862
## duration   0.007913767 -0.12849651  0.060308918 -0.12144198 -0.04257997
## campaign   0.106924291  0.01033502  0.048390165 -0.05437896 -0.05061637
## pdays     -0.076845271  0.02048641 -0.083715986 -0.08582479  0.09928660
## previous   0.218591280 -0.06896414  0.222917019  0.07249113 -0.01222723
## poutcome   0.100080771  0.14050822 -0.046989564  0.04618002 -0.06251059
## deposit    0.030126900  0.00506284  0.025558114 -0.07059803 -0.04297250
##                   PC11         PC12         PC13          PC14         PC15
## age       -0.06957834 -0.097844645  0.133368013 -0.0095368617 -0.119499541
## job        0.05576104  0.054269971 -0.088903662  0.0231211939  0.176573148
## marital    0.26648926  0.166819867 -0.179433172 -0.0354669917 -0.159858185
## education -0.04993964 -0.381855980  0.646447859  0.0753343482  0.039536232
## default    0.01728346 -0.050980511 -0.039581751 -0.0362876049 -0.006860255
## balance   -0.05596962  0.181210560 -0.331368352  0.0581894055 -0.024167743
## housing   -0.10932376  0.136128137  0.019129376 -0.0418216845  0.711846221
## loan       0.67124973 -0.092290717 -0.189325566  0.1861922309 -0.093950036
## contact    0.55170157 -0.056900068  0.374644263  0.0294625740  0.245856579
## day       -0.10580890  0.093452198  0.113574622  0.0006880948  0.140716901
## month     -0.13464552  0.010092036  0.039031548  0.0363380066  0.035600596
## duration   0.13013639 -0.090810871  0.002443049 -0.4377413513  0.020406876
## campaign  -0.24379380 -0.637108955 -0.305370190 -0.0606405608  0.027865502
## pdays     -0.11443385 -0.086881548  0.073783381  0.7139752929 -0.205265884
## previous  -0.17025157  0.562417719  0.271803659  0.0692242671 -0.140530184
## poutcome   0.01579121 -0.005714691 -0.220597247  0.4225351400  0.508564225
## deposit    0.01339201 -0.035094806 -0.024777975  0.2464741196 -0.089519913
```

```
##                   PC16         PC17
## age        -0.425663691  0.583657666
## job         0.008981010  0.011771886
## marital    -0.358326693  0.481818847
## education -0.133894707  0.044270478
## default     0.004152038  0.007471892
## balance     0.027891476 -0.070412612
## housing     0.094910411  0.376930003
## loan        0.005047349  0.035453675
## contact     0.169368116 -0.084661323
## day         0.011488702 -0.003729633
## month      -0.034759579 -0.001925412
## duration   -0.308211995 -0.249323841
## campaign    0.070978462  0.069892853
## pdays      -0.170291974 -0.119096407
## previous   -0.036861555 -0.039407785
## poutcome   -0.384142018 -0.185176065
## deposit     0.595477744  0.390498747
```

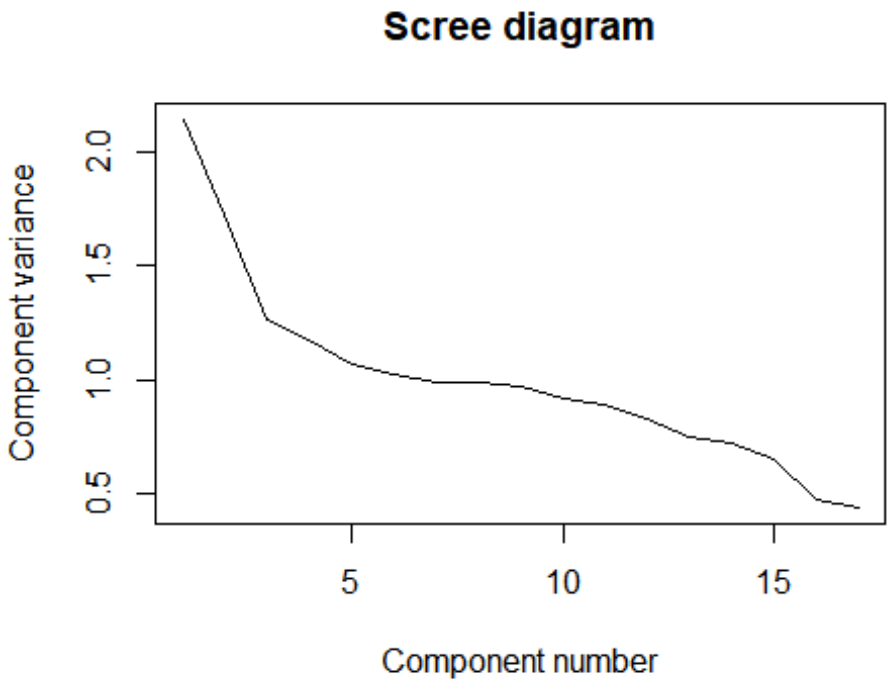
```
# Taking the first four PCs to generate linear combinations for all the
variables with four factors
(eigen_bank <- bank_pca$sdev^2)
```

```
##  [1] 2.1417719 1.7221153 1.2608395 1.1766969 1.0648558 1.0271197 0.9894636
##  [8] 0.9856947 0.9672827 0.9127243 0.8930706 0.8260435 0.7434630 0.7222549
## [15] 0.6543682 0.4742054 0.4380301
```

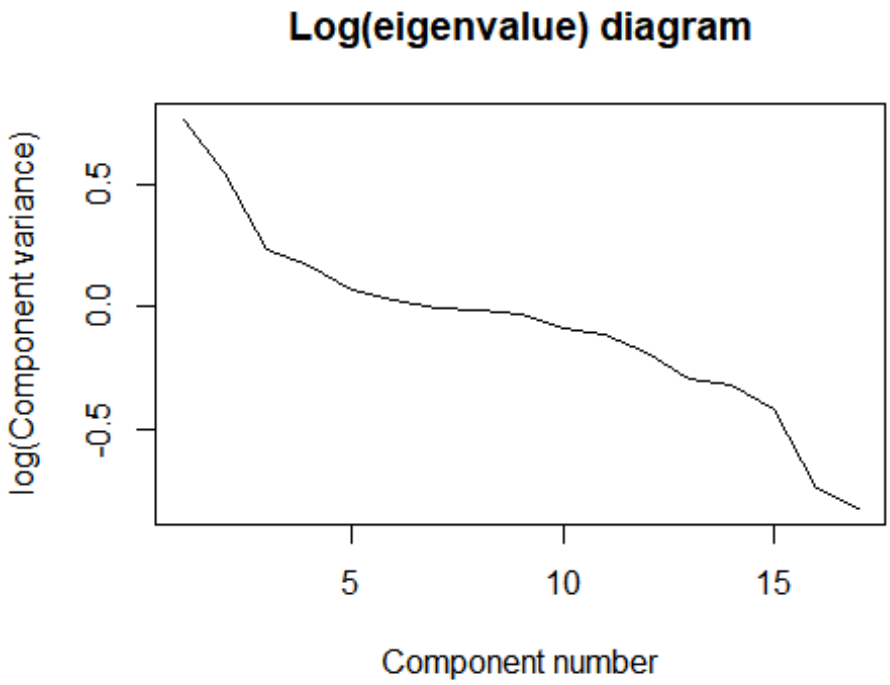
```
names(eigen_bank) <- paste("PC",1:17,sep="")
eigen_bank
```

```
##       PC1       PC2       PC3       PC4       PC5       PC6       PC7
PC8
## 2.1417719 1.7221153 1.2608395 1.1766969 1.0648558 1.0271197 0.9894636
0.9856947
##       PC9      PC10      PC11      PC12      PC13      PC14      PC15
PC16
## 0.9672827 0.9127243 0.8930706 0.8260435 0.7434630 0.7222549 0.6543682
0.4742054
##      PC17
## 0.4380301
```

```
#SCREE DIAGRAM
plot(eigen_bank, xlab = "Component number", ylab = "Component variance", type
= "l", main = "Scree diagram")
```




```
plot(log(eigen_bank), xlab = "Component number",ylab = "log(Component
variance)", type="l",main = "Log(eigenvalue) diagram")
```



```r
#FROM SCREE DIAGRAM WE UNDERSTOOD THAT WE NEED YTO MAKE 7 FACTORS
pcafactors.bank <- eigvec.bank[,1:7] #cording to ske
pcafactors.bank
```

```
##                     PC1          PC2          PC3          PC4          PC5
## age       -0.161057681  0.608031079 -0.004531597 -0.119506274  0.025941107
## job       -0.176545995 -0.150400063  0.121809630  0.006149995  0.350983803
## marital   -0.004781394 -0.546478988  0.152630712  0.183933959  0.133145918
## education -0.130962240 -0.426703412 -0.009284554 -0.046530688  0.003034496
## default    0.084946470 -0.004213002 -0.152059403  0.018926545  0.072681876
## balance   -0.164470903  0.118446734  0.112193540  0.059436893  0.403174170
## housing    0.470473792 -0.007348542 -0.173613840  0.166731679 -0.025546494
## loan       0.246198024  0.054788800 -0.009853140 -0.088328590 -0.231169103
## contact   -0.066106211  0.294906280  0.352171157  0.177414811  0.207315508
## day       -0.102905827  0.016704397  0.046445821 -0.093376417  0.519798095
## month      0.015582128  0.047141839  0.035595372 -0.100578699 -0.260779455
## duration  -0.138036463  0.100369665 -0.414167747  0.622999054  0.007600076
## campaign   0.110654742  0.024684437  0.530174939  0.334377796 -0.043370645
## pdays      0.358087260  0.077893468 -0.213703251  0.312266341  0.266090562
## previous   0.023168222  0.045641022  0.437345179  0.402608664 -0.299586260
## poutcome  -0.460762830 -0.033118908  0.037410812 -0.018658309 -0.280841945
## deposit   -0.471089917 -0.021398531 -0.278213277  0.316214416 -0.118041310
##                     PC6         PC7
## age        0.049533270 -0.06741747
## job        0.044602946 -0.30766406
## marital   -0.156248819  0.20372595
## education -0.048564290 -0.25604282
## default    0.031596822  0.68090133
## balance   -0.390239136 -0.31024049
## housing   -0.029342672 -0.12440034
## loan       0.270144271 -0.33197905
## contact   -0.271861897  0.24713523
## day        0.458197946  0.06839230
## month     -0.617818883 -0.02930478
## duration   0.007913767 -0.12849651
## campaign   0.106924291  0.01033502
## pdays     -0.076845271  0.02048641
## previous   0.218591280 -0.06896414
## poutcome   0.100080771  0.14050822
## deposit    0.030126900  0.00506284
```

```r
# Multiplying each column of the eigenvector's matrix by the square-root of
the corresponding eigenvalue in order to get the factor loadings
unrot.fact.bank <- sweep(pcafactors.bank,MARGIN=2,bank_pca$sdev[1:7],`*`)
unrot.fact.bank #factors education housing and default can come together in
pc1 as they have high correlation
```

```
##                     PC1          PC2          PC3          PC4          PC5
## age       -0.235704593  0.797915476 -0.005088399 -0.129635220  0.026769109
## job       -0.258371421 -0.197369085  0.136776512  0.006671248  0.362186682
```

```
## marital   -0.006997471 -0.717141042  0.171384614  0.199523578  0.137395737
## education -0.191660537 -0.559960284 -0.010425357 -0.050474472  0.003131353
## default    0.124317407 -0.005528697 -0.170743108  0.020530695  0.075001773
## balance   -0.240699773  0.155436927  0.125978882  0.064474563  0.416042888
## housing    0.688528687 -0.009643447 -0.194945962  0.180863291 -0.026361900
## loan       0.360305729  0.071899008 -0.011063806 -0.095815022 -0.238547676
## contact   -0.096745076  0.387003712  0.395442812  0.192451890  0.213932710
## day       -0.150600555  0.021921079  0.052152669 -0.101290686  0.536389275
## month      0.022804122  0.061863948  0.039969014 -0.109103409 -0.269103147
## duration  -0.202013516  0.131714500 -0.465056990  0.675802343  0.007842659
## campaign   0.161940932  0.032393236  0.595318112  0.362718524 -0.044754971
## pdays      0.524053317  0.102219123 -0.239961203  0.338732978  0.274583776
## previous   0.033906215  0.059894434  0.491082258  0.436732410 -0.309148607
## poutcome  -0.674316895 -0.043461741  0.042007519 -0.020239724 -0.289806001
## deposit   -0.689430373 -0.028081162 -0.312397645  0.343015679 -0.121809013
##                   PC6          PC7
## age        0.050200440 -0.067061359
## job        0.045203708 -0.306038927
## marital   -0.158353354  0.202649837
## education -0.049218408 -0.254690359
## default    0.032022403  0.677304696
## balance   -0.395495317 -0.308601750
## housing   -0.029737892 -0.123743235
## loan       0.273782879 -0.330225478
## contact   -0.275523640  0.245829825
## day        0.464369473  0.068031039
## month     -0.626140365 -0.029149989
## duration   0.008020358 -0.127817767
## campaign   0.108364468  0.010280425
## pdays     -0.077880310  0.020378195
## previous   0.221535514 -0.068599862
## poutcome   0.101428772  0.139766028
## deposit    0.030532683  0.005036097
```

```
# Computing communalities is the common variance
communalities.bank<- rowSums(unrot.fact.bank^2)#square of that factor
communalities.bank#1-this will be its unique variance #what the common
variance is
```

```
##       age       job   marital education   default   balance   housing
loan
## 0.7167908 0.3513451 0.6685429 0.4202451 0.5104525 0.5268679 0.5617719
0.3852035
##   contact       day     month  duration  campaign     pdays  previous
poutcome
## 0.5346570 0.5441214 0.4831662 0.7476082 0.5270941 0.5392789 0.5859907
0.5725763
##   deposit
## 0.7071499
```

```r
# Performing the varimax rotation. The default in the varimax function is
norm=TRUE thus, Kaiser normalization is carried out
rot.fact.bank <- varimax(unrot.fact.bank)
#View(unrot.fact.bank)
rot.fact.bank
```

```
## $loadings
##
## Loadings:
##           PC1    PC2    PC3    PC4    PC5    PC6    PC7
## age       -0.149  0.813                0.147
## job               -0.181                       0.270 -0.477
## marital           -0.787                0.198
## education -0.184 -0.508 -0.112        -0.171        -0.292
## default                 -0.138         0.277  0.120  0.623
## balance                                0.415        -0.575
## housing    0.681                      -0.253 -0.129  0.118
## loan       0.207  0.159  0.136 -0.133 -0.528
## contact            0.248  0.284         0.620
## day                                    0.114  0.712
## month                          -0.104  0.163 -0.657
## duration   0.147                0.848
## campaign                 0.698 -0.108  0.120
## pdays      0.700                0.171                0.100
## previous                 0.751
## poutcome  -0.721                0.218
## deposit   -0.470                0.685
##
##                  PC1   PC2   PC3   PC4   PC5   PC6   PC7
## SS loadings    1.848 1.684 1.225 1.330 1.152 1.057 1.087
## Proportion Var 0.109 0.099 0.072 0.078 0.068 0.062 0.064
## Cumulative Var 0.109 0.208 0.280 0.358 0.426 0.488 0.552
##
## $rotmat
##             [,1]        [,2]        [,3]        [,4]       [,5]
[,6]
## [1,]  0.84172470 -0.03106891  0.12814034 -0.36520382 -0.2557746 -
0.110982767
## [2,]  0.09291746  0.96809061  0.08904887  0.06085754  0.1981162 -
0.047354840
## [3,] -0.20198411 -0.06022754  0.73203467 -0.54685922  0.2671323
0.012771448
## [4,]  0.28394533 -0.16548627  0.55263410  0.73984907  0.1966380
0.002500942
## [5,]  0.35327322 -0.07035569 -0.27638555 -0.07717104  0.5310331
0.619453155
## [6,] -0.13835822  0.12572026  0.23743865  0.03199061 -0.5174976
0.769668594
## [7,] -0.13228150 -0.10033309 -0.04006317 -0.09753000  0.4852868
0.095702796
```

```
##             [,7]
## [1,]  0.25100331
## [2,]  0.03226562
## [3,] -0.22163607
## [4,]  0.02314030
## [5,] -0.34955031
## [6,]  0.21784711
## [7,]  0.84655506
```

```
# The print method of varimax omits loadings less than abs(0.1). In order to
display all the loadings, it is necessary to ask explicitly the contents of
the object $loadings
fact.load.bank <- rot.fact.bank$loadings[1:17,1:7]
fact.load.bank
```

```
##                     PC1          PC2          PC3          PC4          PC5
## age       -0.148657497  0.812693201 -0.027307903  0.047592169  0.14720942
## job       -0.099369215 -0.181478593 -0.023980556  0.015828802  0.08525573
## marital   -0.006847149 -0.787287871  0.087273558 -0.022627092  0.19798125
## education -0.183974910 -0.508011071 -0.112297024  0.027298842 -0.17109005
## default    0.076914985 -0.071535806 -0.138467184 -0.007996674  0.27747747
## balance    0.047220515  0.091668463 -0.085680670  0.061512047  0.41453072
## housing    0.680557296 -0.038385247  0.049796251  0.001531071 -0.25319113
## loan       0.206517493  0.159268648  0.135690132 -0.132673396 -0.52832182
## contact    0.010478251  0.247640578  0.283502028 -0.064281796  0.62038166
## day       -0.047778998  0.053338626 -0.075861606 -0.080299348  0.11442168
## month     -0.018688741  0.017968403 -0.095730380 -0.103561392  0.16262405
## duration   0.146592694  0.063242040  0.023734058  0.848221785  0.02440736
## campaign   0.089903254 -0.053810310  0.697567545 -0.108450528  0.12049440
## pdays      0.700339371  0.009917953 -0.007408856  0.171001967  0.08472337
## previous  -0.071868436  0.011564622  0.751314377  0.083460476 -0.09184702
## poutcome  -0.720762025 -0.001187229  0.027870216  0.217649610  0.03254520
## deposit   -0.470345234 -0.031811454 -0.089254055  0.684576738  0.07673263
##                    PC6          PC7
## age         0.03678674 -0.090481685
## job         0.26964545 -0.477214324
## marital     0.02004930  0.030767337
## education  -0.01278825 -0.292458318
## default     0.12026211  0.623478421
## balance    -0.05509228 -0.574664480
## housing    -0.12905643  0.117885152
## loan       -0.01242395 -0.043534078
## contact    -0.05807177 -0.021681209
## day         0.71227813 -0.079738225
## month      -0.65662992 -0.070678119
## duration    0.01073205 -0.036943509
## campaign    0.04566857 -0.033903707
## pdays       0.04688105  0.100164141
## previous   -0.02679457  0.009957985
```

```
## poutcome  -0.01069714  0.061280551
## deposit    0.02323980 -0.043286122
```

```
# Computing the rotated factor scores for the 30 European Countries. Notice
that signs are reversed for factors F2 (PC2), F3 (PC3) and F4 (PC4)
scale.bank <- scale(bank)
#scale.bank
as.matrix(scale.bank)%*%fact.load.bank%*%solve(t(fact.load.bank)%*%fact.load.
bank)
```

```
##                PC1           PC2          PC3           PC4          PC5
## 1     0.4738574339  0.4775188196  0.366859482  0.1640599858  0.646110228
## 2     0.3756216290  0.2785284416  0.186922282 -0.6941835990  2.119444110
## 3    -0.7728084200  0.2998779587 -0.526846463  1.9256362155  0.078578672
## 4     1.2727659094 -0.0087718253 -0.028017868  2.2998699033  0.276283100
## 5    -0.0040451255  0.9360791378 -0.004363662  0.4545337244 -1.428066312
## 6     0.2683481886 -1.2223181875 -0.902260305  0.8987154824  0.030828454
## 7    -0.8057569861  0.0337925405 -0.228275596  0.8886624653 -0.210669102
## 8     0.4963134052 -0.0617223212 -0.807779599  1.9571586262 -0.338889965
## 9     0.1685543159 -1.4738906160 -0.498789456  0.4090380541  0.068401530
## 10   -0.1590894155  1.0850706292 -1.078042855  0.7927636366 -0.244478555
## 11    0.5304147849  1.0870658360  0.030149662  0.6620174239  2.062077309
## 12   -0.6872469618 -0.1928273265 -0.538663410  0.8075299452 -0.309889951
## 13    0.6095881984 -0.2025289934 -0.687924377 -0.2396074561 -1.603363399
## 14   -0.6275132423 -0.5040076516  0.425732878  1.1888987050  0.121073174
## 15    1.1897429813  0.4235696930 -0.507988141  1.5391152908 -1.799370549
## 16   -0.2033119265 -0.1045691755 -1.167425722  0.3834207231 -0.001846726
## 17    0.6448809106  0.9072650243  0.194688475  2.1651873269 -1.811425361
## 18    0.8359858797 -0.2304089090 -0.449153989  1.4811554331 -0.294239196
## 19    0.4995129268  1.1704767705 -0.352314646  0.1288218211 -1.740321899
## 20    0.6038577396 -0.1939775991 -0.571055600  0.4038083249 -0.036869916
## 21    1.2002727480 -0.3190866151  1.053993920  2.6063607248 -0.159019620
## 22    0.7542037531  1.2035417707 -0.281706531  0.5244087224  1.189422299
## 23   -0.6185001459  0.4051422725 -1.010809212  0.2298520001  0.058691632
## 24   -0.0790860149  0.6105066302 -1.171924164  0.4429142242  0.586638377
## 25    1.3166469997 -0.0081195360 -0.933253522  1.6974736222  0.551869364
## 26    0.8092116090  0.7071496715  0.707296374  1.0444218866  0.285189417
## 27   -0.2622723965 -0.5798268241  1.149262833  0.2122050213 -0.302774893
## 28   -0.2415105660  0.8627290270 -0.385824492  1.1363046742 -1.400578781
## 29   -0.7118617550 -0.5472318289 -0.155526289  0.5547564521  0.511281192
## 30    0.6821963361 -1.2559368628 -0.637032424  0.3100831650 -0.189704011
## 31    1.1361062187  0.1087910506 -0.726827855  1.4822048157 -0.402135844
## 32    0.5476792587  0.0358013153  0.849863936  1.1463099089 -2.034749029
## 33    0.0488369446 -0.4138406051  0.098644290  0.5347048378 -0.562308368
## 34    0.4966199273  1.3183033275 -0.444833338  0.3902383850 -0.731454247
## 35   -0.8345421709 -1.3677915096  0.389821083 -0.0114732378 -0.084837610
## 36   -1.4949941581 -0.6098051448 -0.318053254 -0.0558453949 -0.564159917
## 37    0.6817992189 -0.8689167084  0.584850198  0.9989002241 -0.775137561
## 38    1.6022389615 -0.7390806854  0.123593368  3.6427917741 -0.292816064
## 39    0.2837887007 -0.6514888857  0.753856766  1.3633849035 -0.957864569
```

```
## 40    1.0938499038 -1.0630486537 -0.607105759  2.4747673909 -0.409151605
## 41    0.0080650105 -1.5062839761 -0.567988194  0.9845114176 -0.040199353
## 42    1.2750390266 -1.0824176667 -0.532195991  1.7348722467 -0.178611038
## 43   -0.1617234541 -1.4087330043  4.983854367  4.8899046827 -1.097933321
## 44   -0.3371900454 -1.2984654802 -0.890131981  0.1330898212  0.508048091
## 45   -0.9799642996 -0.4849822927  0.163572664  1.0728644163 -0.630956992
## 46   -1.5724521771 -1.1722861347 -0.652003632 -0.2265340031 -0.290172028
## 47    0.0681216401  0.0796678040 -0.764911134 -0.3325305326 -0.709714016
## 48   -1.3031461260  0.3313995226 -0.358898486 -0.1805435312  0.073764445
## 49    0.5853504678  0.0895248702  0.787960047 -0.1445826222 -0.253541221
## 50   -0.5441566416 -1.2656695030 -0.119324696 -0.3881682404  0.155890624
## 51    0.3712844663  1.7077175774 -0.556408417 -0.1020658041 -2.389433197
## 52   -0.5139766800 -1.2911529694 -0.862629319 -0.0359871073  0.062508261
## 53    0.5507334024 -0.0370026119 -0.641464176  0.2003131059  0.325783196
## 54   -0.2357155798  0.8734148645 -0.355797679  0.0989781916  0.111375713
## 55    0.0716604030  0.1231062089 -0.679981992 -0.3221438033 -0.968934868
## 56   -1.2880884027 -0.9220704523  0.524181818  0.1748324245 -0.033816891
## 57    0.3008210315 -1.3832074942 -0.130256411  0.2079210822 -0.072365671
## 58   -0.4922462239 -0.7589934603 -0.410081308 -0.1027724023  0.452589525
## 59    1.1374753797 -0.5994936865 -0.677880262  0.2010159065  0.373016653
## 60    0.6772271164 -0.1859139831 -0.484389982 -0.4140346585  0.020449282
## 61   -0.0414672949  0.5315548148  2.025653343  0.3381050297 -0.484784039
## 62    1.0498297203  0.0983635260 -0.412696603  1.7049852953 -0.819683234
## 63    0.7481792936  1.6060154304 -0.509035567  0.6780572183 -0.907176849
## 64    1.0936307837  0.1753667231  0.025974242  2.5372413619 -0.453729922
## 65    0.5380902802 -1.5051226866  2.625728384  1.5395903973 -0.918203890
## 66    0.3677902892  0.6219048346  1.051587863  2.8246313086  1.285686753
## 67    1.1399450730 -0.6319553804 -0.450666733  2.3225856520 -0.094335203
## 68    0.9176040862  0.4947181286  1.236534439  2.1879156746 -0.368396112
## 69    0.7914581635 -0.3036758873 -0.221217465  0.2499420877 -0.604658696
## 70    0.4589055549 -1.2550220176 -0.087081877  2.6265323766 -0.723240170
## 71    0.5343776298 -1.2120314103  1.934091546  0.3282483645 -0.068523187
## 72    1.8549002448 -0.5354633429  0.376424066  3.9091298541 -0.052326843
## 73    1.2973985275  0.0188658538  0.912660555  1.2499892850 -0.238450281
## 74    1.1805133063 -1.0728521046  0.699731423  1.0427812312 -0.114663616
## 75    0.9964586934  0.0747776288 -0.148716888  2.5235109754 -1.187026873
## 76    0.8413249202  0.4048190389  0.289391348  0.5466213190 -0.437383509
## 77    0.5936180403 -0.9439236362  0.322716305  2.5439323288 -0.282436346
## 78    1.2141627727 -0.5806677786  0.019939873  1.0887872512 -0.563231021
## 79    0.2503364753 -0.7011346146 -0.379429455  0.2859431728 -0.431391117
## 80    0.4952598007  1.4020527423 -0.659986826  3.2197326847 -0.814275618
## 81    1.3602669972  1.0152955915  0.801191933 -0.0171668783  2.187147131
## 82    1.6443055924 -0.1993637673 -0.105812027  2.0295766630 -0.283737563
## 83    0.3942423454 -1.1954127466  2.236968704 -0.0370506806  0.082401114
## 84    0.8715290079 -1.1148488442 -2.609219891  1.3274888540  4.367362761
## 85   -0.3061164138 -0.4448612211 -0.640533070  1.1592254493 -0.267619769
## 86    1.6111993070 -0.0554768423 -0.044453662  3.5356693463 -0.576359764
## 87    1.2481110162 -0.6318225466  0.100294506  2.8751919708 -0.265703207
## 88    1.9281901466 -0.1634968899 -0.213329732  3.0796002020 -0.257422904
## 89    1.5144743524 -1.4528682445 -0.698863096  2.0813940353 -0.184470532
```

```
## 90    1.8216198538  1.3880173699 -0.512304181  2.6639387630 -0.527409965
## 91    1.1233660254  0.1582312174 -0.589169394  2.3873256745 -0.529073693
## 92    0.3377002806  0.3177302986 -0.019492070  2.7115379094 -1.363170601
## 93    1.7215628848  0.5525675592 -0.564454157  2.1456322389 -0.221298860
## 94    0.4314078059 -0.2890897211 -0.604361304  1.1223689113 -0.813651652
## 95    1.2727153692  0.6616786803 -0.364417203  0.8310968174 -0.048758857
## 96    1.2640438930 -0.4330981858  0.396986447  0.6703585007 -0.205048218
## 97    1.6737044396 -1.1325951861 -2.739124124  1.4838690725  4.647164292
## 98    0.7346432444  0.1969919543  0.697731423  2.1727790457 -0.604546247
## 99    0.0414909931  0.9178224354  0.862357624  0.2102854949  2.152083863
## 100   0.1907424226 -1.6025984250 -0.762466993 -0.1480606215 -0.465345989
## 101  -0.8600375737  0.2083518045  0.117140921 -0.2993013262 -1.852760937
## 102  -0.3933787504 -0.2950525547 -0.429719979 -0.2965134515 -0.563637336
## 103   0.1549517365  0.3529222560 -0.910147374  0.2948670471  0.008375104
## 104   0.5583083737 -1.2607651534 -0.159927709  0.2154002755 -0.235687063
## 105   0.2929214766 -0.4485658836  1.865862827  0.0623293141 -0.706563576
## 106  -0.0281442611 -1.2383581798 -0.814427239 -0.2422444669 -0.340993527
## 107   0.1944985560 -1.5923096670  0.986363029 -0.2028548560  0.435878682
## 108   0.9355211462  0.1082096069  0.089977852  0.9932164375 -0.227493536
## 109   1.8977466460  0.0404455822 -0.314886315  2.0663227533  0.325090223
## 110   0.0406714178  0.1618152354 -0.695671872  1.3135838813 -0.366862352
## 111   0.6456729534  0.4541780848 -0.071689274  1.6840560910 -0.519746698
## 112   0.0796307256  0.3304496154 -1.043725948  0.3229014616 -0.216863101
## 113  -1.4073012975 -1.2271661103 -0.772141145 -0.2592266244 -0.027149244
## 114  -0.2916524074  0.6703108753 -0.717961579  0.6241665113 -0.482318234
## 115  -1.4264174940  0.3184413595 -0.707020293 -0.1939850415 -0.426950358
## 116  -1.3415849659 -1.2110413765  0.314881846  0.1047836571 -0.167202753
## 117  -1.3271528184 -1.2929939960 -0.686333941  0.1705725828 -0.202794861
## 118  -0.5548901439  0.9493089231 -0.824417158  1.1277760134  0.028492078
## 119  -1.3570852315  1.4251954672 -1.118854177  0.1897296533 -0.394395028
## 120  -1.4645761461  0.7454758047 -0.730954668 -0.0639077945 -0.357119845
## 121  -0.3672166351  1.8658121653 -0.625326547  2.3109268942 -0.608486586
## 122  -1.4194884060 -0.1703592872 -0.862219360  0.1221492860 -0.460905691
## 123   0.6728788478  0.9462645743 -0.442591291  1.3106734138 -0.406050770
## 124  -0.0142112016  0.7416036575 -0.861390264  0.4643305229 -1.045275129
## 125  -1.5281429212 -1.2345910219 -0.450135740  0.5119637865 -0.358874060
## 126  -0.3744807184  0.3793974966 -0.713074959 -0.0320162198 -0.043527537
## 127  -0.7135090698 -1.0681003595 -0.260045361  1.0565487941 -0.558411511
## 128   0.0839149312 -0.3065682030 -0.866803519  0.5151532087 -0.902623405
## 129  -0.4622261978 -0.9413559756 -0.651786210  0.0932408160 -0.139213362
## 130   1.2976076820 -0.0540443050 -0.982069139  0.5572220180  0.028008264
## 131  -0.4096719840 -0.3887387922 -0.138753698  0.3760860100 -0.519163923
## 132  -1.5136613483  0.3349692122  0.311186883 -0.0409828174 -0.318516457
## 133  -1.1985727223 -0.8329693201 -0.522314143  0.3834978165 -0.087621023
## 134  -1.2326304559 -0.6832671886 -0.535186391  0.3340892787 -0.069221390
## 135  -1.4863452793 -0.1700196111 -0.847825397 -0.1139854118 -0.550627868
## 136  -1.4502656689 -0.9910761616  0.153784134  0.4010034114 -0.122397268
## 137  -1.3852605055 -0.6916884143  0.144997686  0.1395873629 -0.031903046
## 138  -1.3352816876 -1.1177467437  0.995847901  0.8330057555 -0.303254223
## 139  -0.7587776700  1.4823398965 -0.206217580  0.1998006677 -0.864805985
```

```
## 140  -0.1416035438  0.1695389184 -0.892428115  1.4266310399 -0.429993169
## 141   1.0259078780  1.1036060533 -0.298439126  1.2335275647  0.048845825
## 142  -1.2315692795 -0.1984018865  0.336586493 -0.1162407375 -0.546346062
## 143  -1.5380662744 -1.0567225677 -0.535874096 -0.2716895055 -0.262744419
## 144   0.2730118204  0.5543035374  0.006870510  1.3783898626 -0.355784943
## 145  -0.9556945604  1.0602657214  1.313599305  0.8066840581  1.919051948
## 146  -1.5582490183 -1.2008894033 -0.460900235  0.3916964688 -0.353514724
## 147   0.8050626217 -0.3921012668 -0.299277000  0.1767126071 -1.597131800
## 148  -1.2235719664 -1.1128569686 -0.439083977  0.8541032920 -0.334231361
## 149  -0.4063294172 -0.8069535439 -0.325314242 -0.3497154286  0.455057353
## 150  -0.4029227986 -1.2649074632 -1.001654653 -0.1397673998  0.459792910
## 151  -0.9246085365  0.4180083053 -0.388952446  1.7831923397  0.065076303
## 152  -0.6438858258  0.6470710425 -0.018279264  0.2227671441 -0.648906514
## 153  -1.4141955442  0.3140508352 -0.769955984  0.3472123616 -0.144177739
## 154  -0.6016651378  0.4481558516  0.877000388  1.7887570529  1.863210570
## 155  -0.5803440638 -1.4670163325 -0.691738248  0.9514861916 -0.260924914
## 156   0.1321733599  0.7445647983 -0.016038410  0.8079908235  0.200883847
## 157   0.7663093260 -1.1387542669  0.541390565  0.4760865809  0.444113418
## 158  -1.5060211740 -1.5325572991  0.434107613 -0.1374247542  0.098594127
## 159   0.8642050805  0.3273562590  0.749621376  2.2675474861 -1.738029707
## 160  -0.1061104535 -0.5284709444  0.641900843  0.3926919585 -0.743364220
## 161  -1.0467146349 -0.7061927361  0.026961741  1.2112715515 -0.126801355
## 162   0.7524009703 -1.2688302563  2.208166591  1.4115380619  0.102979899
## 163   1.0988385381 -1.1731276842  0.149606961  1.3553744580  0.213373580
## 164  -0.0292275937 -0.0206177728  0.517801525  0.2789370405  0.341510415
## 165  -1.2128492702  1.5187892725  1.270232374  0.8181268501 -0.134264249
## 166  -0.4735059084 -0.9036204155  0.731867147  1.7789027798 -0.384440237
## 167   1.1846822022 -0.8924883608  0.325953974  1.3227320906 -0.044667510
## 168   1.3059704335 -0.7732381034  0.969499598  1.1836479127 -1.542159468
## 169   1.0655623590  0.0361792525  0.085782235  1.9099595579 -0.039322493
## 170   0.6009356105  0.2434209530 -0.150608954  1.4109218336 -1.931320483
## 171   1.5022574674  0.6772203848 -0.643683113  1.9090008853 -0.511184524
## 172   1.5654372084  0.5887934200 -0.139931669  2.0757373420 -2.469229973
## 173   0.6172529025 -0.4389771810 -0.935366729  1.0026071723 -0.627863657
## 174   0.2140700534 -1.1728195504 -0.396675153  1.7459323228  0.440026059
## 175   0.5665023020 -0.0388574106  0.299161650  0.8183498061 -0.439789742
## 176   1.3162711217  0.4520087144 -0.474254444  1.3968418298 -0.032590485
## 177   1.5515017818 -0.0770024445 -0.765783573  1.6742376864  0.135161875
## 178   2.0049564095 -0.9798514008  0.060150835  2.8359312435 -1.544297595
## 179   1.7325222401  0.0780714095  1.050528263  2.1409439035 -1.681367516
## 180   0.8780964471  0.7718724399  0.042903317  1.3148565903 -0.011984921
## 181   1.4061157395 -1.2577000525 -0.410962839  1.7928817373  0.057147937
## 182   0.4592870387 -1.1101310951 -0.613959602  1.4136550617  0.109411077
## 183   0.8201171093  1.3818042413  1.312143209  1.4110431769 -1.434433519
## 184   0.0947686225  0.7531031520 -0.965551902  0.8798477187  0.390196127
## 185   1.0174527411 -1.7089349004  0.387087652  0.6794853067 -0.057720989
## 186  -0.0911190461 -0.1094261947 -0.432141941  2.2295799953 -0.623228687
## 187   1.3541188711 -0.8662559009 -0.072102303  1.8377401988  0.121961377
## 188   1.6203698715  0.2751946746  0.102636312  3.5198523287  0.635041861
## 189   1.5177589942 -0.0286095916  0.119477513  1.6162213641  0.112196431
```

```
## 190   0.9387986646 -0.2942145608 -1.574556434  0.7695005949  3.263741864
## 191   1.1107477774  1.4661376687  5.413758752  2.9739211762 -2.857577410
## 192   0.7076019555  1.1936654189  0.644090753  1.6365409212 -0.760482491
## 193   1.3146986027 -0.5719470668 -0.234953354  0.9512890182  0.447224836
## 194   1.2769628448  0.9851400875 -0.161582358  1.5970994574  0.227024617
## 195   0.0884937265 -0.2372804295 -0.441486572  1.2549399068 -0.439718827
## 196   0.5075281121  0.8104384744 -0.552040655  1.4287660964 -1.881452179
## 197   0.9632251459  0.8090109825 -0.185917911  1.3317770529 -1.795746351
## 198   0.9980027391  1.6678324537  1.047206736  0.3030551280  1.112738491
## 199   1.3796084073  0.1574817165  0.589104988  1.2089966633 -1.906676264
## 200   1.8449308488  0.0075854268 -0.346355191  2.0867892387 -1.349588781
## 201   1.5129428607  0.7014005049 -0.837643024  3.3217958330 -0.785990696
## 202   0.7105759452  0.0595449480 -0.149543566  0.7255937116  0.043560317
## 203   0.8833473271 -0.4981207008  1.815926264  1.6808432220  0.036422993
## 204   1.1664588693  0.8679064161 -0.344711544  1.1105627621 -0.636639928
## 205   1.7123986686 -0.1761990708 -0.587637767  2.5256951984  0.457074937
## 206   1.0935256309  1.1275992170  0.275888012  2.3576296860 -0.406019889
## 207   0.9736604223 -0.7162228118 -0.723370170  1.2952754888  0.203243696
## 208   1.5133862381 -1.0107978290 -0.399818998  2.5701718073  0.323171077
## 209   1.2513386553  0.2214135146 -0.178913206  0.8827088779 -0.061045535
## 210  -0.0047857800  0.3409466193 -0.335356864  0.6737123168 -0.224088882
## 211   0.2692426057 -0.6938905440 -0.661372318  1.1782901917  0.152659883
## 212   0.4905046471  1.0189851125  0.374615506  0.6496068695 -1.940646320
## 213   0.8674174335  0.9418162444 -0.199572196  2.4740829638  0.175604253
## 214   0.5477344755 -0.2029009780  3.966238882  1.8035966200 -0.090391945
## 215  -0.0578149103  1.3933825102  2.541720661  1.1895524466  1.534679653
## 216   1.4073726100  0.5478229368 -0.348949971  1.4593209611  0.141676439
## 217   1.3994270472 -0.2394390369 -0.415129129  1.4016264674 -0.107114126
## 218   0.0675126604  0.6445521624 -0.924037403  0.6058372076 -0.672458698
## 219   1.8113928939 -0.0434622264  0.976927136  1.8599480607 -1.151690258
## 220   1.4200931999 -1.3117734218 -0.122921798  1.5714941183  0.085353816
## 221   1.2735775505 -1.2145846884 -0.908887199  1.5897366592  0.114755151
## 222   1.0547710077  1.9514148753  0.861085957  1.8919604085 -0.629751003
## 223   1.3214620579  1.6056732857 -0.274594388  1.0609570169 -1.928396162
## 224   1.7160467317  0.6638329673  0.231711307  1.8057878301  0.324091145
## 225   0.4745655493  0.9346821719 -0.463948322  1.6361279151 -0.518483543
## 226   1.0951239160 -0.5268736916 -0.624252027  1.1216503718  0.441242189
## 227   0.8173189746 -0.0649410947  0.690331687  1.1042788562  0.008216557
## 228   1.3925150934 -1.2730584807 -0.930677447  1.3425470034  1.413909035
## 229   1.1208498275  2.1653837051 -0.747862817  1.6030364791  0.931011937
## 230   1.2740952640 -0.6636785482 -0.934887976  0.7483267395  0.648572852
## 231   0.1968953419  0.0797459932 -0.917012282  1.3186555248  0.324750739
## 232   0.8768717542 -0.2786246726 -1.028613927  1.3731672380 -0.187361355
## 233   0.7218689507  1.4725972745 -0.296570354 -0.0158447235 -1.633991361
## 234   1.5451298627  0.3358855251 -0.914098281  1.8481334265 -0.043607602
## 235   0.5278657923 -0.4666495051 -0.849176421  0.6343604033 -0.534239153
## 236   1.0885066731  0.4059506783 -0.710993138  4.1207521191 -0.710311562
## 237   1.0087077579  0.8603110812 -0.948153146  0.2188175820 -0.504236286
## 238   0.3960465339 -0.8437264975 -0.516225618  1.0963007232  0.187878022
## 239   0.3243739546  1.3556667351  0.965296867  1.8950464824 -0.602452952
```

```
## 240   1.5365209775 -0.9092849222  0.638000168  1.8385963013  0.284261309
## 241   1.1383247721  0.3667651337  1.400151504  0.9563383394  2.114618711
## 242   1.2609371898 -0.7451930091  0.273297252  1.4076849474  1.043739083
## 243   1.6098027048  0.5051741539  0.690470507  0.9870049600 -1.354578034
## 244   1.1447993732 -0.1180508143 -0.763660879  0.4746987785  0.431296502
## 245   1.3347861282 -0.4316308611 -0.405326115  1.2431806530 -0.173950827
## 246   1.2038980779  0.5481102545 -0.034812938  2.5664450709  0.033413850
## 247   0.9550243496 -0.9300927879 -0.738835095  1.1241872490  0.203355230
## 248   0.4613437844  0.9759782276 -0.723791103  1.1401328732 -0.272735173
## 249   0.4969548050 -0.5398626677  1.158165508  0.1388777228 -0.201370423
## 250  -0.0245349766 -1.0198116646 -0.700507866  0.5102157362 -0.013901664
## 251   1.2204749002 -0.0171707873 -0.585509649  1.0661570336 -0.176845352
## 252  -0.1531256662  1.4105810891 10.108193099  2.3513806867 -3.216616896
## 253   1.6121473002 -0.2874066941 -0.631593117  1.5016242490  0.545005277
## 254   1.5191731396  0.1165335285  0.271935199  1.0244760322  0.358151729
## 255   1.5136045283  0.3840089664  0.863033635  1.2490729136  0.433721220
## 256   0.8811922160 -1.2286457758  0.423573571  0.8056691975  0.387593382
## 257   1.5964957545 -1.0246742943 -0.409463222  1.7928031236  0.200666332
## 258   1.4145860004  0.6034903960 -0.761757647  1.7357317233 -0.059294278
## 259   0.6582315103  0.3493634854 -0.983166056  0.4666775515 -0.079063353
## 260   1.0656631794 -1.5507473087  0.228109489  1.8879529828  0.108296809
## 261   1.9741324673 -0.6920960523  0.764343071  2.9170371651  0.464218921
## 262   0.9076118769 -1.2553935837  0.937483085  0.8101311825  0.693284517
## 263   0.8943364392  0.5855702165  0.566958883  0.9831954231  0.157166500
## 264   1.2242373188 -0.7552272703  0.261596842  0.6236458696  0.428307866
## 265   1.9644327598  0.3684806778  2.131304567  2.3828447967 -1.299784227
## 266   1.2049721895 -0.1570995223  0.021794775  0.9813459236 -0.199089687
## 267   1.6086215023 -0.4621093815 -0.235252637  1.8454010346  0.516748845
## 268   0.8865583864 -1.0433595098  0.369965137  0.7404909163  0.088848759
## 269   0.5715350786 -0.8208210498 -0.678593711  1.4949152447  0.207387962
## 270  -0.4283678084  1.1333897512 -1.148012397  1.2177277585 -0.335677306
## 271   0.7412169717 -0.6661499421 -0.479321449  2.3144822450  0.266634657
## 272   1.4787435145  1.4635090806 -0.573358391  0.9880762783 -1.958533715
## 273   1.8353715698  0.7435658277  1.469007218  1.2821350600 -1.224612931
## 274   1.3327148641  0.4608208762  0.597416583  1.2179338756 -1.801436451
## 275   1.4222328330  0.3620476183  1.441385419  2.1247158313  0.458811374
## 276   0.5344734857 -0.8442036433  1.131240539  2.5881915452  0.176925727
## 277   1.9930017486 -0.8961145024  0.451836972  2.9188833641  0.526384668
## 278   0.2288386627 -1.6874109681  0.923662191  1.3651270215  0.027946255
## 279  -0.4168599646  1.8187871480 -0.367387731  0.6533569481 -2.389419294
## 280  -0.0623291751 -1.3746132635 -0.978685995  0.9220195174  0.366893345
## 281  -0.1003504820  0.0560100820 -0.121895443 -0.1203510087 -0.374191675
## 282  -0.8324982305 -1.0267476411 -0.481182634  0.0900331476 -0.302568843
## 283  -0.1519799940  0.3018204902 -0.770934237 -0.1517361488  0.318738524
## 284  -1.2936775301 -1.1606004731 -0.770558500 -0.2864018563  0.369562628
## 285  -0.6960149296 -1.5793452561 -0.041728701  0.0115629596 -0.050092841
## 286   0.1303466496  0.7731121195 -0.421288505  0.8299561140  0.518239427
## 287  -0.6054967670 -0.3015969687 -0.343266813  1.4254574142 -0.230231580
## 288   0.0525439639 -1.4549851142 -0.829293302  0.9493567056 -0.181481490
## 289  -0.3875499880 -0.2965104236 -0.424577843  0.2506602459  0.096720449
```

```
## 290   0.3811124682  1.7925598103 -1.000284470  0.2960777151 -1.741495794
## 291   0.0049392986 -1.5886364647 -0.808479307 -0.2890921876 -0.172057661
## 292  -1.1412434045 -0.5528428063 -0.180249658 -0.2952976709 -1.369174704
## 293   0.0358808996  0.9825650012 -0.815473119  0.1017475814  0.239720045
## 294  -0.0291754839 -0.0870731881 -0.008098367 -0.8723535181 -2.000240977
## 295   0.5724317493 -0.9181475625 -0.902128756  0.0987059768  0.390578155
## 296   0.0614825521 -1.4574153659 -0.026361869  0.0670957561 -0.094809645
## 297   0.1731276858 -0.9641901598  0.933947146  0.3607398321 -1.866098156
## 298  -0.4471985100 -1.0294443461 -1.366314971 -0.4149117467  2.505673116
## 299  -0.4922300305  0.9024695415  0.068286518  1.7953478712  0.248110628
## 300  -0.2904994543 -1.0253598626 -0.775200981 -0.4018459450  0.648276874
## 301   0.1104247822  0.9347102456 -1.063655210 -0.2912016332  0.602452908
## 302   0.1846739140  1.0205016135 -0.860563143 -0.1227871945  0.762063777
## 303  -1.4714002625 -1.2684414877 -0.298657634 -0.3458510259  0.161064036
## 304  -1.2821567546  1.5222695690 -1.068351196  0.2511069162 -0.225837156
## 305  -0.9424590121  0.3239904979 -0.980654157 -0.0435457992  0.226783821
## 306  -0.9031724401 -0.9015470477  0.485220759  1.0091261613  0.542823479
## 307  -1.0196891139 -0.0196469498 -0.834517057 -0.2464438089  0.107148749
## 308   0.1772326770 -1.4799334338  0.039512431 -0.3729480620 -0.015989151
## 309  -1.4965833190  0.8156992471  0.335272973  0.2127457055 -0.201684007
## 310  -0.8675668710  0.0517163348 -0.828335892  0.1813147295 -0.708338080
## 311  -0.1649478060  0.0388470865 -0.012675198 -0.0162287392 -0.269276412
## 312  -1.4669860643  0.2911155571 -0.724022488  0.0536160050 -0.246827428
## 313  -1.6660296700  1.4060498197 -0.678933609 -0.1037226209 -0.697629522
## 314  -1.3947625154  0.6629331402 -0.879175635 -0.3828685190 -0.804207022
## 315  -1.3686658030 -1.5162663718  0.499905996 -0.0092505688 -0.370250004
## 316  -1.5969952467 -0.0101802078 -0.455403566 -0.1727222577 -0.286456413
## 317  -1.3583078868 -1.0015563593 -0.088349147 -0.1884195341 -1.912727079
## 318  -1.7786319387 -0.1866899396 -0.308222623 -0.2107443980 -0.608462519
## 319  -0.7227598494  0.1053557322  0.261092399  0.3385747747 -0.520266439
## 320   0.1870947065 -0.0843658708 -0.523205444  1.1463059203 -0.764849206
## 321  -0.8887334117 -1.5841878729 -1.068255842 -0.2414100819  1.211854217
## 322   1.3512482919  0.4063958229 -0.719287001  0.6313007629  0.404864545
## 323  -0.4994401779  0.4918020713  0.146120399  0.3799578168 -0.709699913
## 324  -1.1795992517 -1.5978867418  3.294242515  2.2234670684 -0.336651230
## 325   0.1954343254  0.0236469941 -0.140753765  0.0323345546  0.431201670
## 326   0.0385933594 -0.4347082931 -0.621198026 -0.2165330521 -0.612358366
## 327  -1.4012366331 -0.2489831035 -0.294936098 -0.0092785636 -0.151559391
## 328  -1.5043270290 -0.2112721455 -0.110034717 -0.2961109422 -0.280101781
## 329   0.1872061391  0.3968145243 -0.853027132  1.1449021181  0.085183016
## 330   0.3124300339 -1.4970735247 -0.776602854  0.3063605058 -0.367343808
## 331  -0.5287584231 -1.3430415526  0.602476063  0.6189500844 -0.210483531
## 332  -1.3884550264 -1.5753988315 -0.276601833  0.1216013528  0.040316676
## 333  -0.2285176232 -0.4595988235 -0.913198829  0.9631862030 -0.365407063
## 334  -0.9064381541  0.8712461552 -0.162480766  1.1752100035  0.265491067
## 335   0.2474642018 -0.0321881847  0.201357471  2.1434715323 -0.631331007
## 336  -0.7410170624  0.6215067943 -0.974003740 -0.1096412290 -1.251942644
## 337  -0.6867172249 -0.1563478544  0.303148145  0.4521486158 -0.648030215
## 338   0.5230507952  0.5007298234  0.163844300  0.1081151276 -2.010794872
## 339  -0.5822953204 -1.4857790799  1.580893709  0.6116272552 -0.832717080
```

```
## 340  -0.8796326952 -0.5157147527 -0.830479229 -0.1600350918 -0.110390272
## 341  -1.4021073056 -0.8659538038 -0.223800956 -0.3816070861  0.293635121
## 342   1.1133028238  0.8545030895 -0.278418893  0.1785569446 -0.492410898
## 343  -0.3687154057  0.5385344039 -0.127171873 -0.4829397420 -1.869659735
## 344  -0.8871404659 -1.3121562944 -0.356935863  2.2729353833 -0.232239191
## 345  -0.3710148158 -0.7704464343  0.505816491 -0.0459029596  0.210000379
## 346   0.1531992339 -0.5470071362  1.471556025  0.8887690911 -0.279839918
## 347  -1.3291129525 -1.0333415190 -0.549135521  0.1928620560  0.008158813
## 348  -1.6429116148  0.9476903961  0.231451221  0.0940089205 -0.902530081
## 349  -0.7919641397 -1.7075605211 -0.656213253 -0.0207772692 -0.514495889
## 350  -1.4486141040 -1.4016551473 -0.281027775 -0.0907101061 -0.053561807
## 351  -1.3929307250 -1.2087569605 -0.140797140 -0.2973793339  0.072737154
## 352  -1.2346687307 -1.1455864677 -0.297873618 -0.0110504058  0.596606878
## 353  -1.0125833072  0.4552218621  0.906273016  1.7771791550 -0.554266183
## 354   0.3249669730  0.7251463923  1.678112178 -0.3757271940  0.707151129
## 355  -0.0778482564 -0.9996697866 -0.664513776  0.6058026794  1.132350550
## 356  -0.8947430072  0.1792314260 -0.376847734  0.5116196789 -0.189641993
## 357  -1.4034172576  0.8231386007 -0.825053068  0.2860108486 -0.068196900
## 358  -0.4192627883 -1.0120922839 -0.808999063 -0.0713662160  0.518740586
## 359  -0.4432251378 -0.1478959803 -0.934085037 -0.4620218131 -0.083198861
## 360  -0.7459341525 -0.9938909208 -0.722532547  0.3016906934 -0.376601512
## 361   1.1790481376 -0.0509992809 -0.145007422  0.1304111758 -1.734110116
## 362  -0.6143985441 -0.9293299803  2.881377040 -0.5103809404  2.667883543
## 363   0.2947257653 -0.3374881094  1.513194271 -0.3775465195  3.262000998
## 364   0.1291398689  2.7380264666 -0.090820795  0.9414246252  2.527815179
## 365  -1.5649321061  0.6463839075 -1.016265760 -0.0788536605 -0.207721664
## 366   0.5867830221  0.7266235942 -0.204276196  0.2489014785 -1.891514540
## 367  -1.8025961428  0.8558533257 -0.412566798  0.0330290901 -0.436271628
## 368   0.5193243968 -0.2895909461 -0.657324568  1.6160259797 -0.385467892
## 369   1.6098484481  0.6902647380 -0.033390189  1.3668089393  2.003698189
## 370   1.2343955113 -1.4261832557 -0.512345069  2.5943219012  0.826085670
## 371  -0.5051221254  1.0075647082  0.437812627  1.0759166497 -1.160137245
## 372  -0.0421577627 -0.1324866602  0.025120874 -0.2479880000 -0.675538363
## 373  -1.4999167718 -0.8094786267 -0.784473579  0.0856440648 -0.570641877
## 374   0.3038919209  0.6719320307 -0.245568948  0.8952412027  0.283256171
## 375  -0.0154546120 -0.0337938107 -0.309033938  1.5358059666  0.170606012
## 376   1.8356416304  0.3637942880 -0.953976943  0.8579306839  0.755974146
## 377   0.0979080849 -0.9590939064 -0.680746634 -0.2564953347 -0.221998520
## 378  -0.0233298996 -1.3681134337 -0.667344516  0.3519300132  0.018376293
## 379  -0.7554213441  0.0858958546 -1.001496176  0.2491348752 -0.105754683
## 380  -0.6022873604 -1.4923282259 -0.248812500  0.1466823555  0.215587248
## 381  -1.2015926510 -1.5674514905 -0.471682361  0.9593423252 -0.468768726
## 382  -0.6080394487  0.3015863766  0.333385092  1.0853077011 -0.842922705
## 383  -0.8447859158 -1.2135968646  0.116397218  0.2610163045 -0.640380637
## 384  -1.6217638794 -0.0484275364 -0.291058605 -0.1690618643 -0.672874408
## 385  -1.1747867814  1.1669073608 -0.155356771  1.9689678804 -0.917037196
## 386  -1.2753132968 -0.6659130660  0.264173476  0.7576125213 -0.597157053
## 387  -1.5796033375  0.0979951913 -0.520574435  0.4796760150 -0.728630292
## 388  -1.5979029802 -0.7519341853 -0.047834349  0.2451427990 -0.470151234
## 389  -1.4088655457 -1.4746739626  4.093993850  0.5036403125 -0.593186989
```

```
## 390  -1.4781293304 -1.3193127187 -0.452829173 -0.0689844296 -0.245004162
## 391  -1.6930669813 -0.2623784700  0.602849751 -0.0279164806 -0.866013294
## 392   1.0214889551  2.0992985994 -0.069283215  2.8800981749 -2.791924756
## 393   0.6390445290  0.4333463969 -0.527880818 -0.0895166815 -1.479426088
## 394  -0.6084719280 -0.0439348944 -0.683862707  0.0466338057 -0.617312554
## 395  -1.4950742348  0.2355906134 -0.403888908 -0.0433750322 -0.623508667
## 396  -0.7841253111 -0.4839713486 -0.471713553  0.4001816042 -1.131694632
## 397  -0.9871468122 -0.2839628390 -0.403078424 -0.1279200256 -0.031896625
## 398   0.3672420037 -0.6118858904 -0.681582825  0.0307657590  0.005461392
## 399  -0.7567435291  0.6739777735 -0.465070825  0.2586740417 -0.649301044
## 400  -1.4080036349 -1.3338158871  0.614675034  0.1978616418 -0.362259178
## 401  -0.5256221927  0.7116529675 -0.743130688  0.7522905402  0.520008484
## 402  -1.2198059892  1.2918669716 -0.820607028  0.3223210484 -0.647097212
## 403  -0.3100223110 -0.9646899444  0.191176849 -0.3642620961  1.968561257
## 404  -1.0103911985 -0.5214163493  0.079015571  0.2367071515  0.323526435
## 405  -0.6087619434  0.8201791766 -0.109879829  0.3786434788 -0.645436851
## 406   0.0295478402 -1.0972073766  0.212522835 -0.0858797775 -0.522593452
## 407   0.3777280634  0.6661698060 -0.132519680  0.1190683806 -0.526356295
## 408  -1.4661024038 -1.3979199855  0.359707431  0.0944730445 -0.361533685
## 409   0.0583625565  0.1178841372 -0.079167323 -0.1106380949 -0.683113419
## 410  -0.4910345079 -0.9426294045 -0.213000971  0.1388542354 -0.218390363
## 411   0.6141144179 -0.5107803459 -0.551657003  0.8460160224 -0.036905083
## 412   0.2252098733  0.2445894991 -0.125885700 -0.0674445422 -0.671146407
## 413   1.5753403636  1.2085667808 -0.799701336  0.5764285874  0.160578129
## 414  -1.3114880287 -0.9813810072 -0.512362466 -0.0898970392 -0.068609832
## 415   0.2611844639 -1.1886193952  0.150469445  0.1061877414 -0.231987988
## 416   0.4076606201  0.0228768885 -1.136493945 -0.2351898564  1.973757057
## 417   0.7281663689  0.6559746028  0.732329442  0.7044936399  0.316640086
## 418   0.4506284394 -1.2941980216  1.125597157  1.4596157839 -0.602073648
## 419   0.8351963535  1.2073037624 -0.431739067  0.6677457597  0.280259534
## 420  -1.2308610451 -0.7380319594 -0.044107425  0.2709681900 -0.048258075
## 421  -1.4759149409 -0.2920707768  0.725610050 -0.0260066980 -0.373971391
## 422  -1.2472617013 -0.0987505354 -0.229250739  0.0646778212 -0.261423327
## 423   0.4327432103  0.2027085317  1.791261656  1.5092421343 -0.799450884
## 424  -1.2849832534  0.0102806904 -0.157423842  0.2214276350 -0.483133824
## 425   0.8932708410  0.5185495793 -0.957787558  0.8005636364  0.387200969
## 426  -1.5220947770  0.3867485087 -0.184622365  0.1871203477 -0.537462779
## 427  -0.0899994908  1.9910680288 -0.434349085 -0.0784539634  0.512448704
## 428  -0.3164163368 -1.2343695172  0.192866297 -0.3377973923  0.205267949
## 429  -0.9514941315  1.3138102776 -0.168681876  0.2604047218  0.728860900
## 430   0.7137402538 -0.8925792954 -0.298609068  1.2067630295  0.075558214
## 431  -1.1811059783  0.5305485710  1.056284444  0.7990868644  1.384293107
## 432  -1.3048625354 -0.9695109972  0.123128192 -0.0257276063 -0.120643965
## 433  -0.2223133165  0.3127082121 -0.048824665  1.1212536091 -0.044602853
## 434   0.6782910956 -0.1783836218  0.275823699  0.1861542058 -0.577063108
## 435   0.1015645884 -1.4562578541 -0.389386706  0.5631315501  0.200856536
## 436   0.7483342461 -0.2511243071  0.112728545  1.9018602040 -0.571541136
## 437   0.7332724603  0.8310361339 -0.585337423  0.9808571372 -0.159241110
## 438   0.6378275704 -1.2237702272 -0.436046810  0.5297342933  0.261464560
## 439  -0.8570810006  1.0934286917 -0.719587665  1.0488966291 -0.089531208
```

```
## 440   0.5611140081 -1.5500248412 -0.792682815 -0.0304068396 -0.350404225
## 441   0.1855010315 -0.9451516530  0.249323715 -0.3592453046  2.304617063
## 442  -0.1506275582 -1.0410115430 -0.723394134 -0.2982616987  0.173998271
## 443  -0.7076449458 -0.3684555506 -0.742433895 -0.4121928357 -0.640986542
## 444  -0.2258949968  1.1033273467 -0.129255266  0.2295364790 -1.424922141
## 445   2.0017486453 -0.3357890306 -0.262653521  1.4241866399  0.971739072
## 446  -1.3071983966  0.5505720718 -0.254241877  0.8283005571 -0.541532809
## 447   0.0687645384  0.5893304575 -0.622531654  0.2134032434  0.860190465
## 448  -1.3532258442 -1.2862904069 -0.606094050 -0.2100443084  0.130387066
## 449  -0.2309655621  0.1182915948 -0.523267553  0.0598210578  0.675299426
## 450  -0.1804430335 -1.5015610934 -0.208266327 -0.1274094534  0.755708071
## 451  -0.4198322583  0.8132753828 -0.305868994  0.2912974830 -0.067480918
## 452  -0.3976330010 -1.5051323703  0.637150750 -0.1614011305  0.362115744
## 453  -1.5184724608  1.1030501513  0.130991016 -0.1781163917 -0.216473653
## 454  -0.7963634879 -1.1885048424 -0.627911352 -0.1059049452  0.063578159
## 455  -1.1552924535  0.5231468033 -0.158675114  0.6097702118  0.034802391
## 456  -0.8339504172 -0.2961584421 -0.024460668 -0.0576960543 -0.407159847
## 457   0.3636485824  0.9835048812 -0.388281522  0.9714640406 -0.849031963
## 458  -0.3013540778 -0.0724105718 -0.180902466  1.4468315384 -0.858615136
## 459  -1.0126662246  0.8289266647 -0.423144715  0.6120786137 -0.106477780
## 460  -1.4611231164 -1.3811678095 -0.273960866 -0.3765365824 -0.162309917
## 461  -0.8820023013  0.5413256968  0.164315763  0.3683817472 -0.229445240
## 462   1.3249301798  0.6767232004  1.391353209  1.3749272463 -0.436580583
## 463  -0.4103050956 -0.4585018236 -0.850876513  0.1487585371 -0.709922113
## 464  -1.4383333174 -0.4579023499  1.841756130 -0.1819836124 -0.309362367
## 465  -1.3175304851  0.3176454090  0.177278866  0.0721041480 -0.135518308
## 466   1.5313710226 -0.8862820517 -0.623652438  0.6406660584  0.141285276
## 467  -0.0147501902 -1.0627710114  0.463328102 -0.4833767813  1.721282075
## 468   0.7188617275 -0.6853120462  0.727874117  0.7835734652  0.179312083
## 469   1.8462246548 -0.9028404550 -0.402725849  0.8439670350  0.466082904
## 470  -1.3446814332 -1.0479887238 -0.649768613 -0.5209727646  0.129346975
## 471  -0.0928008032  0.0881165346  0.762679987 -0.0060991045 -0.461390234
## 472  -0.1378181240 -0.5471761572 -0.366424829  0.0176676843 -0.875469623
## 473  -0.5878532094 -0.6041209836 -0.289387599  0.4935574407 -0.852634629
## 474  -0.7463693582  1.7862180834  0.586437015 -0.3569714972 -0.594966843
## 475  -0.3897413488 -1.3195198642  2.106657698 -0.6692386842  0.482780655
## 476  -0.4532128433 -1.5946165815 -0.048787041 -0.6365929478  0.125006027
## 477   0.5360465124  0.8671560272  0.636748422  0.4585134194  0.347343713
## 478   1.6218236996  0.8106350374 -1.040153014  0.5658864795  0.138564872
## 479  -0.2777830575 -0.4962828442 -0.662224602  0.2745449133  0.430777614
## 480   0.3625635747  0.4560007158  1.201536369  0.1764569061 -0.631735155
## 481   0.4582248016 -0.4324861023 -0.039329368  0.9019472708 -0.251690782
## 482  -0.4495915372  0.9261549450 -0.775579176  0.0698037747  0.461635239
## 483  -0.7136774112  0.1555112803 -0.997128679 -0.3549495672 -0.017445120
## 484   0.3958482796  0.2142450749 -0.476887170  0.8918004389  0.133000935
## 485  -0.3284437935 -1.0570409252  0.789977076 -0.2570891785  0.087351600
## 486  -1.7194825482  0.1225915593  0.244551684  0.1888085514 -0.395390848
## 487  -1.3091648206 -1.4198544963 -0.869998259  0.2283809481  0.316066517
## 488  -0.9341095717  0.0190340005 -0.701699947  0.0882372002 -0.102100190
## 489  -0.9192359595 -1.1473595624 -0.957366080  1.1160679123  0.814885450
```

```
## 490  -1.3059629006  1.1861515977 -0.204788155  0.0961748736  0.455783187
## 491   0.6140656479  1.2064109582 -0.781348573  1.3047874753 -0.322589840
## 492  -0.7342273630 -1.3203204939  0.360964754  0.2028603984 -0.114302476
## 493  -0.7216346099 -0.8146074956 -0.226426218  0.6854325777  0.350091213
## 494  -1.4391463606 -0.6102767050  0.018996679 -0.0750857927 -0.019018301
## 495  -1.5778793601  0.9105301537 -0.165497709  0.2601530744 -0.157716313
## 496   0.8084332945  0.4159109504 -1.083620795  0.1033079486  0.071641531
## 497  -0.7634520112 -0.0754540833  0.073341351  0.4478894412 -0.528926873
## 498  -1.5392167359 -1.3626964040 -0.499680241 -0.0897921362  0.045571757
## 499  -1.3215838348  0.3425093886 -0.744966140  0.5820257354  0.192081242
## 500  -1.5236399005 -0.1201148772 -0.352723784 -0.2403562269 -0.130197057
## 501  -1.3109353227 -1.0057548108 -0.736772694 -0.0714771506  0.361419634
## 502  -0.2172586821 -1.2993397417 -0.842077946  0.4319958742  0.409794327
## 503  -1.5235801671  0.4270267142 -0.597881171  0.2195306376 -0.050365495
## 504  -0.6686110054  2.0436600264  0.028241336 -0.5270800111  2.282828474
## 505  -0.5836842642 -1.4070775482 -0.994998931 -0.3579428932  0.168115259
## 506   0.6535772975 -1.2858237237 -1.330591465  0.3111792841  1.519743044
## 507  -0.5391142484 -0.4999707008 -0.168115720 -0.1445738057 -0.186273165
## 508  -0.5353822116 -0.5345049208  0.659342835 -0.0504225436 -1.677466159
## 509   0.1515982978  0.4511165082 -0.443982193 -0.4489352944 -0.121201535
## 510  -0.8008562138 -0.5737406610  0.769888575 -0.5235725317  2.426080260
## 511  -0.5837368375 -0.0205431846  0.264885920  0.6890294221  0.640599216
## 512  -0.6582922432  1.1356929819 -0.906384576 -0.5488509969 -0.157693521
## 513  -1.4018037714  1.4014208599 -0.328450560 -0.5232000941  0.597095256
## 514  -0.6845646961  0.6071598754 -0.145849273 -0.5350104368  0.143606034
## 515  -1.4858162422  0.0663650597 -0.500388780 -0.5841817522  0.047427951
## 516  -0.8644331004 -1.4920217430 -0.633967442 -0.5715764779  0.529928674
## 517  -1.7515828066  0.9667730856 -0.868796590 -0.4809405021 -0.556857181
## 518  -1.5662437801  1.3752096739 -0.811475108 -0.4762811142 -0.140842584
## 519  -1.0076667215 -1.4751147832 -0.597632848  1.4776517798  0.076869314
## 520  -0.4916889061 -0.3279304947  0.180513757  3.2494272402  0.044693121
## 521  -0.7713994807 -1.4434512104 -0.895239288 -0.2281170458 -0.104693246
## 522  -0.4450994495 -1.5812085088 -0.458293991 -0.3609026291  0.353643204
## 523  -0.7427787739  0.9288354777 -0.450207866  1.6954116937 -0.007707669
## 524  -1.0752970854  2.7350981799  0.090440534  0.7080021016  2.565961867
## 525  -1.6110849264  0.7486410128 -0.945043835 -0.5493618273 -0.363522829
## 526  -1.0176514640  0.6366776244 -1.060947740 -0.2840690233  0.992887490
## 527  -0.8070882383 -0.9760238301 -0.749174623 -0.0523695563 -0.100004119
## 528  -0.6359337657 -1.2693358629 -1.421895051 -0.0384079365  2.033987346
## 529  -1.1804942154  0.5269128283 -0.192786890 -0.0731321776  1.001419065
## 530  -0.0592473983 -0.0121947296 -0.356682880 -0.3142024022  1.739304809
## 531  -1.3930590910  0.4133535939 -1.078807439 -0.6141820972  0.269747734
## 532  -1.2925240542 -1.2785748666 -0.672603660 -0.1304286799  0.238538742
## 533   0.1237591548 -1.2237938847 -0.933020987 -0.2552080370 -0.130654207
## 534  -0.6019062921 -1.4447268649 -0.595063412  0.6171478118  0.524125276
## 535  -1.6361174840  0.2379576674 -0.557387884 -0.1837738738 -0.144964984
## 536  -0.8620920124  0.3319573040 -0.618295987  1.4693717072  0.479619445
## 537  -0.6164280538 -1.2526245002 -0.724859959 -0.3834095201  0.476276378
## 538  -0.4566304574 -1.4648587966 -0.943046570 -0.1297429633  0.132851504
## 539  -0.3018821874 -1.1225950850 -0.056560941 -0.1389147003 -0.067224044
```

```
## 540  -0.3629110203 -0.5947910070 -0.460680945  0.2043418938 -0.051220479
## 541  -1.3330920728  1.6868739843 -0.007464387 -0.6166575633  2.346571073
## 542  -0.8760006515 -1.2995773326 -0.393976091  0.9019659286  0.331117256
## 543  -0.9247949687 -0.2031126884 -0.049092781  0.0513462380  0.345399417
## 544  -0.6765558559  2.3814755357 -0.535160500 -0.1304520837  2.848610853
## 545  -0.0558906002  0.5633874080 -0.206418246  0.3358499240  0.429623917
## 546  -1.1226728677 -1.1795969830 -0.947870912 -0.0489950498  0.403148195
## 547  -0.7241049133  1.2571870179 -0.986885554  0.1329259910 -0.805043382
## 548  -0.6535102623  0.9642889695 -0.002554514 -0.3570119893 -0.421114927
## 549   0.3224848374  1.0800541553  1.320291572  0.2773964375  1.152510999
## 550  -1.4340555695 -1.3638932965 -0.875012183 -0.1590141994  0.120403994
## 551   0.1483305105  1.6337937677  1.045226390  0.0511521911  2.691584392
## 552  -0.1505504099  0.9849632747  1.496247072 -0.2819909039  2.377293865
## 553  -0.2354214025 -1.1746590374 -1.013401708  0.4389348830  0.334218271
## 554  -0.4905680453  0.4317450064 -1.096876611 -0.5142373330  0.096730328
## 555  -0.1514548370  1.9339356754 -0.458397981 -0.6516070790  2.758655425
## 556  -1.4995128172  1.2124249620 -0.990585642  1.1885252406 -0.165905642
## 557  -0.4286319750 -0.5317090527 -0.167118468 -0.4585486939  0.319822352
## 558  -1.3405274553  0.1716413319 -1.082987966 -0.2074337225 -0.081445533
## 559  -0.4174222097 -0.9969526591 -0.727071622 -0.0903757770  0.346966831
## 560  -1.0564548046  3.2406028516  0.507206888 -0.3503338793  2.311050740
## 561  -1.2214946594 -0.4246200687 -0.505088513 -0.3133265483  0.018136235
## 562  -0.4778031953  1.1380929227 -0.799213457  0.3696551679 -0.069607492
## 563  -0.6066440487  1.0865294119 -0.063729266  0.5591974916 -0.953427169
## 564  -0.0971144127 -1.4407884288 -0.375801703  0.6733427417  0.299210709
## 565  -1.3396046998  0.5373515751 -0.281488696 -0.2907631847  0.146101671
## 566   0.3131240190  1.2756908046 -0.985753004  1.1071589081  0.712865226
## 567  -0.7637046045 -1.5424519189 -0.336551887  1.3727302093  0.251647607
## 568  -1.0199321405  1.4072775686 -0.687414928  0.3855114696 -0.020510018
## 569  -0.7230460518 -1.1996940429 -0.625449309  0.5491875825  0.917968829
## 570  -0.2919256591 -1.3359214190 -0.921058214  0.2839564428  0.044341679
## 571   0.9396918504 -0.4159110783 -0.595502983  0.1685118632 -0.170946256
## 572  -0.3828229894 -1.5842566838 -0.090249206 -0.7194944650  0.525953159
## 573  -1.2745554558  0.0771568211 -0.895318549 -0.0030585881  0.563788963
## 574  -1.5364898937 -1.0819070293 -0.812702317 -0.4977021201  0.269997617
## 575  -0.9151680968  0.2341550097 -0.222177297 -0.2384120244 -1.529892385
## 576  -0.7597455203 -0.8704509083 -0.672623678  0.5662076136  0.712071445
## 577  -1.1027072254  2.2729882183 -0.275990676 -0.1561499269  1.381912734
## 578  -0.7115066450 -1.5577882290 -0.637466239 -0.2919771087  0.572336912
## 579  -1.2542020423  1.1814436039 -1.222019477  0.1440513582  0.321044293
## 580  -0.1742438779 -0.2467107786 -0.175241925  0.0004153622  0.311776823
## 581  -0.7239006692  0.8845322040 -0.446081994 -0.0997842891  1.428239739
## 582   0.4606396084  0.6702280368 -1.275793856 -0.4343328143 -0.241193761
## 583   0.1156754115  1.2956953933  0.248373686 -0.3694592406  1.359137539
## 584   0.9178255511 -0.4135065686 -1.216931532  0.6420567974  0.758319148
## 585  -0.6362470640 -0.8528213697 -0.438494332 -0.4156373525  0.432205122
## 586  -1.0321474804  1.7914817082  0.597961543 -0.4452306926  2.821201899
## 587  -0.2787935798  1.9485529226 -0.394573999 -0.0199507110  0.559264670
## 588  -0.5923984135 -0.4678246229 -0.615592331 -0.3782816205  0.412518956
## 589   1.8111373042  0.5733109028 -1.243449834  0.8135833550  0.539615096
```

```
## 590  -1.1350521979  0.9099737466  0.157935317 -0.0833335107 -0.029946235
## 591  -1.2229011270  0.9733920119 -0.252718520 -0.2582105021 -0.113730648
## 592  -1.0162786905  2.5429111521 -0.136594768 -1.0056609488  2.408445618
## 593   1.1397424871 -0.8541592704 -0.104736618  0.5667653727  0.593616037
## 594  -1.2290296294  0.5434131706 -1.223219912 -0.2209635742  0.231267925
## 595  -1.5602446973 -1.3617817388  0.586476606 -0.3975618015  0.261012956
## 596  -0.1665036553  0.7602220756 -0.829461526 -0.5768019781  0.508826905
## 597  -0.9434442624  0.5215024865 -0.594798952 -0.5577226710  0.608425413
## 598  -0.7211033622  2.2322404272 -0.561578407  0.6812855664  0.693945173
## 599   1.1442810634  0.5726755308 -1.301359303  0.8105220438  0.228754093
## 600  -0.9307033938  0.1261560858 -0.430602875  0.3431985063  0.358543222
## 601  -0.1601681963 -1.0214151687 -1.046732351 -0.3945334755  0.746390730
## 602   0.0437621032  0.6305375200 -1.427106793 -0.1084699753  0.564317437
## 603  -0.5092139332  0.9867747308 -0.610539822 -0.6066454793 -1.546290838
## 604  -1.0242796059 -1.2753078422 -0.923255137  0.0316825639  0.537167066
## 605   1.8233674665  0.9098305371 -0.258701453  2.6082066363 -1.731995713
## 606   0.4739465310 -1.2343515584  0.224083460  1.0400278746 -0.389159905
## 607  -0.7604018905 -0.4713681252 -0.866779964 -0.3055055821 -0.347511069
## 608   0.1692059017 -1.5892986143 -0.540272764  0.1471743549  0.425295082
## 609  -0.2903463354 -0.4707675390 -0.893315859  0.1971034848 -0.155750162
## 610  -0.6412259675  0.4248801782  2.035077916  0.5382002962  0.171592972
## 611  -0.9096538283  1.6126456091 -0.206034314  0.2886916964  0.335186669
## 612  -0.5879086472 -0.6250944141 -0.133713325  0.3759301311 -0.412830206
## 613  -1.3556369142 -0.1605390231 -0.679200345 -0.0308890724 -0.019961774
## 614  -1.6723322824 -1.3110018215  0.237887061 -0.1221812223 -0.156745378
## 615  -0.4904477537  0.5389226742 -1.238574259 -0.5740151581  0.773263938
## 616  -0.5279943039 -1.2027495896  1.483206824  1.0352572257 -0.129578728
## 617  -0.4135434254 -1.3118459218 -0.824393357 -0.2858308684  0.329580504
## 618  -1.7960229218 -0.2210353210  0.285645669 -0.1364903119 -0.607905401
## 619   0.9218167537 -0.3780860864 -0.793894762  0.0788022414  1.456467181
## 620  -1.4608438867  2.6352673569 -0.498745814 -0.0150707497  0.009119974
## 621  -0.3630302156  0.3987052366  1.403299325  0.1040740409  0.062438646
## 622  -0.7534210405  0.5952697888 -0.931502558 -0.1045502730 -0.006774744
## 623  -1.1248933378 -1.5458986536 -0.857472484 -0.1184315955  0.164411003
## 624  -0.6150659777 -0.1363912456 -0.313462727 -0.4898582741 -0.048131085
## 625  -0.8649070006 -0.4820589085 -0.121697374  0.0679647292 -0.684805463
## 626  -1.7240867687  0.2143844188  0.890050566 -0.2000599750 -0.213332218
## 627  -1.0105254765  0.6295790368 -0.379421969  0.0214451897 -1.051580269
## 628  -0.9742769765 -1.0025347255  0.150827457  0.2353155479  2.316910911
## 629  -1.6549519736 -1.4163038626  0.892265789 -0.4377340000  0.021742243
## 630  -0.7721411125  0.0429366164  0.881240781  0.0565444291 -0.279601838
## 631  -0.5515817880 -0.1298033390 -0.460320623 -0.2451656760 -0.075411044
## 632  -1.0149571487 -1.4135276503 -0.907216490 -0.2680275693  0.121672010
## 633   0.2423388943 -1.1507166781 -1.002736881 -0.3565234719  0.848592328
## 634  -0.7524515080 -0.5128263570 -0.422659315 -0.4921316639 -0.301222727
## 635  -1.3992408209  0.5271225519 -0.377123504 -0.5938299211 -1.549234250
## 636  -0.4688761092  0.5803677236 -0.706070186  0.0982433214 -0.241369792
## 637  -0.3862229198 -1.6238394791 -0.495761404 -0.4573738637  0.649906097
## 638  -0.2730435902 -0.5645056918 -0.106209623  1.1565926823  0.344010270
## 639  -0.7618021732 -0.2172965574 -0.388867339  0.9054348566  0.110715164
```

```
## 640  -0.0751657758 -0.6106766309  1.219524837 -0.0102140459  3.052577396
## 641  -1.5396474028  2.0261725502 -0.569604636 -0.3964205288  0.516471836
## 642  -0.8436718186  2.6153040462 -0.078864156 -0.7497484803  2.884220777
## 643  -1.4112307131  1.7965271922 -0.459455929 -0.3261315247  0.578390611
## 644  -0.8377833406  0.2888398824 -0.271696109  0.1022515775 -0.560124337
## 645  -1.1706441484 -1.0677619194 -0.603751397 -0.2546571429  0.525087362
## 646  -1.3908122653  1.6310655351 -0.995988115  0.4578758045 -0.346413826
## 647  -1.5352025121  1.0150915029 -1.016572911 -0.3367506216 -0.405899260
## 648  -0.6697691912  1.2263510592 -0.908849807 -0.2951954042  0.180812757
## 649  -1.3627648892 -1.0253898800 -0.120935513 -0.1862726867  0.332027449
## 650  -1.3995784989 -0.8661531969 -0.758429297 -0.2950492548  0.357749963
## 651  -0.9494351542  1.6846030755  0.757930237 -0.2773310269  3.105691053
## 652  -0.4184812318 -1.3257033208 -0.078858690 -0.3277668922  0.402919273
## 653  -0.5975740160  0.1092153639 -0.847216144 -0.6017743805 -0.013694392
## 654  -0.6756147546  1.0571974051 -0.680308038 -0.1796176188 -0.019379511
## 655  -1.3951571880 -0.9337589075 -0.729757061 -0.3126997792  0.252096825
## 656  -1.1437216271 -1.2728766322 -0.923653818 -0.1715940483  0.269699821
## 657  -0.4932311716 -0.0496488816 -1.187947509 -0.0334757978  0.072838254
## 658   0.3879752894 -0.5872903951 -0.720094733  0.2668824002 -0.116152103
## 659   0.0327583894  1.1656985998 -0.585600092  2.0486786819  0.495334188
## 660  -0.7610709958  0.2628414142 -1.005564421 -0.4408518745 -0.139790589
## 661  -1.7077944300  0.9687649367 -0.760235819 -0.4908212802 -0.481204464
## 662   0.1463225029 -0.1998525338  3.071948795  0.7603496207 -0.026381064
## 663  -0.1885549058 -1.0528963869 -0.780142541  0.1217221952  0.634515587
## 664  -1.5959623207  1.4784469157 -1.047708838 -0.3740136527  0.250637441
## 665   0.6915533349 -0.8314532695 -0.886187517  0.2813919081  0.204672228
## 666  -0.1002188502  1.2992368803  1.551618441  3.0302313321  2.502737275
## 667  -1.2381014754 -1.8613473674  0.752935846 -0.4333356651  0.561037108
## 668  -0.5697253510 -0.1314945150 -0.266343720  0.5551950724 -0.527267528
## 669   0.3033973447  1.2210650678 -0.261866670  0.8289477259 -1.292829659
## 670  -0.9233935433 -1.2032984854 -0.086835816  0.2328935759  0.164829948
## 671  -0.2027670844  0.5534879766 -1.065559203  0.2305723949 -0.605002812
## 672  -0.7544534896  0.7946996241 -0.817558484 -0.2381141506 -0.306553018
## 673  -1.5624356650  0.0645037336 -0.410679358  0.0396740216 -0.662939172
## 674  -0.9216796256 -1.1401600567 -0.465066386  0.5265290666 -0.023753171
## 675  -0.9726121540  0.0835253151  0.705590936  0.8241790747 -0.070539799
## 676  -0.0980839536 -0.9455502612  0.890487079  1.6787724425  1.169236478
## 677  -0.6660503741 -0.3687535278  0.708910412  0.6855777804 -0.472248557
## 678  -0.1987855671 -0.3740497580  0.988520805  1.6620859525 -0.243918649
## 679  -0.2495027323 -1.1442547556  0.343805399  0.3534624739  0.028732713
## 680   1.1167578123  0.6560186983  0.049500670  0.7238280656  0.620392029
## 681  -1.1394457884 -0.3590503132  2.327468168  0.1935298293 -0.220396720
## 682  -0.4188094042  0.1890286066 -0.607757128  0.2869953041 -0.733848448
## 683  -0.6864958985  1.6985067294  0.910115089  1.0944534151  0.464285510
## 684   0.2736679948  0.2728476259 -0.134406623  1.7737111711 -1.332885913
## 685  -0.0560912029 -0.2889916179  0.041985687  1.2265126385  2.348090262
## 686  -1.2176545794  0.4763957300 -0.437975519  0.7126563463 -0.561093567
## 687  -0.5194490384  1.7905007152  0.565167010  0.6801998742  0.556590982
## 688  -0.8832973959  2.0634455613  0.416763921 -0.2260813104  0.404006511
## 689   0.0510579125 -0.2675587628 -0.682388108  0.3952311002 -0.022315986
```

```
## 690  -1.1103042480 -0.4067915288  0.582739618  0.3883672355 -0.429926556
## 691  -0.8256757019 -1.1425214629  3.401911230  0.5279007692 -0.269744912
## 692  -1.0069249718 -1.3860125451 -0.675678795  0.3455021505 -0.130398981
## 693  -0.8843255865  0.8724968754 -0.445773264  0.2443383292  0.355703746
## 694  -1.1571722124 -0.0730374064  0.068058700  0.2584033287 -0.208956958
## 695  -0.8982751350 -1.2563875383  0.844438631 -0.1379665471  0.369148431
## 696   0.6366155755  0.2038200397 -0.882610194  0.5591933511 -0.254692764
## 697  -0.4622146853  0.8673560300  1.368527988  0.1634585282  2.158867123
## 698  -0.2437629575 -0.7219201818 -0.540613158  0.4854307086 -0.246889246
## 699  -0.8513103580  1.4383838272 -0.513976890  0.6463456061  0.228595721
## 700   0.4584968006  1.7716408765  0.660608489  4.2749212158  2.205165218
## 701   0.0962793581  0.6333323921 -0.484987979  0.3625650098 -0.023338926
## 702  -1.2740228152  1.2009050510  0.543293075  0.2017635416 -0.138457910
## 703  -0.6034626730 -1.1968950200  0.251949611  0.3009169755  0.080211774
## 704  -0.5113905494  1.8572339360  0.713031269  0.4708851941  0.724879904
## 705  -0.8337843820  0.4513312083 -0.607836896  0.1983302991 -0.055079683
## 706   3.1010637178  3.0105030066 -1.900733101  1.3615597986  9.588802786
## 707  -1.0488490915 -0.0248285751 -0.400874836 -0.0335746627 -0.024176182
## 708  -0.2755255911 -1.1572543773 -0.586940432  0.4288940654 -0.270927985
## 709   0.5114368283  0.4275139143 -0.551922941  0.4814573423  0.951311478
## 710  -0.3736120722 -1.2592181532 -0.772824708  0.0108747078 -0.275885575
## 711  -0.9500507396 -1.1954087553 -0.130324549  0.1826597835  0.155287241
## 712  -0.1389071826 -0.0579228506  0.551298578  2.7119159263  0.063771487
## 713  -1.3570207808  1.0357558940  1.378637870 -0.2709461939 -0.126086293
## 714  -1.1449270704 -0.8377249940 -0.196839020 -0.3189163293 -1.542427316
## 715  -0.7673067117  1.2537480017  0.235500556  0.7457360201  1.977772495
## 716  -1.1737640347  0.9310216595 -0.610178707  0.1357513484 -0.126708739
## 717   0.7519624273 -0.4979441177 -1.070566363  0.3921484265  0.004277945
## 718  -0.9570415876  2.2905612000  0.613509241  0.9105854922  2.282693683
## 719  -0.5873652441 -1.0525067549 -0.523866393  0.2860759288  0.481554052
## 720  -0.7328288458 -0.9943202304  0.675762355  0.6747968272  2.384369489
## 721  -0.5787604094 -1.5006907542 -0.525405804 -0.3677841927 -0.036556249
## 722  -1.0944526665 -0.7346649219 -0.687533387  0.2129039254 -0.411604602
## 723  -0.8928342066  2.9746654626  0.150416088  0.1989711932  1.873478863
## 724  -1.2305836555  1.1753919575 -0.311206724 -0.2039416703 -0.320742825
## 725  -1.3942214734  1.2977583269  0.834310536  0.3396423325  0.122604261
## 726  -0.6109811096  0.3632586204 -0.260476796  1.0069200587 -0.025763552
## 727  -0.6250302183 -0.9551415522 -0.212448905  0.3667503016  0.363843392
## 728   0.9713053697  1.1839887303 -0.354051949  0.4431242490 -0.509942655
## 729  -0.3344894140  2.5588644902  0.428240026  0.1649004125  3.227371196
## 730  -0.5688457678  1.1515191363 -0.770106792  0.0220105505 -0.064323302
## 731  -0.7853463474  0.1773759657  0.697056403  0.7638959043 -0.737279467
## 732  -1.4487089756  0.6413661674 -0.768224038 -0.0240096413 -0.236253290
## 733  -1.1119664277  1.2161231748 -0.829205902  0.3485180395 -0.036255226
## 734  -1.2541021280  1.0927553977 -0.789702473  0.7838178100 -0.126447438
## 735   0.2314545558 -0.5072769791 -0.782509401  0.0923145491 -0.029687662
## 736  -1.5089225030 -0.2821444962 -0.904884305 -0.1208578344 -0.461516000
## 737   0.4012328558  0.5126929707 -0.621165786  1.3343672550  0.494243471
## 738  -0.4097153326  2.1849471159  0.206477273  2.8963531555  2.337437230
## 739  -1.4389500847  2.2819521631 -0.791339576  0.0197428627  0.230899613
```

```
## 740  -0.6012456878  1.5212499463 -0.741326342 -0.1889751582 -0.345658195
## 741  -0.6608655014  0.6474073233 -0.650694072  0.2597714024 -0.366860699
## 742  -1.4952180958  0.9544645920  0.872146315 -0.3897899253 -0.475828253
## 743   0.5893734211  0.3688620222  0.581078842  0.7584382511 -0.064685633
## 744  -0.9970042058 -1.1476013908 -0.711681882  1.4173921191 -0.013855414
## 745  -1.2690988998  0.5834287291  0.427598749  0.0332884087  0.179743304
## 746  -1.5750645535  2.2454090365 -0.490513056 -0.3894366702  0.242253265
## 747  -1.4930385106 -0.5292877082 -0.630371181 -0.2477912348 -0.308467581
## 748   0.5670120880  0.2760370319 -1.272630055  0.0495902655  0.323186100
## 749  -0.6617230437  0.9657997768 -0.819676698 -0.5484255123 -0.116409469
## 750  -1.6746724260  0.8458578651 -0.516477390 -0.1685524989 -0.233208853
## 751  -0.3247303728 -0.4607774657  1.474523976 -0.0263308369 -1.737378772
## 752  -0.9522712055  2.1275600733 -0.989547912 -0.5346771364 -0.123977903
## 753  -0.4510708056 -0.4296470985 -0.746064502 -0.1441391236 -0.278689105
## 754  -0.4649114036  1.6169656459 -0.523729486  0.7279869698  0.288897536
## 755   0.2048570063  0.6610377486 -0.288743073  0.4332476513  0.164563847
## 756  -0.8785003618 -1.5451310314 -0.782799854 -0.1401764571  0.112065524
## 757   0.0851316824 -0.2806268313  0.078287632  1.0178206473 -0.616323827
## 758  -1.3346519009  1.8178683057  0.177694376  0.5698584811  0.115562022
## 759   0.4183496513  0.1764601842  0.044152939  0.6198334813 -2.369259198
## 760  -0.7529887665 -0.5913441211 -0.420707509 -0.0919571334  0.007823946
## 761  -1.5885540943  1.2024804288  0.080217910 -0.3063122064 -2.097595068
## 762   1.3374661554 -0.5115908394 -0.162554582  0.1255315024 -1.518526821
## 763  -1.4145102867  0.5274829406 -0.589637212  0.4356927587 -0.511206400
## 764  -0.3336530220  0.7513507719 -0.597648281  0.1185661207 -0.057541855
## 765  -1.5775867424  1.1067460726 -0.144857008  0.2962188419 -0.841146199
## 766   0.1191701208 -1.5642222556  0.223918613  0.1227067480  0.132114916
## 767  -1.1475090545  0.7641535606  3.269376666  0.0218663282 -0.776758697
## 768  -1.3238995588  0.8732780163  0.672248631  0.6583219376 -0.449754784
## 769  -0.4957442585 -1.1865171842  0.225623228  0.6102348449 -0.473106816
## 770   0.0250700117 -1.3997930171 -0.736703418  0.9922738347 -0.037763122
## 771   0.1182494159  2.1024370864  0.113229358  0.9897905402  2.159723595
## 772  -0.1627846758 -0.0351949712 -0.082611344  0.4694168306 -0.317296852
## 773   0.6215587389  0.5727185666 -0.582464780  0.8632035848 -0.477852287
## 774  -0.4131708024 -1.0568897729 -0.080839734  0.0397990146 -0.236129463
## 775  -1.6691651284 -1.4464097216  0.002693173 -0.2846474071 -0.365106238
## 776  -0.0881992996  0.4799224451  0.079641896  0.5513517499 -0.563124821
## 777   0.6992517705 -1.6235239201  0.894312729  0.4079535193 -0.478700015
## 778  -1.5841557561  1.9687779867 -0.438059093 -0.1112729859 -0.549197653
## 779  -0.3223068321 -0.6001792878  0.142277340  2.0533083446 -0.349897091
## 780  -0.8569590028 -1.3767681475 -0.515864896  0.4846942085  0.055625247
## 781   0.8892102856  0.8917418009  0.245272429  0.4254694859  2.173568224
## 782  -0.1410510578 -0.4467724644 -0.280092258  0.5540394717 -0.440859602
## 783  -1.2859578087 -0.1398910000 -0.320746656  0.3682557384 -0.332171175
## 784   1.1569427893  0.7203679865  0.132031389  0.7920029711 -0.104121222
## 785  -1.4957287944 -1.7421429765 -0.657459247 -0.3140294725 -0.262260834
## 786  -1.4265545648  1.2066567193 -0.068592473 -0.0864418304  1.709028207
## 787  -0.5720857181 -1.5436686243 -0.190159358 -0.4435986456 -0.136266963
## 788  -0.1514888564 -0.3171251867  1.664926223 -0.6343058202 -1.406724910
## 789   0.3376722897 -1.0490632140 -0.185511475 -0.1001964006 -0.364391104
```

```
## 790  -1.1729584004  0.8948338152 -0.505883571 -0.1182644966  0.595631400
## 791   0.3054975122 -1.3523374421 -0.184992411  1.1306430235  0.253032280
## 792  -0.6557810359  0.0753476246  0.135940874  0.2751911835 -0.596537189
## 793  -1.7864723798  0.5004937876  1.394784783  0.1048288748 -0.676017808
## 794  -0.9733067446  0.4937080233  0.268910227  0.0981506197 -0.685872158
## 795  -0.3317743527  0.6520654778  1.054915107  1.0518121512 -0.446204326
## 796  -1.3587040607  1.1130171368 -0.203812661  0.3969328828 -0.627127802
## 797  -0.7605817252  0.3407661402 -0.071751818  0.2942705397 -0.700670842
## 798  -1.4192216396  1.3350697090  0.740473371 -0.3441599298 -1.791467825
## 799   0.7672923156  0.7699258004  0.249513957  1.3057347865 -0.826660659
## 800  -1.2647158205 -0.0597479687 -0.891327167 -0.2012194050 -0.343436240
## 801  -1.2619765114 -1.5625683197 -0.234231009  0.2361271352  0.117367022
## 802  -1.2297230640  1.5988960948 -0.795362553  0.2800399474 -0.073079113
## 803  -1.4151260586  2.0424930506 -0.181574345  0.2409906506  0.181493813
## 804  -0.4402647192 -0.1650771847 -0.085524233  0.4700775911 -0.807892895
## 805  -0.7826520905 -0.4563081448  0.425694534  0.6462285277 -1.035197035
## 806  -1.2902773836  0.7918175966  0.303716669  0.3701683045 -0.343730345
## 807  -0.2689510083  0.3387116848 -0.022606155  0.8799398800 -0.570781526
## 808  -1.0674431376 -1.2488009590 -0.674418456  0.4360934836 -0.116218170
## 809  -1.0924155752  0.9704715731 -0.366995946  0.7580751149 -0.233463982
## 810   0.9813259057  0.0085259793 -0.243876920  0.3373952158 -0.266368629
## 811  -0.6923688825  1.4195545845  0.184882403  1.9473200880  0.559567555
## 812  -0.1952405767  1.5274406097 -0.888558581  0.6085580783 -0.023380524
## 813  -0.1810501228  0.6866389162 -0.606799028  1.0537400904 -0.327271724
## 814  -1.0172315818 -0.5428288598 -0.380572218  0.5476001448 -0.369137562
## 815  -0.9686039124 -1.1618691795  0.392271402  0.3831179527  0.099732614
## 816  -0.4118319836 -1.0947917887 -0.925212901  1.1863029794  0.993661538
## 817  -0.2738316765  0.0165849982 -0.714888765  0.0939233045  1.989714330
## 818  -0.6699787294  0.5815934274  0.080231032 -0.0412824430  0.055713226
## 819   0.3234116587 -0.2228731717 -0.890866271  0.7117229347  0.315926494
## 820  -0.9576454592 -1.1387010421  2.172212510 -0.0791186063  2.327959627
## 821  -0.7922464664  0.6870683641 -0.646329601  0.2738148502  0.692992651
## 822  -1.4917529316 -1.4373936412 -0.080044396 -0.2449578964 -0.158133514
## 823   0.0059599498  0.0948023317  0.566808193  3.9294220745 -0.122104023
## 824  -1.0209364173  0.2674579125  1.399326152  0.4649127724 -0.003365679
## 825   1.2870241083 -0.0644656135 -0.691349756  0.7769173163  0.248390990
## 826  -0.3217878641 -0.4440177226  1.757958696 -0.2109967925 -0.167063406
## 827  -0.0746271249 -0.3227961906  0.408536504 -0.1619656051 -0.817042505
## 828  -1.2930920443 -1.2266849030 -0.484517722  0.6750417388 -0.187288885
## 829  -0.9321650934 -1.3851229861  0.431461178 -0.0336555972  0.269525331
## 830  -1.6369038098  1.0696576375 -0.199302034 -0.0014067911 -0.439266497
## 831  -0.6626083228 -0.1613433018  1.324405590 -0.0105270398 -0.697620280
## 832  -1.1608912705 -1.0746419089 -0.447733345  0.2127603008  0.244385605
## 833  -1.1465670382 -1.2819721386 -0.563679232  0.2842814167  0.107070269
## 834  -0.8040679740 -0.4414183936 -0.227019232  0.4200977000 -1.011654788
## 835   0.7946118362  1.6968019339 -1.394299291  0.7246859263  4.133859966
## 836  -1.4019648371 -0.9247235177 -0.381921241 -0.1659442080 -0.067694565
## 837  -0.0324404753  0.5249860516 -0.172656420 -0.0994225220 -0.573729520
## 838   0.5353016053 -1.1733175545 -0.589175849  1.9746285973  0.354576249
## 839  -0.9797723012  1.6734187013 -0.491239203 -0.1189064653 -1.487743392
```

```
## 840   1.2327823325  1.0138699405 -0.154903246  0.3645303559 -1.198062417
## 841   0.8228128477 -1.1617599363  0.495917031  1.0487958944 -0.002181590
## 842  -1.5176723166  0.3962292080  0.513943004 -0.1955351595 -0.079821563
## 843  -0.1333685966  0.6024615614  0.306918381  0.9389060323 -0.516126365
## 844  -1.1830635188  1.7858531711 -0.917984781  0.2336860709 -0.508314460
## 845  -0.0139899457 -0.9727583516 -0.879693866  0.5852747039  0.120849979
## 846  -0.0068731363  2.2863358608 -0.840624447  0.7743514435  0.298206200
## 847  -1.1967598250  0.6874336616 -0.077790907  0.2352819247 -0.308951679
## 848  -0.7314331835 -0.8068248980  1.285219905 -0.0437555371 -0.078647447
## 849   0.1540248368 -0.0027336129  0.462964324  0.0217133946  2.356600400
## 850  -0.6554938342 -1.4178861940  0.146892296 -0.4068658040 -0.168171427
## 851   0.3467108851 -1.0297458442  0.428480936  0.0830436166 -0.332852522
## 852  -1.3937532803 -1.3677406654  0.255343897 -0.1754242598 -0.068591931
## 853  -1.1176032496  0.1865341895 -0.462568253 -0.2108739054  0.152400646
## 854  -1.3383534918  1.1713965960 -0.308194930 -0.1254458719 -0.231375241
## 855   0.0790927210  1.8768266072 -0.169243347  1.0010770788  0.365116985
## 856  -0.3460721318  0.9900466245 -0.942574060  0.5346794268  0.331939101
## 857   2.5364006568  0.9045250569 -1.042417790  3.3317295959  0.773827088
## 858  -0.7944509085 -0.9082201585  0.460522743 -0.3721274836  2.323333627
## 859  -0.7001609219  0.5707236770  1.002348424  1.7671323869 -0.057961744
## 860  -0.9706910564  2.2662892862 -0.912272224  1.2557417742 -0.424356677
## 861  -0.4622400444 -0.4666479496  0.021747131 -0.1489321167 -0.288029151
## 862  -0.9269589071  1.2053477110 -0.006244724 -0.1305673829 -1.514580475
## 863  -0.8051246878 -1.2521124665 -0.517419801  0.5538373749  0.374506553
## 864   0.1652170550 -0.9858729656  1.161895903  0.9455038138 -0.585398361
## 865   0.9398720829 -1.2924818555 -0.601370429  0.1878386055  0.138169849
## 866  -0.5520738567 -1.1967821076 -0.515290715  0.5183860154 -0.360086811
## 867  -0.5515984584  0.6724794307 -0.341684419 -0.2179445588  0.301178926
## 868  -0.1682963554  1.1045889348  0.301239689  0.3270880958 -0.239786463
## 869  -0.0052017873 -1.3858657146  0.803650870 -0.1674903356  2.429476471
## 870  -0.1945497472 -1.3180737978 -0.597181526 -0.2822540501  0.262341729
## 871   0.2120413940 -1.6357263946 -0.148683296  0.3573796280 -0.256890253
## 872  -1.0134588887 -1.3832980837  0.332777032 -0.1156535727 -0.106601544
## 873   0.4355668702 -0.5838326583 -0.488400699  0.2674252661 -0.523786844
## 874  -0.8353167594 -0.1795478333 -0.476729665 -0.3482193657 -0.510633337
## 875  -0.0162703378 -1.5184149237  0.467218593  1.1226512022 -0.345218710
## 876  -0.1209160212  0.5529750570  0.202349179  0.6412001170  0.644669388
## 877   0.1674964250 -1.2265083986 -0.906729057 -0.0487810568  0.810580105
## 878  -1.1174346426  0.9218970549  1.655275236  0.0838177304  2.054454782
## 879  -1.0646473069 -0.7812139906  0.161492113 -0.0745258689  0.095019439
## 880  -0.3466737008 -0.1144231640  0.803171458  1.0519316446 -0.594683773
## 881  -0.7858736416  0.2608500801 -0.651634943  0.3331422598 -0.405087692
## 882   0.9665629358 -0.8960570010  0.213041144  0.2464404325 -0.064654592
## 883  -1.4861194614  0.7535559350 -0.664081195  0.0922441152 -0.044804363
## 884  -1.2431258529 -0.4446934503 -0.177985466 -0.1072146562 -0.189803376
## 885  -1.0492413020 -1.3478491950 -0.548623026  0.6751165795 -0.057819907
## 886  -0.7123600790 -0.1603136248 -0.206220935  0.3331325428 -0.581304085
## 887  -1.3129852565 -0.5288029426  0.844376475  0.0984236714 -0.402821584
## 888   0.0579228627 -0.5539446842 -0.882582494  0.7054981363 -0.542321380
## 889  -1.2466249558 -0.0182317125 -0.092456896  0.0803046192  0.210215601
```

```
## 890  -0.7444765572  1.5265543775  1.792266615  0.4006203926  2.498496061
## 891  -0.9611502138  0.4617364430 -0.427333579  0.4953419644  0.202308126
## 892   0.6308336066 -0.3526840674 -0.389310803  0.1001323835  0.140706905
## 893  -1.3749493345  2.5489477636  0.205192025 -0.2441816061  2.264846800
## 894   0.4158369113  1.7466023392  0.126565830 -0.1749438950 -1.024891669
## 895  -1.3011706550 -0.4357793305  0.809779303  0.0704172326 -0.333287533
## 896  -1.3960575448  1.0596093588 -0.905343822 -0.0473069138 -0.023140037
## 897  -1.0418094971  0.1623475895 -0.430422933  0.5442519529 -0.195470316
## 898  -0.4120613918  3.3883103134  0.244919116  0.2607565744  2.180324239
## 899  -0.0121331063 -0.6476504856 -0.376736296  0.3170670171  0.099759793
## 900  -1.3145007934  1.2830033572  0.110788807 -0.2271852092  2.033125251
## 901  -0.4370443175 -1.4392004234 -0.617091401  0.2187717742 -0.230766780
## 902   0.1898587596  1.5398752275  0.159967198  1.2371815917  0.635883747
## 903  -0.3704575982  0.8299831593 -1.189251447  0.5152861785 -0.429758893
## 904  -0.1503830539  0.0055636619  0.116589007  1.8499023224 -0.588325793
## 905  -0.6865371488  0.5325563340  0.185866993  0.5665739000  0.052225550
## 906  -0.6857396433 -0.9524968635  1.406537410  0.5723848330  0.482253359
## 907  -1.0077444537 -1.3437600753  0.273162019 -0.0249039284  0.494382434
## 908  -1.2853529675  0.7182048572 -0.234770197 -0.1320845363 -0.426490387
## 909  -1.6424081123  1.2071881883  0.621341819  0.0783178541 -0.062387910
## 910  -0.7408770117  0.8221703616 -0.172751717 -0.0430432122  0.179557806
## 911  -1.3085324775 -1.0005003860 -0.626692225 -0.4501392273  0.429649108
## 912  -0.3062226721  0.2714141950 -1.037920662 -0.0103915312  0.431120836
## 913  -1.2904074397  0.7021275214 -0.981486827 -0.1655605306  0.142226345
## 914  -1.0266251966  0.5818027642 -0.417919935  0.1854664181  0.634723859
## 915   0.8428668202 -0.7300408259  0.182119849  0.6119108894 -0.039027172
## 916  -1.5164177572 -1.3919460026 -0.329040191 -0.6516206883  0.214828476
## 917   0.6892829573 -0.9447513831  0.590916805  0.0898316878  2.699965322
## 918  -0.6132622174  1.2765442975 -0.906388216  0.2198084745  0.075486158
## 919  -0.8361948162 -1.2029030206 -0.679338076 -0.3958985339  0.379563427
## 920  -0.4402322686  3.0440925619 -0.737166083  0.6628157935  0.150934275
## 921  -1.2769305041  0.1399633839 -1.094522060 -0.2501315572 -0.100759247
## 922   0.1173339424 -1.0537373870 -1.118258575 -0.5044426461  1.112941881
## 923   0.3143943548 -1.2037107751 -0.150014674  0.4299918613 -2.137807821
## 924  -1.1761230757  1.1982075515 -0.348407779  0.4925430126 -0.873532007
## 925   1.6082027424  2.8972318285 -1.385591445  0.7646430595  8.895315783
## 926   0.2133677067  0.4150420487  0.853651382  0.5211500124 -0.406502559
## 927   2.3330159987  0.5007075904 -0.682962922  1.8075282896  0.096944097
## 928   0.4715389382 -1.3563358687  1.783671661  1.7489981861  0.356317558
## 929   1.1108027272 -0.8961450943  2.189036432  1.2055958278 -0.355276764
## 930   0.4059641605 -0.9350704931 -0.289866409  1.0046906365 -0.170580228
## 931   1.3056493276 -0.9812169298 -0.365983937  0.2957235473 -1.863846797
## 932  -0.8113873102 -1.3191190540 -0.352942231  0.0886633048 -0.740783564
## 933   0.9858225261 -1.7820887604  0.408178996  1.1791462120 -0.363436742
## 934  -0.7986705439 -1.6009735245  1.413869628  0.9577498097 -0.079328619
## 935   0.4276565856  0.6641378486 -0.572615418  0.1986296856 -0.660300967
## 936  -0.4639921472 -1.2969847369 -0.697328052  0.5015412792  0.074877581
## 937   1.4481867815 -1.1788047794 -0.650421448  1.5439109669  0.298585842
## 938  -0.3075191270 -0.2758771141 -0.713652245  0.0494502368 -0.558713960
## 939  -0.8716742943 -1.4602965051  1.401373316  0.1043614870  0.226818454
```

```
## 940  -0.3179627322  0.7324642905  0.671009999  0.5890675516 -0.429631405
## 941  -0.9946932287 -1.4138793687  2.473327338 -0.2753132071  0.455376319
## 942  -1.0302534935  1.9605246631  0.145789403 -0.1745018803  2.155237339
## 943   0.3806650590  0.7366503459 -0.141794357  0.1217022258  0.095717227
## 944  -0.4719770793  0.6429099576 -0.026486334  0.7208508493 -0.070219499
## 945   0.4707341360 -1.6543346014 -0.031853880  0.8752726800 -0.395624521
## 946  -0.9317584032 -1.3488428337 -0.073210368  0.0849983556  0.039212702
## 947   0.0601680129 -0.4856946167  0.680415560  0.3314902918 -0.715974328
## 948  -0.5611973451 -0.8327102764  0.082228721  0.9057778606  0.442475852
## 949  -0.7348534228 -1.5851180732  1.281099758 -0.1777647655  0.874524578
## 950  -1.2329633402  1.4449319816 -0.528105388  0.0013666566 -0.621970555
## 951  -0.3890667147  1.4383463372  0.743954352  0.0043464545  0.864967418
## 952   2.4470559763 -0.5386975801 -0.787481887  1.4712130983  0.474789224
## 953  -0.7341322873 -0.8012524541  0.255316865  0.4086401232  0.420947408
## 954   0.7115058578 -0.6754976948  0.934973367  0.5418047571  2.660102551
## 955  -0.1912731521  0.9435466077  0.090687834  0.0298649689 -2.001237954
## 956  -0.6497766857  0.6892699171 -0.685754608  1.1215599558 -0.283161795
## 957  -0.9322470233 -0.4715325617  1.870709531  0.6154715062 -0.192449040
## 958   1.8576524222  0.2241253502 -0.941654127  0.8084578762  0.020915488
## 959  -0.7219362867  1.9976445057 -0.226535162  1.6903554685  0.047492807
## 960  -0.4910948694  0.4298629046  2.999510174 -0.1119677181  0.044268691
## 961   0.5068936464  1.8129397974 -0.115699425  1.1291252699 -0.484890491
## 962  -0.9261432144 -0.0562288507 -0.207323675 -0.0737188707  0.060713679
## 963   0.3557780966 -1.4821241383 -0.883457560  0.0229420460  0.104707207
## 964   1.3088257567 -0.1699880702  0.024744542  3.1076872336 -0.264680972
## 965  -1.1237530086 -1.3526828495 -0.092607507  0.2184633609 -0.063710412
## 966  -1.0066449552 -1.4602267193 -0.561943021  0.0562699658 -0.060438575
## 967  -0.1115840209  2.1125625297  1.069007658 -0.0606427276  1.999767577
## 968  -0.1747346638 -0.3984314162  0.843347662  0.1276816214  2.561127450
## 969   0.4487130997 -1.4705391232 -0.858038585  0.6309550077  0.304852436
## 970  -1.0004537055  1.3450864620 -0.271000969 -0.3099883940 -0.108273251
## 971  -1.0104647949 -1.2981206919  0.999055681  0.9378756108 -0.271629360
## 972  -0.9069535955  1.2415470566 -0.887267894  0.4298675542  0.269731568
## 973  -0.1989787882  0.9087945984 -0.337456012  1.2144240300 -0.524734616
## 974  -0.7708035611 -0.2306377273 -0.424703406  1.6231935357 -0.492736176
## 975   0.7637206533  2.1079460100 -0.261307994  0.6303959308  3.360062641
## 976   1.1820337199  0.1025495434  0.701130355  0.5822252455  1.805833141
## 977  -0.1093224240  0.2000270896 -0.778749073  0.9211538053  0.027102509
## 978  -0.9149257949 -1.3846487963 -0.445469923 -0.1198482029  0.111547329
## 979  -1.0110982771  1.9219566693 -0.839318883  0.2602870789 -0.185325741
## 980  -0.6502449624 -0.5230180271  1.613667485  0.2199803272 -0.262549658
## 981  -1.2567996468  0.2552692049 -0.761452672 -0.0880067956 -0.349621901
## 982  -1.3560150695  0.5333490059 -0.525779554  0.7581512563 -0.315657413
## 983  -0.7424512693  0.5741841983 -0.392635079  0.5154778455 -0.487583028
## 984  -1.3418147172  1.5031340770 -0.459117821  0.6029651255 -0.015950728
## 985  -1.5771853442 -1.4177701857 -0.179663284  0.1198121184 -0.266998603
## 986  -1.2409853627  1.5811222089 -0.141246825  0.2039428243  2.435010876
## 987  -1.6156423739  2.5081038224  0.411393270 -0.4167618104  2.152551475
## 988  -0.4662861654 -0.4219804468 -0.281179365  0.7964690089 -0.845890347
## 989  -0.8875473017 -1.1796039156  0.285085879  0.3361711110 -0.380406852
```

```
## 990  -0.7208193811  1.4480932149 -0.841734487 -0.2535184666  0.074896827
## 991  -1.0115302499  0.4986633583 -0.031107760  0.2060774518 -0.678150800
## 992  -1.1668630352 -0.5154208323 -0.626146900 -0.2177687490 -0.414088585
## 993  -0.5631222796 -0.3765445860 -0.473111026 -0.2253367649 -0.120178186
## 994  -1.4369085246  0.0154601908 -0.256166903  0.8834894721 -0.340416891
## 995  -1.6332454719 -0.4555625830  0.077625532 -0.0461119685 -0.499966318
## 996  -1.6553149178  0.1815250447  1.513592493 -0.0407255510 -0.087744108
## 997  -0.8209064145 -0.1844268594  2.194843386  0.8006092642 -0.532805286
## 998  -1.2012879636  2.4476544704 -1.124679932  0.2154269587  0.027869783
## 999  -1.1429165547 -0.2026516107 -0.081696240 -0.1320830418  0.003644489
## 1000 -1.4826788756  0.2502480525  1.416442443  0.0392435757 -0.245480836
## 1001 -1.1123957872 -0.1267747387 -0.124520907  0.3199267349 -0.153960134
## 1002 -0.4938519033  0.3228711385 -0.080304662  0.4951851823 -0.534997118
## 1003 -1.4150096581  1.4144543641 -0.957971231  0.1213946609 -0.598196680
## 1004 -0.9724167429 -0.3270706834  0.630810373  0.2625357117 -0.754286832
## 1005 -0.4101455145  0.5634406411 -0.050515759  0.4563715290 -0.257066942
## 1006 -1.2450884009 -0.3178113317 -0.743660633  0.1981941528  0.233098586
## 1007 -1.6562527610  1.2855103166 -0.183733442  0.2110789907 -0.092148290
## 1008 -0.9633086763  0.0482690500 -0.786225393  0.1209629844  0.358331212
## 1009 -1.5574962445 -1.2650634395 -0.477650238 -0.1157164053 -0.008481470
## 1010 -1.5891651498  0.9837961332  0.732061649  0.1317698400 -0.123392439
## 1011  0.9210966200 -0.4331750910  0.335363551  0.9630091388 -0.312212690
## 1012 -0.7032587949 -0.2247240655 -0.384055685  0.3271482163 -0.257851062
## 1013 -0.9288117578  0.0879213446  0.412581630  0.6962699476  0.025908516
## 1014 -0.3234430327  0.4678496500  2.605642991 -0.0611461516  0.383384067
## 1015 -1.1005678740  1.2838232564 -0.803818241 -0.0524662969  0.330167018
## 1016 -0.8544567001  1.2960361810  1.438721813  1.0339290752  1.020432696
## 1017 -0.3395629638 -0.6850330970  0.998466987  2.4071911262  0.573865494
## 1018 -0.9166851552  1.1655406671 -0.567949285  1.4863707960  0.299485331
## 1019 -1.4492038337 -0.0629606038  0.711999490  0.3462779975 -0.182973032
## 1020 -0.5022514721 -1.6039553216  0.670399973  0.5735877921 -0.025819313
## 1021 -1.2511939474  0.2721451759 -0.652865728  0.3733004565 -0.220491365
## 1022 -1.1933639812 -0.2933138947 -0.227452094  0.0955006954 -0.135542339
## 1023 -0.6488478008  1.1517366151 -0.375855726 -0.0638846494  0.107511174
## 1024 -1.0887375284  1.0380340286 -0.587329256 -0.0481328896  0.460149896
## 1025  1.1799811469  0.2610210042  0.451148659  0.2495075305  1.807920745
## 1026 -0.7341580164  0.5771679095  0.038246564  0.6549807610 -0.444625101
## 1027 -0.6156148990 -0.3038002650 -0.013890679  0.1031874695  0.073780268
## 1028 -0.8639641927  0.5413673546  1.209244773  0.0610992358 -0.348799673
## 1029  0.7071754145  0.4225285059 -0.736100016  0.9675716714  0.406525689
## 1030 -0.3758361590 -1.0306410969 -0.727020092  0.1691483814  0.709273398
## 1031 -1.3279144159 -1.3272561673  0.329141861  0.2232465819  0.119040793
## 1032 -0.2716867477  1.8571599215 -0.301544719 -0.1415753424  0.770312727
## 1033  1.2937176577  0.0348457169  0.497716785  1.5431441923  0.235486698
## 1034  0.2597376657 -1.2304815784 -0.203238919  0.3086621925  1.026313326
## 1035 -0.0742035633 -0.7657134549 -0.492856320  1.1740676118  0.014913221
## 1036  0.8692120188  1.7237949866  1.195599372  0.2490185734  3.115401601
## 1037 -0.3590223930 -0.8533802567 -0.920278638  0.2471285417  0.901935167
## 1038  0.1462038309 -1.0666106913  0.065112101  0.0365302371  0.809219944
## 1039 -1.0141518317  0.0858304331  0.843208884 -0.4637478434  0.242438149
```

```
## 1040 -1.1368282919  2.0961437981  1.022307083 -0.3146320097  2.535064471
## 1041 -1.1462642598  0.4778689376 -0.115758434 -0.3434080970  0.251263270
## 1042 -0.8610631389  0.7786927241  0.300782497 -0.1443010705  0.513390053
## 1043  0.3506634707 -0.1302269157 -0.172478104  0.9492799039  0.002829853
## 1044  0.6389031882 -1.2469425997 -0.602658556  0.5385239973 -0.355303660
## 1045 -0.9742609100 -1.0398941536  1.884437821  0.2876222493 -0.687344628
## 1046 -1.0914798889 -1.2277231314  0.487950311  0.3214130563  0.190262917
## 1047 -0.1042995479 -1.5622786903 -0.300493639  0.7732093919 -0.409406421
## 1048 -0.8017665467 -0.6073330713 -0.623352753  0.6446992529 -0.526496797
## 1049 -0.8886944131 -1.4201074716 -0.605968245  1.2193308430 -0.158904506
## 1050 -1.1565996032 -0.1798193363  0.281719574  0.2259655839 -0.357787154
## 1051 -1.0258319493 -1.1704417601  0.142808476  0.0812221758  0.293535592
## 1052 -0.5000620845  0.2152312404 -0.530815703  0.2323626058 -0.602293173
## 1053  1.1698488642  0.6382176565 -0.240238846  0.5211473973 -0.416861011
## 1054 -1.4951828929 -1.4635612930 -0.711616140 -0.1120305081 -0.174976452
## 1055 -0.3313258974  2.1917255075  1.656484171  0.8924282836  2.408057709
## 1056 -1.5657141957 -1.3885904640  0.057814072 -0.2022735716 -0.157041363
## 1057  0.1519446841  0.0783879394  0.490377471  1.5290428280 -0.121554125
## 1058 -1.7338089628 -0.3375758559  0.520732924  0.0140256869 -0.713807177
## 1059  0.5166798273 -1.0774575855 -0.616976238  1.3316144321  0.734052757
## 1060 -1.4217511175  0.9990630274  0.459626946  0.6958931240 -0.378430971
## 1061 -0.2811001351  2.5805090392 -0.953085021  0.5971359546  0.167518164
## 1062 -0.2028703506 -1.6023835645  0.734147795  0.8637263923 -0.213318180
## 1063 -1.0465766700  1.4605864357  0.468302210 -0.2834289643  0.220794616
## 1064 -1.1878051340  2.5160175182 -0.241960404  0.7899471402 -0.039376667
## 1065 -0.1373962051 -0.2076280936  1.481375116  0.9472333687 -0.192899095
## 1066 -0.5312905304 -1.4311451752 -0.354376100  1.8024940717  0.084588547
## 1067 -0.6921733265 -1.1074824035  0.978281300  0.1004924178  0.687379402
## 1068 -1.0244302390  1.5323202595  1.712474412  0.0017129745  0.627194939
## 1069 -1.0436014839 -1.4218530705  0.245318490  0.2269568729  0.167478981
## 1070 -0.4432017920 -0.7230250558  2.359371930  0.9205222903  0.048135524
## 1071  0.8177912629 -0.4647170488 -0.121911178  0.7529249645 -0.252751701
## 1072 -0.8280007673  0.5616031045  0.509034798 -0.4159148353 -0.145682754
## 1073 -1.1760117152  1.2269171814  0.501598569 -0.0407009839 -1.683684425
## 1074 -1.3334617925 -0.9898244925 -0.640029295 -0.1015693628  0.101731025
## 1075 -1.2157553501  1.3481257737 -0.723358236  1.4020990643 -0.510275205
## 1076 -0.7073404906  2.4132586363 -0.695731129  1.1705742435 -0.070276365
## 1077 -1.3539596462 -1.2347109815 -0.202466824  0.0716363723  0.042745025
## 1078 -1.1741376216 -1.0903173474 -0.133671793  0.3150029774 -0.003128849
## 1079  1.4359531096 -1.2688006277  0.459045311  2.2912788738  1.055337305
## 1080 -1.2664728340  0.3375888012 -0.669059024  0.3938079587 -0.060395314
## 1081  0.3831062180  0.4157090457  2.610260707 -0.3760745126 -1.805159814
## 1082  1.2340761225  0.5053932984 -1.008108236  0.4992741199 -0.356964759
## 1083 -0.8533693506 -0.8594355862 -0.590124753  0.3058326502  0.500973525
## 1084 -0.2289228197 -0.4792649049 -0.335623522  0.1467410856  0.029079391
## 1085 -0.7074292241 -0.7355221400  1.480578277  0.9771903665 -0.332713331
## 1086 -0.8034529748 -1.1016716395  0.859501606 -0.1550681656  0.328429467
## 1087 -0.8020013082 -0.6974153007  0.762451195 -0.0355432830  0.228433013
## 1088 -0.9073866067  2.1619773485 -0.641608111 -0.0396513441 -0.133851280
## 1089 -1.3909018061 -1.1059049853 -0.883281336 -0.0561950966  0.148077842
```

```
## 1090 -0.3432136930  1.6039151486  2.829630695  1.0356995592  0.690662391
## 1091  1.1589287474  0.9731454780 -1.038523706  0.4664143633  0.655764054
## 1092 -0.6371691302  1.5454349245 -0.388287542  0.2993262163  0.579012153
## 1093  0.1335629116  0.4687546200  0.008283794 -0.1306429639 -0.273130067
## 1094 -1.3318508776 -1.2026301150 -0.399377150 -0.3072486845  0.239014694
## 1095 -0.8107908613 -0.0684277595  0.436158381  0.9829867368  0.060407537
## 1096 -0.7802153870 -1.2065549272 -0.478268116  0.0506996170 -0.294535358
## 1097  1.6629033381  0.2718924486 -0.041283602  0.1560746578  2.685986175
## 1098  0.1642231380 -0.8631065531 -0.658430224 -0.0772531114  0.494760674
## 1099  0.0926545833  2.9083942275  0.500535513 -0.1601659410  2.795751474
## 1100 -0.0985385868 -1.2887330234 -0.323908296  1.2582530678  1.103513783
## 1101 -1.3610076727  1.0466326332 -0.599389847  0.3057524455 -0.050847004
## 1102 -1.6241814593  0.4663094769 -0.476901099 -0.0632646766 -0.935224985
## 1103  0.2330133716 -1.6527009533  0.495304806  0.7250916751 -0.345612109
## 1104 -0.1232042688 -1.4080612177  0.197857403  0.1749442156  0.141163410
## 1105 -0.3836783849  0.7780895752 -0.643903645  0.9049996380  0.118993477
## 1106  1.6151731153 -0.2222728435  9.446729873  2.8752442822 -1.339787598
## 1107 -0.9664693489 -0.3442327346  0.927796783  0.1233593858  1.947074466
## 1108  1.0174939264  0.8834273805  0.424298708  0.5280925043  2.457596353
## 1109 -0.1436791229 -1.4985010696 -0.368281584  0.6557850952  0.386160355
## 1110  0.7031488137 -0.7450833076 -0.929203652  0.3807345994  0.876844205
## 1111 -0.9357827745  1.7892909457 -0.540276155  0.7411900900  0.339838887
## 1112  1.9606009097 -2.6944860266 -2.918916279  0.7736934163  5.180002242
## 1113 -0.6419696056 -0.2446444550  1.715453246  0.3328193922  1.657778086
## 1114 -0.4675066966  2.0550009017 -0.097740155  0.2240563793  2.309989291
## 1115 -0.1895479384 -1.3826715506  0.006509196  1.6445993864 -0.260858484
## 1116 -0.0755585054  0.1415103442  1.650141537  1.0825057702 -0.362215155
## 1117 -0.8543714899 -0.5172189546  0.922823325 -0.0046931538 -0.235958475
## 1118  1.0626306383 -0.4480714817 -0.026846651  0.3832762763  0.834072473
## 1119 -0.8417940573  1.2574667016  0.378206582  0.6767413240  1.988247498
## 1120  0.5755987800 -1.3701514481 -0.555019932  0.2042127883 -0.086316896
## 1121 -0.7858980884 -1.0744409196  1.437637164  0.2353938381 -0.388233569
## 1122 -0.1116015058 -1.2483773682 -0.911512837  0.1998504378  0.202431414
## 1123 -0.0277285345  3.3160069172 -0.133099117  1.0709640046  2.393603454
## 1124  0.5015374389 -1.3008131866 -0.750737008  0.9413997872  0.599826470
## 1125 -0.9225084462 -1.0440643755  0.391165803  0.1397355055  0.386990156
## 1126 -0.5348682606  0.6493221387  0.127600403  0.1371316006 -1.616923531
## 1127 -0.9488125112  2.9777640610  0.311656810  0.2740584057  1.866206683
## 1128  0.0947673240  1.0552176793 -0.063123106  1.4255071133  0.807934495
## 1129 -1.0868778233  2.7851545645  0.351126773 -0.1407637341  2.388043736
## 1130  1.4477444808 -0.0587764128 -0.520265120  0.5526599059  0.007368529
## 1131 -0.6096407708 -1.2187586455  0.286816101 -0.4539416226  0.403260664
## 1132 -0.2658840276  1.0411150168  0.898278343 -0.2057440889  0.331112924
## 1133 -1.4820547716 -1.3547901794 -0.731157686 -0.1256409226 -0.150251444
## 1134 -0.6152552077  1.2909954702 -0.503056000  0.6175714298 -1.016463470
## 1135 -0.5230521866  0.6843830147 -0.777022096  1.8390949574  0.224957950
## 1136 -1.2292993112  1.1843674888  0.338092653  0.5084933313 -0.168838836
## 1137 -0.3727985204 -1.1352032206  0.195599348 -0.0006734811  0.382768124
## 1138  0.3780311483  0.4016440464  0.332616655  1.6681436046 -1.205293228
## 1139 -1.0553399793  1.1491971239 -0.450166515  0.9055729556 -0.077573518
```

```
## 1140 -0.9931327816 -0.8924143345  1.070286500  0.4472864113  0.167373056
## 1141 -0.7640234135  0.3295827150  0.806211972  1.4323491734  0.030072483
## 1142 -0.4666035935 -0.1996301979 -0.052883457  0.4809471107 -0.049574440
## 1143  0.0314356753 -0.2259942012 -0.058740956  0.4510395602  0.464813268
## 1144  0.6034942570  0.4472561177 -0.838495161  2.3267232821  0.903046687
## 1145 -0.3626206453  0.4293247948 -0.596960685 -0.2080139949 -0.546197489
## 1146  0.5544765416 -0.9735330821  0.447408127  0.3651732752  0.789343737
## 1147  0.0672792334  0.8356309686  0.624801841 -0.1457055317 -0.170769229
## 1148  0.0507541768 -0.8811376396 -0.352004532  0.3347551403  0.703783512
## 1149  0.1091946310 -0.6156403568 -0.479502318  0.1321787759  0.479743866
## 1150 -1.1968146105 -0.9954484752 -0.214049828  0.0963568881  0.238835601
## 1151 -0.4338279884 -1.3708204941 -0.552915867  0.5955409278  0.404307720
## 1152 -1.1994443200 -0.5421934342 -0.019981006 -0.1619209790 -0.216942702
## 1153 -0.0490417326 -0.9677772196  0.878641821  0.0101064139  0.002335391
## 1154 -0.9426762552 -0.3572470039  0.147986674  0.8319623288 -0.222892059
## 1155  1.0378482031 -0.4195178318  0.361038828  0.9510834367 -0.050677161
## 1156 -0.5056003666  0.6420383194  3.093199231  0.1130983027 -0.961294190
## 1157  1.1954139422 -1.4858289692 -1.139391161  0.4247349581  0.865216433
## 1158 -0.6925731355 -1.0647733241 -0.280051867 -0.3983454452  0.029251160
## 1159 -1.1998275281  2.2973435634 -0.671861385  0.0295816125  0.342971078
## 1160  2.9861876708 -0.1078487057 -0.364017770  1.7189951118  0.655939987
## 1161 -0.5879549064  0.6343104089 -0.512575363  0.3900640184  0.894116702
## 1162 -0.1033000000 -0.7524271409 -0.081125479 -0.3045486597 -1.486020549
## 1163 -0.2198570701  0.2789873216 -0.497922873  0.1971776623  0.055739008
## 1164 -1.5296041735  1.0475446741 -0.141687027 -0.2587295428  0.044524954
## 1165 -1.1606662727  0.4235628902  1.387854803  0.7894956398 -0.370473821
## 1166  0.1188806009  3.0549352166  1.187549813  1.0939402658  0.373200158
## 1167 -1.1139058278 -1.5211099020 -0.281732742  0.4777243812 -0.010214015
## 1168 -0.9250678459  1.2752201662  0.092531929  0.2035644021  0.373633568
## 1169  0.4674618772  0.6024088084  1.829023760 -0.0448078917  2.565300605
## 1170 -1.2679519693  0.3211866790 -0.491221479 -0.2671314439  0.025701480
## 1171  1.7067563349 -1.0074214234  0.944161655  0.2939219659  2.507000927
## 1172 -0.1857860363 -1.4203450640  0.416383674 -0.4928591820  0.490457368
## 1173 -0.8867603100  2.1123464759  0.111181238  0.1626010133  2.522713413
## 1174 -0.3363082662 -0.3884059328  0.651930588  0.4485899328  0.044543438
## 1175 -1.1904327926  0.1711958551 -0.433356374  0.4275360052  0.337930685
## 1176  0.0579151604  0.8036193870 -1.224856426  0.4194653324  0.163197308
## 1177 -1.1865052927 -0.2181482669 -0.784379807  0.0955580946 -0.373302167
## 1178 -0.8060113334 -0.7150289628  1.725537852  1.5930366278  0.375534348
## 1179 -0.7270544426  2.1064419891  0.321712867 -0.1810013899  3.433161842
## 1180 -0.7473742412 -0.8982658797  2.640454449  1.7234754605  0.438256208
## 1181 -0.2270621003 -1.3328397540  3.616674429  1.1295195498 -0.625263858
## 1182  0.7932768008 -0.0964315301  0.729944990  1.9008597350 -0.153304795
## 1183  0.5470858539 -0.0096564197 -0.443318927  0.5165171478 -0.132144208
## 1184 -0.4553052834  0.5792325021 -0.067832296  0.9574966683 -0.118350000
## 1185 -0.1595348650 -1.2321897505  1.149902528  1.2608810190 -0.709025928
## 1186  0.7039638876 -1.2066135249 -0.348283061  0.9789509091  0.017026627
## 1187 -1.3414444344  0.9595640087  0.654219019  0.2589662015 -0.410698426
## 1188  1.6031907557 -0.2798262453 -0.603361545  0.8445550046 -0.324161358
## 1189 -1.0922727080  0.6115701060  1.140043595  0.3531198256 -0.062107930
```

```
## 1190 -0.1818778566  0.1250262401 -0.103619392 -0.2745345446  0.345592568
## 1191 -1.1594515229  0.6990132582  0.831273962  0.6200153135 -0.171520612
## 1192 -0.6524871399  0.8511256369 -0.127238437  0.4498227109  0.014505574
## 1193 -1.9846310104  1.0331808695  0.641895424  0.2717835684 -0.758319306
## 1194 -1.7889780035  0.8576072803  0.345713385  1.1408823178 -0.743429228
## 1195 -1.8676042779 -0.2890405937 -0.686537357 -0.1476886582 -0.808784356
## 1196 -0.9242156812  1.5149768602  0.672965159  0.0683908101  2.091260841
## 1197 -1.5713326043  0.5265323716 -0.219324613  0.0619204575 -0.653458222
## 1198 -1.1711829144  0.7341403666 -0.529589341  0.1938003901 -0.186354852
## 1199 -1.3621263443 -1.3852807795 -0.011523331  0.7316086583 -0.425593708
## 1200 -0.6967409477 -0.5288116605 -0.258885543  0.4311192689 -0.617883747
## 1201  0.9480738502 -0.2450095238 -0.410171883  1.3329909843 -0.079358519
## 1202 -1.7945259762  0.2006366624  0.013390621 -0.2854901092 -0.101379502
## 1203 -1.1372129100  0.0873148606 -0.278451232  0.7604487989 -0.241804922
## 1204 -1.2744097482 -1.4138011968 -0.504228962  0.7681568432 -0.425173089
## 1205 -1.1456793974 -0.0238739742  0.269246749  0.4793191873 -0.529829170
## 1206 -0.8760436285 -1.2420555975  1.494185209  0.2493145381 -0.576901150
## 1207  0.0428556896  0.2032717847 -0.247498416  0.5405842895 -0.527698201
## 1208 -0.7523411725  1.1862614722 -0.136914406  0.2699817478 -0.996049117
## 1209  1.0058296589 -1.0621486316 -0.329599598  0.6717408599  0.718067974
## 1210  0.3318705922  0.8233642320  1.210674192  0.5121346236 -1.290144925
## 1211  0.1482246313 -1.2898545101  1.797668186  0.6988641372 -0.979058954
## 1212 -1.4554053823 -0.3466456714  0.230541015  0.3351438095 -0.617589250
## 1213 -1.0374672575 -0.2040440761  0.319706784  0.3436105402 -0.306468240
## 1214 -1.2627241583  1.5350193791  0.332189469  0.8968619863 -0.272301138
## 1215 -1.0205358527 -1.3918260867 -0.297645518  0.1229896202 -0.092410195
## 1216 -0.5759112025  0.1011100247 -0.388707482 -0.1907586568 -0.472305302
## 1217  0.0366972231  0.5075159690 -0.715500605  0.7790250115 -0.174702527
## 1218 -0.9998135769 -0.2235502885  1.793704459  0.5574415555 -1.929919572
## 1219 -0.6692707789 -0.7829488350  0.115311353  1.2987010254 -0.297629472
## 1220 -0.5765982257  0.7889486672  0.566377526  0.6473801342 -0.730124151
## 1221  1.8637962242 -0.5333865381 -0.854394905  1.5154628567  0.178016656
## 1222 -1.2599445281  0.5526947552  1.656344736  1.1494129345 -0.702440282
## 1223 -0.4230392339 -1.5188366715  0.259311535  0.1369245365 -0.179543909
## 1224 -0.9080624507  1.5091864116 -0.676274120  0.8988360110 -0.380032377
## 1225  0.6844569401 -0.5922733295 -0.241226130  0.4711387398  0.447474106
## 1226  1.1647912971 -0.9319639161 -0.280754717  0.7589775063  0.490439433
## 1227 -0.8241943398  1.4105211139  0.288637857  0.6561738797  1.909831428
## 1228 -0.0333952877  1.1338151232 -0.698691468 -0.0040444495 -0.127204574
## 1229 -1.0171583574  1.2180542169  0.145938039  0.4475686128  1.707360492
## 1230 -0.0787553390  1.7842948898  0.233297395  1.3778482883  0.026274782
## 1231 -1.2533455808  0.8021786465  0.971887743  0.5483567963 -0.393398937
## 1232 -0.0211099889 -1.0839362055 -0.629772764  0.6190521515  0.463178143
## 1233 -1.3855225386  0.2123552360  0.100009955  0.3499183450 -0.721855328
## 1234 -1.0643794715 -1.2416758492 -0.014921383  0.4894182460 -0.164203761
## 1235 -0.5637553992  0.1206609531 -0.307573374  0.6929302943  1.565319241
## 1236 -1.0521953862  1.3410573874  1.136429567  0.1728745973 -1.837247837
## 1237 -0.4566212962  0.3739932732  0.341305782  0.4350995707 -0.710391232
## 1238 -0.3873596317  2.4677837371  3.353511663  0.4630999726  1.793503716
## 1239  2.9259590711 -0.0185557870 -0.726497538  1.6177277330  0.098680642
```

```
## 1240 -0.3371807908  0.1231666652 -0.077985153  0.6936647752 -0.727408992
## 1241 -0.2942499154  0.2739306419 -0.434834951  0.7204377768 -0.651176461
## 1242 -1.8320753144 -0.4869306097  1.667545831 -0.0305640663 -0.719300556
## 1243 -1.0910308070  0.3422051126  1.353411698  1.0100925374 -0.421789786
## 1244 -0.8434263121 -1.3380304612  0.329771193  0.2706654656  0.232281092
## 1245 -0.2224869204  0.9031769921 -0.583503625  0.4079109153 -0.205863831
## 1246 -0.4010096547  1.2774566227 -0.646008196  1.1004574634 -0.608498265
## 1247 -1.1230559384 -0.5388596836  0.425372080  0.2795144545 -0.435164328
## 1248 -1.3005339843  0.3723618575  1.109135213 -0.0963098978 -0.947199675
## 1249 -1.2270819720  0.9339141965  0.660355216  0.1194319517 -0.174189643
## 1250  2.1627802824  0.3114881563 -0.297926364  1.1872361734  0.510232526
## 1251 -0.4478854388 -0.2736834820  1.607651385  0.3846734337 -0.682022895
## 1252 -1.3168902981 -0.9817848609  0.890073685  0.0789936892 -0.063944436
## 1253 -0.6856532131 -1.6007690669  4.443587632  0.2587420318  0.715242684
## 1254 -0.0324498075  1.5689761468 -0.054913766  0.2800429817  0.238420866
## 1255 -0.7431713672  0.2739473596  0.551355147  0.7333227203 -0.040944366
## 1256 -1.0433961513  0.5139724954 -0.553565434  1.5922095369 -0.246873511
## 1257 -0.5301098176  0.0335051226 -0.477150509  0.8635511284 -0.271777505
## 1258 -1.2921854651 -0.4829967875 -0.623973082 -0.0377986526 -0.424334821
## 1259  1.4073404700 -1.1150175709 -0.926198263  1.1259491049  0.896555788
## 1260 -1.0369312925 -1.0102292219  1.682441138  0.3697904572 -0.602836716
## 1261 -1.3328416845  0.9324456684 -1.040336222 -0.1250815451  0.610373444
## 1262 -1.2208457768 -0.4199315233 -0.365824179  0.1590577582 -0.141573692
## 1263 -0.8448998482 -1.2687501261  0.046290742  0.2831400873 -0.359016884
## 1264 -0.9849187343  1.8836433414 -0.197785715  0.7645438056  0.521034117
## 1265 -0.0294756126 -0.3692765347 -0.728152654  0.6951443356  0.010275491
## 1266 -0.8802919065 -1.1449635843 -0.500346274  0.5740620055  0.826119614
## 1267 -0.9823107483 -1.3087235360 -0.337118885  0.4505140910  0.293981223
## 1268  0.8505031380 -1.7059003434 -0.617333069  1.2761926828  0.555877728
## 1269 -0.9297174949 -0.6593715242 -0.188586831  0.1316613284 -0.241310401
## 1270 -0.2410796322  0.0481590891  0.057991805  0.1638150356  0.326426611
## 1271 -0.0355470541 -0.0329037579  0.203382403 -0.0901267196 -0.553426282
## 1272  1.2438452336 -0.5025925448  0.670808884  1.0255754019  0.638678685
## 1273 -1.5994746932  1.2767240500 -0.914925346 -0.0681468759  0.040496614
## 1274  0.6645933197 -1.3344987787 -0.460102125  0.7685215040  0.315404292
## 1275 -0.1510530983 -0.0177881756  0.678435006  2.0316356995 -0.547550412
## 1276 -0.9364438782 -0.3032603510 -1.138455009  0.3135073172  0.388058924
## 1277 -0.6910669642  0.3929571667  0.774605176  0.4233772312  0.292378280
## 1278  0.5073019203 -0.6713845183 -0.525505628  1.6302555444  0.140649833
## 1279 -0.8587884815  0.2181259396 -0.461145184  0.0404772040 -0.514452821
## 1280 -1.2281710006  0.3010012753 -0.389129715  0.0217111261 -0.396101933
## 1281 -1.2314840498  0.7668153348 -0.634281214  0.0555595915  0.221640744
## 1282 -0.9418737098 -0.3842705437  0.166961976  1.2308174415 -0.097118147
## 1283 -1.2240426554  2.1005626476  2.679465767  0.7323389141  2.675356439
## 1284 -1.3596826787 -0.2739029492 -0.316936609  0.0668961746 -0.284631271
## 1285 -0.2637097594  1.4234171021 -0.607520334  0.0550440556 -1.492757973
## 1286  0.1232789542  1.8919625117 -0.006870359  2.2404912312  2.412407415
## 1287 -1.7024199230 -0.5582048819  0.249381873 -0.0231526971 -0.491353126
## 1288  2.1697153082 -0.6671703769 -0.579005537  0.7475536792 -0.179576641
## 1289  0.2475764404 -0.7916145226 -0.781268533  0.4273017645  0.297655688
```

```
## 1290 -1.5029255283  1.4499759936  0.017937091 -0.4355206908  0.439562714
## 1291 -0.9469646074  0.7586304914 -0.031579649  0.3445730601  0.415835206
## 1292 -0.8592409162 -0.1162370800 -0.377057080  0.3003142126  0.061778100
## 1293  0.5908061845 -1.6678412340  1.022281414  1.6578466460  1.058012681
## 1294 -1.5105397637 -1.4661885451 -0.670290137 -0.0965302740  0.028325891
## 1295 -1.1284373190  0.4182155827  0.186124901 -0.1338233581  0.434903976
## 1296 -0.4974425800 -1.5059643278  2.933392831 -0.1524326891  0.937876401
## 1297 -0.0374013236 -1.3409138971  0.439276076 -0.1611548848  0.674883816
## 1298 -0.6031966573  0.5581136552 -0.079975836  0.2965003425 -0.275936123
## 1299  0.7238096891  0.3906153890 -1.175199506  0.5504785561  0.673150374
## 1300 -1.5138427622 -1.4333388636 -0.384566365 -0.1430234041  0.137347841
## 1301  0.2304745960  2.3878554049  0.323798312  0.9018269505  2.720805908
## 1302 -0.6714603403  0.1559923375 -0.138726481 -0.0927188558 -0.134341007
## 1303 -0.1736210075  0.5360527483 -0.164000575  0.3229016272 -1.917495245
## 1304  1.9324254835 -0.4257395027 -0.341998563  1.0642252228  0.900832679
## 1305 -1.0528880531  1.3290205739  1.540945051  0.4201177124  2.365444205
## 1306 -0.0722926442 -1.3912346362 -0.296990863  0.4028923713  0.862041617
## 1307 -1.5791115354 -0.0078059198 -1.109728226 -0.2750842992 -0.024027862
## 1308  1.0798368844 -0.7233949914 -0.538201370  0.2183489351  0.446623521
## 1309 -0.6103459893  1.4490595518  0.901012990  0.0034390083  0.671904614
## 1310  1.9306249661  0.8791761262 -1.333020906  0.9182075532  1.117125258
## 1311 -0.5625619409  1.1010532924  1.133776764  0.2723668369  0.680926676
## 1312 -1.3769064468 -0.2512795066  1.953811895 -0.1062799319 -0.311145362
## 1313 -0.4046411855 -1.4841925701  0.035661089 -0.3717378339  0.801825387
## 1314  2.8180832425  0.3469490516 -1.306157720  1.3257818246  0.089271750
## 1315 -1.2423374695  0.7913195841 -0.601513328  0.1591615806 -0.374557331
## 1316 -1.3108577666  0.7903657412 -0.404756511  0.0851043110 -0.382473817
## 1317 -0.3146842163 -1.3715440457 -0.663103094 -0.1074155835  0.244489501
## 1318 -1.3924927763  1.1822541724  0.652050421  0.0162537068  0.199099112
## 1319 -1.2869421957  0.8536614248 -0.039836529 -0.1119719764  0.277275109
## 1320  0.4045859990  0.5528261083  1.777778322 -0.2411560575 -1.835243126
## 1321  2.9764115473 -0.2067148960 -0.842334167  1.0961334809  0.799584406
## 1322  1.5796954858 -1.1735263901 -1.141140943  0.7897433095  1.293889085
## 1323 -1.5214038061  0.6027359117 -0.906558367 -0.2125097510  0.337627007
## 1324 -0.8406497309 -0.6139221946  1.072748161 -0.2103223623  0.356810917
## 1325  0.8555816762 -0.7863302685 -0.701228556  0.0173622566  1.173661234
## 1326 -0.9818963316  0.6059075505  1.576575261  0.0590635881 -2.339647938
## 1327 -1.1350940900  1.3699362406  1.468103187 -0.2463865433  0.230596676
## 1328 -0.4329120320  2.9886547892 -0.845401966 -0.3117868315  0.584399901
## 1329 -0.9316938946  0.1105366073 -0.679510141 -0.1366876128  0.587009364
## 1330 -1.6090701502  1.0726966011 -0.720843724 -0.3557043884  0.168368076
## 1331 -0.6266009875 -1.3505895357 -0.399243623  1.4048055869  0.313034932
## 1332 -1.1895591202 -1.0268539456 -0.775162636  0.0717207820  0.582530157
## 1333 -0.3627878154 -0.2401312331 -0.737424748  0.6731308673 -0.081430114
## 1334  2.4810938953  2.0681680183  0.254564047  0.9944375373  2.409486744
## 1335 -1.4058655181  0.6118968201  0.649078757  0.3925922566 -0.186021367
## 1336 -0.5997579351 -0.7854268110 -0.887613876  0.1710859535  1.525511021
## 1337 -0.8994888812  1.2000022440 -0.778536478  0.5569735383  0.219862056
## 1338 -1.4085008532 -1.4385467505  0.936874350  0.4488025142  0.040708225
## 1339 -1.3758704834 -0.6280658585  2.498486476  0.1412978016 -0.085714043
```

```
## 1340  1.3079449303 -1.4370214920 -0.024993847  0.2755397738  0.359882867
## 1341 -1.3648648913 -1.1380277784  0.638942154  0.0643351956  0.105500329
## 1342 -0.7670844733  1.2967091898 -0.633398840  0.2017141109 -0.867384869
## 1343 -1.5512595761 -1.4654480905 -0.187246605 -0.1850122180  0.070955856
## 1344 -1.4362641209 -0.9723099858 -0.055603858 -0.1660176805  0.258925411
## 1345 -1.0832961615  0.8082276713 -0.208826069  0.8757016763  0.050156305
## 1346 -1.1893321236  0.2211066230 -0.661828481  0.6364291450 -0.176201762
## 1347 -1.1112681779 -0.8048740193  0.035020349 -0.3307530191  2.487373427
## 1348 -1.3665753087  1.7137611620  0.905236025  0.0877339985 -0.373407821
## 1349 -0.8556742851  0.1270533019  0.944107545  2.0860542428  0.112371385
## 1350 -1.2164949484  0.7035500020 -0.591300528  0.6445917473  0.207363479
## 1351 -1.4262335756 -0.2475217057 -0.845524244  0.3246251973 -0.194343761
## 1352 -0.8099901364 -1.2038236645 -0.113967828  0.4484069645 -1.487909404
## 1353 -1.4826413611  0.7126235172 -0.983964795 -0.3340588900  0.163437261
## 1354 -0.4178094305  0.9771058558  3.950133229  1.1106908555  2.601750616
## 1355 -1.6175152895 -0.9153020547  1.205666610 -0.3793481064  0.322642191
## 1356 -0.0043060211  1.9797293697 -0.977590762  0.6873232147  0.293563633
## 1357 -1.1735550279 -1.1283695574  0.681316736 -0.3683691943  0.663732304
## 1358 -0.1712379190  0.7201201076 -1.113774938  0.0919255118  0.291800285
## 1359 -0.1643202444  0.9733668433 -0.217430917  0.4345365102 -1.695192330
## 1360 -1.0330553416  1.2492539014 -0.667810973  1.7655145225 -0.183906392
## 1361 -1.3128505842 -0.2435991007 -0.248596811  1.0996132331 -0.372942477
## 1362 -0.0686175860 -1.5060806034  1.291517389  0.9555909830  1.135003127
## 1363 -1.1316802577  1.9925632650  0.701062176 -0.1338284311  2.414935268
## 1364 -0.7007900628 -0.9956435094  1.651310189  0.2961377285  0.089628872
## 1365 -1.0748102618 -1.3671715575  0.766746087  0.5024187396  0.334747963
## 1366 -0.8325417067 -0.2761669680 -1.029412288 -0.0852076202 -0.482189693
## 1367 -0.0697991048 -0.1639917265  0.123957551  0.7424456127  0.230895872
## 1368 -0.6608835475  1.1355295228 -0.602398992  0.1984742341  0.359405750
## 1369 -0.7055867980 -1.3464318823 -0.732932880  0.0721698108 -0.095999381
## 1370 -1.2444542970  1.5524893236 -0.711080550  0.2565494773  0.310111389
## 1371 -1.0900770643 -0.7218018097 -0.850212206 -0.2790483051  0.485212643
## 1372  0.1041284469  0.5366154032 -0.216804058  0.1262750198 -1.766410419
## 1373 -0.8224582166 -1.3297429654  1.690956813 -0.3145796742  0.672953646
## 1374 -1.3463246696 -1.4585471598 -0.575264934 -0.0243987112  0.132790159
## 1375 -0.4002025274  0.7184912365 -0.551187722  0.4442827628  0.127143204
## 1376  0.6266399133  1.6738217217  0.416877632  0.0700240807  0.477852440
## 1377  0.0602065672  0.1063333659 -0.078941262  0.4854839981  0.656175808
## 1378 -0.4297503999 -1.2232376871 -0.835403284 -0.6667809875  0.586682448
## 1379 -1.6839688890  1.4074823782 -0.339904978 -0.1975950749  0.070648981
## 1380 -1.2868899797  1.5741391196  0.396558347  0.0312340638  2.241132713
## 1381 -1.0181312347 -1.3797063657  1.274678812  0.3984999425  0.177763196
## 1382 -1.2274237460 -0.5094867171 -0.005275272  0.2023758977 -0.243645074
## 1383 -1.6234982506 -0.0086320309 -0.934625643 -0.0699211050 -0.392588025
## 1384 -0.6633498269  0.0044637307  0.829524577  0.3010401513 -0.224753595
## 1385 -0.5911881454 -0.1534085708 -0.040890532  0.8561933205 -0.550669392
## 1386 -1.4482661331 -0.8948108437  0.110358221 -0.1631196287  0.173447565
## 1387 -0.2107951871 -0.8118437992  0.072999986  0.5150565971  2.493495520
## 1388 -1.0688726687  0.5769581710  0.258475584  0.6028283909 -0.634536082
## 1389 -1.6176697660  1.1594893650 -0.516112866  0.0453315314 -0.133315468
```

```
## 1390 -1.3212177722 -0.6185476676  0.823348236  0.1902711569  0.452037560
## 1391  0.4259806600  0.9467626325 -0.971508528  1.1530870068 -0.453899481
## 1392 -0.6662206996  0.0749086967 -0.404635363  0.5305450142 -0.545393938
## 1393 -0.8850958273  0.4607455016 -0.584201914  0.0031052315 -0.218177687
## 1394  0.9937299304 -1.0522574318 -0.659161918  0.8078441097  0.514801454
## 1395 -1.1592537659  0.0339386786 -0.521378697 -0.0326735252 -0.102784872
## 1396  0.3151706092  1.8601349360 -1.414323263  0.0363748240 -0.298971157
## 1397 -1.3546628588  1.2743706514 -0.112168481  0.0358183326  0.091186364
## 1398 -1.3720621129  0.2986427230 -0.530859671  0.0205936280 -0.196206839
## 1399 -0.9265332980  1.5008382501  0.094269225 -0.1651368633  0.133767851
## 1400 -0.4684312824  1.3761273973  1.093028950  2.0056710467  0.898799265
## 1401 -1.3596938201  0.4076524735  1.269354854  0.1117046414  0.005137563
## 1402 -0.7744728942  0.3310063807 -0.245434056  0.0576580929 -1.555571653
## 1403 -0.3676283611 -1.1680393568  0.392005519  0.1814023110  0.278281162
## 1404 -1.1576106675  0.5817425235 -0.857640377  0.2859582866 -0.551700999
## 1405 -0.5175764498 -1.3549391666 -0.790674896 -0.0620412309 -0.011054828
## 1406 -0.7743825798 -0.2002985363 -0.689321665  0.8723829199 -0.137541673
## 1407 -1.4181934173 -1.4433341622  0.426292455 -0.1001223621 -0.208792194
## 1408  0.8179524316 -0.2857659657 -0.346878672  0.3370394142  0.540258399
## 1409  0.7792125323 -1.5108410673 -1.103321690  0.5899412496  0.607564353
## 1410 -0.3962167626  0.0376676005 -0.920671905  0.8507719056 -0.370784287
## 1411 -0.9261750703 -0.0784660094 -0.941312233  0.3813500872  0.289330865
## 1412  0.0217623899 -1.2723053220  0.914938690  0.5289032916  0.448278515
## 1413 -0.1419264726  0.4764689186 -0.173178886 -0.1997903079 -2.298990785
## 1414  0.2741452055 -0.0325468787  1.027088717  0.6733370873 -0.590550046
## 1415 -0.4529776177  1.2374542456  0.329901410 -0.7920558365 -1.245165986
## 1416  0.1631999964 -1.5936499094 -0.419351880  0.2781217957  0.562205344
## 1417 -0.8200749442 -0.5809007722 -0.121092477  0.2361361741  0.296708932
## 1418 -0.3875166050  1.2115648118 -0.999770570  0.5422992060 -0.583454686
## 1419 -1.8513023610  0.0489814799  1.478020082 -0.4084412490 -2.585917394
## 1420 -1.4333043776 -1.6212619868  0.208941170 -0.0113814049 -0.065987235
## 1421 -0.1449735363 -1.4986150855 -0.573925901  0.2295928492 -0.084858342
## 1422 -1.0929477277  1.2731882980 -0.228147807  0.3686245197  2.038803326
## 1423  0.0389367695  0.5356983022 -0.464489094 -0.1049774743 -0.287779061
## 1424 -0.5370699486 -0.4657620870 -0.684194539 -0.2293003729 -0.187988416
## 1425  0.8481053217  1.3068365639 -0.771437982  2.5373163900  0.592818953
## 1426  0.2003524483 -0.9117981164 -0.318633837  1.4480845891 -0.143288724
## 1427  0.4075988452 -0.4920442858  0.040055835  1.3185026039 -0.259421596
## 1428  0.7615366305  0.4269151440 -0.644893239 -0.1161880968 -2.022673871
## 1429 -0.5078483655  0.4489560967  0.002871061  0.1143645270 -0.440355713
## 1430 -1.0094301721 -0.2367839826  0.259495160  0.1335600634 -0.917379187
## 1431 -1.4908595148  0.3015592456 -0.855932423  0.0369643556 -0.168260129
## 1432 -1.3672823289  1.4059415398 -0.309705114  0.8718193731 -0.142798226
## 1433  1.6597376363  0.7550970139  1.322288800 -0.0519818389  0.479860359
## 1434 -0.3780452373  1.7968002591 -0.689265093  0.0964623338 -0.782183400
## 1435  0.4628121339  0.7765439403  1.891345902  0.6379066956  2.165204929
## 1436 -0.5698576048  1.3046743803 -1.178295047 -0.7149063756 -0.030623121
## 1437 -1.0424472409 -1.5085913580  0.292335040 -0.1907197815  0.603265610
## 1438 -0.9501967038 -1.3863190230  0.354025325  0.5591849733  0.250886152
## 1439  1.3203472568 -1.0015876078 -0.078019222  0.8911033233  0.402235056
```

```
## 1440 -0.4139477083  1.0182293293  0.353317695 -0.4661773004  0.529916703
## 1441 -0.6710489697 -0.9248051341  1.587752981  0.0417695197  0.538669996
## 1442 -1.3924229832 -1.7353890856  0.455981533  0.0017485670 -0.227174304
## 1443 -0.6997300987 -1.4273431209 -0.816595583 -0.0791141036  0.526190306
## 1444 -1.1116899063  0.9854361882 -0.048377657  0.4508693000  0.017673106
## 1445 -0.0717111591  1.4153166545  0.483975775  1.0699665382 -0.562605671
## 1446 -0.4310744860 -1.0404199748 -1.015587881  0.1961547299  0.400336500
## 1447 -0.8196166185 -1.4793323553  1.669857736 -0.2417054082  0.902496669
## 1448 -0.4046007593  0.4498663606 -0.160823905  0.2222688448 -0.173039647
## 1449 -1.0676209071  0.0260691535  0.792398489 -0.3848703821  0.326887401
## 1450  0.2016112611  1.8585772818  2.447076516 -0.1994948590  0.566479335
## 1451  1.6989723479 -1.3989865525 -0.453961104  0.8785897483  0.420665115
## 1452 -1.0256612677 -1.5425403604  0.430721881 -0.2080079302  0.218802094
## 1453 -0.8723041901 -0.1482109287 -0.779285969  0.7243698304  0.015357417
## 1454  0.7705029428 -0.6790202947 -0.757295545  0.9502403036  0.112031573
## 1455  1.0351627443 -1.2917243984 -0.797987191  0.9730020956  0.349801711
## 1456  0.3384016253  0.3285503176 -0.146765543  0.4759773150 -0.838156620
## 1457 -1.1622568767  1.7741449201  0.340164065  0.0852533743 -0.597967022
## 1458  0.9356917643 -0.3495999869  0.671948670  0.4815072527  0.152814052
## 1459 -0.2270590888  0.5126999349 -0.839501641  0.9307338547  0.277196255
## 1460 -0.0826303062  1.0436710853 -0.861410884 -0.0047575482 -0.203446716
## 1461  1.6334001039 -0.8976260429  0.029827606  0.8867895323 -1.242196550
## 1462 -0.5818165200  0.1671086774  0.201219659 -0.1119934214 -0.030900135
## 1463 -0.7995290411 -0.5784354762  1.508643993 -0.2275446282 -0.118475674
## 1464 -0.9135569833  2.0000938324  1.328269965 -0.2569079853  0.276294722
## 1465 -0.7864090430  1.4725602222 -0.680182055  0.5243640010 -0.276128560
## 1466 -1.5693483183 -1.6948964195 -0.567802338 -0.3672286020 -0.140996339
## 1467 -1.0377502525  1.7062845127 -0.723131060 -0.4139577787 -1.838396188
## 1468 -0.7379734605 -1.2841904547 -0.033132752  1.1501266247  0.068092066
## 1469 -1.4525474542 -0.6301892314  0.334310615  0.1938962917 -0.237049072
## 1470 -1.2242355640  0.8395915501  0.970318865 -0.2648178570  0.092381520
## 1471 -0.4410280097  0.5468694311 -0.790125401  2.3262644229 -0.283937734
## 1472 -0.6517648595  0.5091023865  1.063269964  0.2259293617 -0.020023424
## 1473  0.1290199163  1.2781234433 -0.066586957  0.2814214463  2.046578126
## 1474 -0.6695630420 -0.2308721990  2.974796655  0.2841116855 -0.802643378
## 1475 -1.2333142961  1.6383139711 -0.701894046  0.4834120549  0.079158014
## 1476 -1.3851946976 -0.2972765206  0.522486491  0.1706620746 -0.232331471
## 1477 -1.1232132049 -0.7567131101 -0.754349631 -0.0173905024  0.416439254
## 1478 -0.5927020014 -0.0369878350  0.284134116  0.5885669617 -0.344872585
## 1479  0.3893468337  0.9752175968  0.443099793  2.6584413438 -0.946395716
## 1480 -0.3080834813  1.0562999000 -0.442080967  0.9922625783 -0.736761809
## 1481  1.5284366409 -0.6486668479  0.244219238  2.2098711315 -0.218711794
## 1482  0.2407684458  1.5401171906 -0.403811140  0.8148125435 -0.398329068
## 1483 -0.7342434219 -0.3642139491 -0.779359317  0.2114532058 -0.931733005
## 1484  0.5156600186  2.1108015101  0.262133158  0.9471922690 -0.177515347
## 1485 -1.0169530942 -0.1749347653  0.260829996  0.4265158219  0.011145311
## 1486 -1.4869880468 -1.0791224465 -0.523908905  0.1315217792  0.020852962
## 1487 -0.7401454423 -0.3514553676  0.908335152 -0.6876269107  2.578640370
## 1488  0.0574818542  2.3533415454  2.511888388 -0.1760514299  2.709017240
## 1489 -1.5796598806 -0.3559939894 -0.733254010 -0.0146044379 -0.711177099
```

```
## 1490 -0.7392029404 -0.3180588007 -0.486062305 -0.2425076226 -0.751628578
## 1491 -1.2549244046 -0.3262181233 -0.236061672  0.0411186280 -0.160279924
## 1492 -0.4023768712 -1.1047132641 -0.651134976  0.3844488838  0.205383674
## 1493 -1.4307829286 -0.4230092406 -0.484671564  0.0775487299 -0.583763634
## 1494  0.5945415370 -1.4459819508 -0.445085291  1.7722488190 -0.517780435
## 1495 -0.2007922785  0.1086688452 -0.392367886  0.2739813363  0.262001594
## 1496 -0.9097782289 -1.8620732964 -0.088209833 -0.7135892914  0.308862947
## 1497 -1.4807455958 -0.9453666134 -0.327513560 -0.2723530657  0.101888709
## 1498 -1.3739542533  0.6208815551 -0.702858240 -0.3144176373  0.116540452
## 1499  1.0681015712 -0.0120523400 -0.914770607  0.4243031222 -0.247483295
## 1500 -1.0482120763 -1.5198857296  0.295288279  0.0014683892  1.118063511
## 1501  0.3154538935  0.4197949594  0.239455219  0.0548715599 -0.271424378
## 1502 -1.0489967211 -0.1384115720 -0.410934335 -0.1336729548  0.043049201
## 1503  0.6081494353  0.8075444019 -0.008827920  0.5353618784 -0.032965742
## 1504 -0.4615884072 -0.3627438145 -0.330222436 -0.2529760852  1.753529231
## 1505  1.8502051552 -0.1186248266  1.178945463  2.0581577843  0.693912994
## 1506 -0.1799710001 -0.7119503491 -0.444760732  0.8752446304 -0.102246328
## 1507 -0.2254550773 -0.1142866831 -0.794646172  1.5282170317 -0.192427549
## 1508  0.0994081894 -1.4111660228  1.167776059  2.4789407730  0.131001303
## 1509  0.0922866646 -1.3729798804 -0.858223588  0.2163574934  0.521929378
## 1510  0.6025492935  0.1353814955 -0.881663127  0.3961323175  0.664647035
## 1511 -0.3642099789  1.1565877661 -0.332896870  0.9046870664  0.377412337
## 1512 -1.2539373989  1.0907708186 -0.671592555  1.3603085160  0.072852899
## 1513 -0.8182810583 -1.5354787773  0.381685353  0.2915720567  0.105433667
## 1514 -0.8662216547 -0.5483376235 -0.322103461 -0.1000235418 -0.619376044
## 1515  0.0109514427  2.2976549798 -1.380354987 -0.0377435636  2.875765813
## 1516 -0.2249913608  0.8621607641 -0.506180439 -0.3589231810 -1.875097207
## 1517 -0.4382875511  0.2645556812 -0.579342371  1.1632775946  0.001244864
## 1518 -0.2698099680 -0.8411338406 -0.168654239  1.0424512507  0.315681277
## 1519 -0.9378903661 -1.0248768825 -0.364896682  0.1460120420  0.410091941
## 1520 -1.4753858069 -0.6910596484 -0.541684534 -0.2536570634 -0.142898941
## 1521  0.0011526833  1.2999330285 -0.522397554 -0.4906172752 -1.415092332
## 1522  0.7851718299 -1.3351030739  0.006956531  1.3173925687 -0.136840477
## 1523 -0.2737468220 -1.4300408816  1.020177323  0.3842500851  0.292719674
## 1524 -1.6706860255 -1.0419024495  0.124881672  0.0319727832 -0.237047102
## 1525 -0.0061041419 -1.1606945642  0.094808596  0.7478916967  1.063740384
## 1526  0.1012824613  1.6091932598 -1.155725481  0.0477162587 -0.101952425
## 1527 -1.3643246014 -0.3847121284 -0.391765285  0.4871914071 -0.365483935
## 1528  0.4493095317 -1.0365033796 -0.517570748  0.4057194955  0.688049651
## 1529  0.2686814700 -1.5805263783 -0.900066973  0.0423234919  0.261547422
## 1530 -1.7008079076 -1.3282854144  0.750953882 -0.0003741700 -0.516995365
## 1531 -0.8708382761  0.6103946159 -0.104901394  0.0480761202 -1.246432416
## 1532 -0.9472114563 -1.2634048349 -0.433264616  0.2297799822  0.143418272
## 1533 -1.0445766913  0.4582427789  0.768384094 -0.2995494038 -1.781976248
## 1534 -1.0430808084  0.6491200589 -0.217751079  0.0761939541 -0.464314650
## 1535 -1.5439723838 -1.4575286959 -0.179519811 -0.2479102015  0.041705999
## 1536 -1.1617332270  0.7126718102 -0.062990094 -0.4614626868 -1.391338663
## 1537 -1.2321061439  0.0281807983  0.561896889  0.2252284536 -0.361441812
## 1538  0.0114407401 -0.4271471964 -0.572154966  0.5520479968 -0.903923170
## 1539 -1.3243297028 -1.2666802322 -1.041709567 -0.5303865679  0.579403468
```

```
## 1540 -0.7738565639 -0.8518987209  1.439358599  0.7499241774  0.137040426
## 1541 -1.5309259791 -0.4521826923  0.329452715 -0.0967087260 -0.639569478
## 1542  0.5856717654  0.0689155583 -0.825281534 -0.0566178508 -0.121712098
## 1543 -0.4131184251 -1.0624732816 -0.434376893 -0.3812911607  0.518556271
## 1544  1.7169040546 -1.3127520494 -0.806760034  1.7096937627  0.373424609
## 1545  0.9388568863 -0.4663001054  1.216022452  0.9744296719 -1.873505012
## 1546  0.2626083848 -0.0575254328 -1.001177906  0.4893853013  0.197346918
## 1547 -0.9832130731 -1.2309978203 -0.516046656  0.1528347011  0.306950515
## 1548 -0.6941033362 -0.3067874154 -0.267688867  0.2117029929 -0.346044083
## 1549 -1.6053068419  0.5080517647 -0.891186760 -0.1665847954 -0.479556695
## 1550 -0.7548078717 -0.2689606013 -0.487705922  0.4474126010  0.129151601
## 1551 -0.5483348000 -0.6203793361  1.978472024  1.4111524791  2.061114174
## 1552 -1.1472685698  0.9603161552 -0.785682927  0.1655919330 -0.047258384
## 1553 -1.5812694338  0.8116273923 -1.101501353 -0.4293947491  0.028636558
## 1554 -0.7330266177 -0.2304358637  0.211400567  0.1208650960 -1.929186187
## 1555  0.2656201714 -0.8342901512 -0.630954249  2.1322941547  0.440240909
## 1556  0.2476304021  0.6531221337 -0.680617603  0.9784262055  0.213458002
## 1557 -1.2989526520 -1.3731524622 -0.062190505  0.0202673310  0.236805165
## 1558 -1.4789346085  2.0782416577 -0.161334508  0.0793619680  0.401057025
## 1559  0.3008853829  1.3678211772 -0.341156082  0.6714794681 -1.838879267
## 1560 -0.5002907812 -1.3677466227 -0.492234471  0.7127716632 -0.414642472
## 1561  1.3678445912 -1.3512646641  0.120639253  1.3177739224 -0.057233072
## 1562 -0.8696486660 -1.4375675243  0.061294532  0.2338365940 -0.060349293
## 1563 -0.4609445635  0.1441734221 -0.397215604 -0.4035501188 -0.051538361
## 1564 -0.2405295614 -1.0987995001 -1.104383196 -0.4180809085  0.429308970
## 1565 -0.6781007522  0.5149823985  0.153358701 -0.0125256821 -2.303898220
## 1566  0.5184736310 -0.0003470580 -0.515148596  0.0559345495  0.124217200
## 1567 -0.8472914785 -0.6706308425  1.444823394  0.9386255864 -0.279456444
## 1568 -1.3362148428 -1.2550859362 -0.348202988 -0.0215506137 -0.071566590
## 1569 -1.2195629715 -0.3721097281 -0.874377219  0.1674410977 -0.355223970
## 1570 -0.2136298819 -1.1464220294  1.708852008  0.5778694076 -0.220074638
## 1571 -0.7613058090  1.3116127861 -0.555867804  0.1407795776 -1.286180906
## 1572 -1.2182158415 -0.0929653491  0.006434475 -0.0446639753 -0.114806661
## 1573  2.7339565530 -0.9106587228 -1.264010802  1.1620525949  0.967061300
## 1574 -0.8637713136 -1.0420551567 -0.414085613  0.0196883151  0.542034446
## 1575 -1.5679691396  0.5138433630 -0.492517700 -0.4708885157 -0.003749155
## 1576 -0.2809029453  1.5033258054  0.741006145 -0.6243925486  2.681714650
## 1577 -0.5237046693  0.1413265236 -0.361412719  1.0465567891  0.221315683
## 1578 -1.4728727856 -0.2977277140 -0.246652021 -0.4996914961 -0.122152904
## 1579 -1.4132383388  0.4351894155 -0.911906205 -0.0618222669  0.095748490
## 1580 -0.5685902408 -1.6384253204  0.109594986  2.2450341945  0.079090993
## 1581  0.0065142201  1.0224307778 -1.168642965 -0.5390671284  0.888094679
## 1582 -0.8650154741  1.0092135574 -0.077439976  1.0034507882  0.354761474
## 1583 -0.2684155496 -0.5909183722 -0.934178860  0.4059815971 -0.585385709
## 1584  1.6681731840  0.4732419926 -0.790082792  1.1966717062  1.059811548
## 1585 -1.3876845368  1.0184519171 -0.399671724 -0.0150074726  0.197329802
## 1586  0.7535932578 -0.0105556571  0.407298500  0.1903626870  0.609216950
## 1587 -0.9591983536 -1.4302709258 -0.579871574  0.4551475272 -0.281131552
## 1588 -0.5289468782  1.0368197406 -0.096616924  0.2215535625  0.639270760
## 1589  0.0243308885 -0.2532177580 -0.466283210 -0.0275684532 -0.114427418
```

```
## 1590  0.1161504121 -0.0768815397 -0.554159886 -0.0727886881  0.145736215
## 1591  1.7527615980 -1.5743864402 -0.769347083  1.6039742560  0.750348136
## 1592  0.5099540563 -0.9367869367  1.038644345  1.5831938245  1.728151712
## 1593 -1.3755865792 -1.3820050358 -0.074918278  0.2421419984 -0.141314856
## 1594 -0.2704978602  0.6903744230  1.008041992  0.5420253744 -1.020473359
## 1595 -0.4893774104  0.9346068278 -1.063080143  0.0062968387  0.198082848
## 1596 -0.4081938855 -0.4020054694  0.486993220  0.0920788074 -0.468673409
## 1597 -0.7908900918  0.0169274440  0.906007351  0.2999136234 -2.203842118
## 1598 -0.1621503295 -1.2282258237 -0.616194873 -0.1211972928  0.728251464
## 1599 -0.6822393935 -0.0309449714  0.619147542  0.1564951939  0.115762393
## 1600  1.3571815618 -1.1073792361 -0.660722450  0.7964263259  0.282915336
## 1601  0.3257459171 -1.0588949994  0.741430413 -0.4355763377  0.493009044
## 1602  0.3043571815  0.0189720589 -0.043577511 -0.6560552495  1.658858452
## 1603  0.4853314952  1.5742917720 -0.911507953  0.6323550022 -0.626438454
## 1604  0.7171040811  0.9806199698 -0.759733269  1.2402698873 -0.072070708
## 1605  0.3135826424 -0.1638926712  0.086827688  0.3174101947 -1.874262977
## 1606 -0.7257090224  0.8307845386 -0.984209966 -0.4332022320 -0.333120644
## 1607 -0.4036925935 -0.4198929889  0.378048081  1.4791874295 -0.444901519
## 1608 -0.6213719534 -0.5708017697 -0.075469472  0.3968235233 -0.789216344
## 1609 -0.2698708591  0.4669567443 -0.811539186  0.8336631632 -0.287081675
## 1610  0.5193117840 -0.9869318728  0.799701738 -0.2679304944  0.021140208
## 1611 -1.2827050275  1.1085887535  0.690590982  1.7706524049 -0.705286159
## 1612 -1.0612346185 -1.0459056379  0.047172640  0.0561929104  0.089861728
## 1613  1.2216797152 -0.1555507858  0.079267265  0.5695431350 -0.014117432
## 1614 -0.8330215106 -0.9988285283  0.480360008  0.4356518805  0.327898145
## 1615 -0.5662730279 -0.3403455961 -0.476672219  0.4442438521 -0.326380920
## 1616  1.4525923272  0.0791561602 -0.559955614  1.0709701367  0.532074895
## 1617  1.0647606372  1.0349982935 -0.855438970  1.3603062135 -0.696815785
## 1618  0.7897508383 -1.2008583785 -0.702937737  0.7391869527 -0.134849537
## 1619  1.1719575430  0.6761885766  0.529856861  3.3466770991  0.211960293
## 1620 -0.6456931734 -0.6470270935 -1.204659226 -0.5013788673  0.049356683
## 1621 -0.8182065020 -0.0237860712 -0.138740156  0.0264566623 -0.482897769
## 1622  0.0318192706 -1.4298369641 -0.008101182 -0.4972205178 -0.497268681
## 1623 -1.3276704197 -1.2882376543 -0.601410837 -0.3161300969  0.419759830
## 1624 -0.2608577190 -0.6956770017  2.668932567  0.0096398385  2.822876607
## 1625 -1.1554035604  2.4732146967 -0.171209114 -0.3650473652  2.212277337
## 1626 -0.0531561504  0.1809819515 -0.632428292 -0.2911028752 -1.691268369
## 1627  1.5624015372  0.4387018240 -0.090066688  0.5713071139 -1.589116151
## 1628 -1.1117182167 -1.3764078409 -0.496691548 -0.1488085957  0.290192443
## 1629 -1.2218208454  1.5355457263 -0.545477285  0.4805244299 -0.236464282
## 1630 -0.3668543515  0.6760851179 -0.341882125  0.0831636972  0.053071350
## 1631  1.7181789247  2.3483544142 -0.328543989  3.5820533849 -2.455040466
## 1632  0.4707671424  0.4389509761 -0.536194796  0.7388928022 -0.106576100
## 1633 -0.9761554446 -1.1824367206  0.568896318  0.2458962695  0.571217835
## 1634 -0.3591905741 -0.8080265072 -0.453409094  0.0074379813  0.101041322
## 1635  1.4367438090  0.8803451545 -0.300906598  1.4347408280  0.059918126
## 1636 -1.1853687655 -1.4676582639 -0.255082238  0.0332866650 -0.017240516
## 1637 -0.0798373635  0.5608911780 -0.127465007 -0.1083345775  0.569476737
## 1638 -1.4397253269 -1.2382415322  0.031190433  0.1402044121  0.182911185
## 1639 -1.5093198859  1.0698873938  0.831105002 -0.0357367483  0.125139240
```

```
## 1640 -1.6324214140 -1.3720283926  0.164467015  0.0101801868 -0.606200515
## 1641  0.1095142622 -0.2713847735 -0.321915724  0.4966449003 -0.301213143
## 1642  0.6796547057 -0.1562331169 -0.510532490  0.6106638104 -2.063612952
## 1643 -0.5380814458  0.6065557684  0.441465406  1.2610812205 -0.764757680
## 1644  0.3870475110 -0.2625743221 -1.022925759  1.2317958147 -0.093589427
## 1645 -0.8916100183 -1.2201636898 -0.338584936  0.2326769676  0.782571728
## 1646  0.1543703699  0.5129098461 -0.107126836  0.5923873697  0.602558881
## 1647  0.2722558468  1.7266898173 -0.064175717 -0.2187763752  2.675371148
## 1648 -1.4414682166  2.0137658236 -0.558666932  0.8912489022 -0.509910527
## 1649  0.3693566623  1.0078145275  0.354318099  1.2150650760  0.264854127
## 1650 -0.3085164102  1.2792820186 -0.783250315  0.0210528759 -0.764001598
## 1651  0.3051055919 -0.3832948555 -0.974797201  0.2943869741  0.329977122
## 1652  1.3284753244 -1.6622735942 -1.158180757  0.0734418620  0.514277415
## 1653  1.0622719734 -1.4658081916 -1.070467823  0.5382101438  0.710114308
## 1654  0.3637151980 -1.2475659466 -0.233760591  2.1337154886  0.172157153
## 1655 -1.3076724842  2.7790590687 -0.197782217  0.1878281414 -0.190153372
## 1656 -1.6061770617  0.1154244569 -0.769679323 -0.3395321563 -0.043270214
## 1657  0.3853674702  0.9668225137 -0.751150576  1.3861905513 -0.403707149
## 1658 -0.3277727158  0.7876571666 -0.801252709  0.2543810208 -0.270045347
## 1659  0.0168877691  0.8264045790  0.157773551  1.7137979727  0.373493827
## 1660 -1.2899105971  0.1500119718 -0.486008208  1.0046863686  0.178833167
## 1661 -1.9475741306 -0.3652266001 -0.304288183 -0.5074269772 -0.445503914
## 1662 -0.3386711811 -0.2023953629 -0.277176560  0.5028367646 -0.666913718
## 1663 -0.5338302976  0.5109088460 -0.265980472  0.2827072050 -0.479256514
## 1664 -0.7274196806 -0.7712750835  0.686206803  0.1323968438  0.890030693
## 1665 -1.0438723102 -1.6868525060 -0.550492250  0.3479601940  0.217976738
## 1666 -1.4291541852 -0.2031760852 -0.834042100  0.0634961419 -0.554374784
## 1667 -1.4217732215 -1.3046237079 -0.817322559 -0.3726350766  0.404901470
## 1668  0.8109056391 -0.6928367456 -0.148078537  1.6270538019 -0.653771442
## 1669  1.3972774261  0.1019070458  0.202245190  4.1532382218 -0.367609481
## 1670  0.0452446957  1.3542098843  1.235863871  0.9407205186  1.711729360
## 1671 -1.5665142159 -0.2862501766 -0.404337405 -0.3996123017  0.274502178
## 1672 -0.4312159246  1.1696977415  0.289609135 -0.1183144907  0.253668677
## 1673 -1.4086429861  2.4880912746 -0.052012011  0.2167192183  0.116535990
## 1674  0.9043647771 -0.7714607674  2.493670589  1.4339610295 -1.956770091
## 1675  1.6472569923 -0.7584812474 -0.149162651  1.9686173015  0.295055150
## 1676 -0.6496766157 -1.2953926452 -0.454506284  1.2943273715  0.327398204
## 1677 -1.6071461404  0.3722420047 -0.428625119  0.1297413270 -0.400957958
## 1678 -0.6826923502 -1.2539410471  0.034075889  0.5263984360 -0.187449943
## 1679 -1.0259331072 -1.4394597515  0.819951535  0.2062767837  0.032420641
## 1680 -0.9261855785 -1.3576893192 -0.428650620  0.3344624812  0.143216366
## 1681 -0.6222223591  0.0785329382 -0.031863609 -0.1570298721 -0.184095465
## 1682  0.0503556085  0.1805463118 -0.514689269  0.7533019377 -2.122886045
## 1683  0.8009150063  1.1708377937  0.619582915  4.0945658069  2.345858890
## 1684  0.3821305645  0.5886657016 -0.281899630  0.9617348430  1.000741812
## 1685 -1.1678620914 -1.5765675128 -0.864972520 -0.2435853996  0.139990844
## 1686 -1.0575955509  0.3488145897  0.153677444 -0.1063424820  1.617438947
## 1687 -1.3886176716  0.0134646451 -0.161083984 -0.1320311597  0.028836797
## 1688 -1.5952987241  1.1819566454 -0.056013283 -0.1658127866 -0.041548730
## 1689  1.0023164479 -0.2613606462 -0.817522796  0.0877793082  0.796376032
```

```
## 1690 -0.0842916965  0.0524771804 -0.560744379  1.7108420086 -0.034943525
## 1691 -0.2685534279 -1.3079405265  0.464780939  0.6707499987  0.489120831
## 1692 -0.5873168731 -0.8442859266 -0.041416811 -0.3492352807 -1.524136521
## 1693 -1.5476173893 -1.4371242788 -0.653665334 -0.2469108998 -0.060707231
## 1694 -0.6540714716  0.2775849629  0.244169686  1.9056154227 -2.102938220
## 1695 -0.5562492984 -0.2101367671 -0.484658056 -0.2423855520 -0.380612592
## 1696 -0.9444979743 -0.3653954125  0.083640152  0.3644627409 -1.309716228
## 1697 -1.7654107504  0.2166911458 -0.133876916 -0.1641006281 -0.687505464
## 1698 -1.7504000979 -0.4401442486  0.570843452  0.0720594089 -0.804508376
## 1699  0.3118638589 -1.2610400567 -0.208810751 -0.6471553025  0.871658688
## 1700 -1.0645352396 -0.1741029283  0.238626888  0.1934066369  0.457898428
## 1701 -0.9775998153 -1.0009603651 -0.501953935 -0.0246103887  0.217780397
## 1702 -1.5579133099  0.5272254971 -0.309286151 -0.1915938506 -0.213843631
## 1703  0.1185985482  0.6149971297 -0.527969886  0.6653084506  0.440888141
## 1704  1.1292866606  0.0856855328 -0.523587122  3.9822434528 -0.502646327
## 1705  0.0705401830 -0.2265270959  1.206612241  0.4087572027 -0.755134013
## 1706 -1.4266683051 -1.4327109370 -0.469269897  0.3335283499  0.134402123
## 1707 -1.5930228511 -0.2983209593 -0.846421216 -0.3598567953 -0.245572077
## 1708  1.0273710332  0.0179845321  0.012978476 -0.0833917553  0.962435664
## 1709 -1.7379979833  0.2764737055  0.102771294 -0.0428233676 -0.740717260
## 1710 -0.5410655936  0.1830354940 -1.346346396 -0.7219948438  0.187662001
## 1711  1.0249330899 -0.3098189199 -0.210716382  1.8549198425 -0.214256370
## 1712 -0.7070554084 -0.1160482440 -0.695179207 -0.3200861779 -0.264469057
## 1713 -0.7521126634 -0.2086377975 -0.476951652 -0.3347151608 -0.190622360
## 1714 -0.9020410145 -1.7292081812 -0.383418462  0.7277952229  0.304827636
## 1715 -1.3635458393  0.6720320774 -0.685617362 -0.1842739841  0.773995966
## 1716  0.5365830633  1.8496693289 -0.790731351  1.6638262079 -0.337088753
## 1717 -0.8885818476 -1.0529037626  1.234363844  0.1996414382 -0.313120110
## 1718 -0.8247409697 -0.7708935781 -0.623207639 -0.1429594292  0.326297637
## 1719 -0.6242348564  0.2077955547  0.371324049 -0.0017046322  0.058354513
## 1720  0.6708749871  0.0365350086 -0.677843589  0.9175458396 -0.688781922
## 1721 -1.3067296840  2.3420353347  1.095860758 -0.2671940510  2.543869148
## 1722 -0.7567679171  0.1146122364 -0.249433115 -0.3015513783 -0.600671442
## 1723 -1.2072452603  0.1178238059 -0.586152635 -0.2013986063  0.578113389
## 1724 -1.3978876533 -0.4872046394 -0.475246943  0.1429894528 -0.281419132
## 1725  0.1886418678 -0.8716207283 -0.554986589 -0.0467700003  1.052302289
## 1726 -0.7589901086 -1.1747918927 -0.773594823 -0.3461350089  0.635742509
## 1727  0.2617895542  0.4118680880 -0.988752845 -0.0082478602 -0.265350674
## 1728 -0.2496055531 -0.5842768123  0.682378414  0.3261487892 -0.037390523
## 1729 -1.2028143567 -0.2611721998  0.387306433 -0.0765110482 -1.056861630
## 1730 -0.6723712356  0.0597145220 -0.465786024 -0.0462054537  2.040362763
## 1731  0.0206052069 -1.0190258969  1.299264859  0.4515254229  2.980708928
## 1732 -0.4982627389 -0.1157850185 -0.598179849 -0.5543089187  0.002890218
## 1733 -0.9487663877 -0.0694385939 -0.197652880 -0.0695101626 -0.075582019
## 1734 -1.4292665861 -1.5357880772 -0.843705338  0.0173618976  0.148470848
## 1735  1.5211103620 -1.3162171494  1.119974978  3.2643717751  0.504246303
## 1736 -0.1156966015  0.8580499266 -0.707254856  1.2045739679 -0.954880358
## 1737 -0.3123488000 -1.1183084371 -1.098748128 -0.1219792797  0.537848877
## 1738  1.6731764634 -0.2444238110 -0.746575529  1.0004749124  1.028942999
## 1739 -0.9282453680 -0.5718646010  0.451015148  0.2091700412  0.110398775
```

```
## 1740  1.2916708134  0.2374510740 -1.137833945  0.9958139449  0.717281235
## 1741 -1.4968496376 -1.2821137731  1.041185658  0.5384609315 -0.390008574
## 1742  0.3717302137 -1.3726712641  0.295750625  0.2419720794  0.070166242
## 1743  0.0228656111 -0.3716914365 -0.106627099  1.0658619775  0.320311916
## 1744 -1.0935809885 -1.3428181759 -0.796199422 -0.4266584395  0.432251451
## 1745 -1.2036532313 -0.5528749684  0.132873755 -0.0727967350 -0.632170257
## 1746 -1.0558406430  0.5119222556 -0.511494886 -0.2002727924 -0.453396351
## 1747 -0.2876931611  0.2886478055 -0.175367367  0.0525170820  0.214475973
## 1748 -0.4541990576 -1.5899819858 -0.318259251  0.8573928183 -0.020528526
## 1749 -1.2738512066  1.1472243807 -0.941348193  0.7156244413 -0.402969905
## 1750 -0.1531430129  1.9376103190 -0.899941319  0.1114947184  0.653571942
## 1751  0.1008951379  0.1810106019 -0.525827373 -0.1384569168  0.171853100
## 1752 -1.2975988513  0.2298974417 -0.621271171  0.1369984270 -0.579308889
## 1753  0.3266147899 -0.9691762794 -0.232811522  0.2745056897  0.426405885
## 1754 -0.7653562055 -0.0633689063 -0.132957332 -0.2604706786 -0.151496770
## 1755 -0.5484187046 -0.2907227641 -0.979750312 -0.2609072347 -0.470708741
## 1756 -1.5888817623 -1.5112213767  0.164263370  0.2527279510 -0.046081043
## 1757  0.2245916846 -0.3988343928  1.381122081  0.7529242994  0.116838715
## 1758 -0.7518814324 -0.4551181352  0.739583121  0.1972145995  2.587896035
## 1759 -0.5902514719  0.6952299357 -1.005306371 -0.5528476361  0.131474309
## 1760 -1.2626968973 -0.0844216346 -0.566716559 -0.1077460974 -0.146991041
## 1761 -0.3667970999  1.6514062936 -0.007060212  0.3961910597  0.225720487
## 1762  1.6907222195  0.0969412639 -1.030402602  0.9005762553  0.135957812
## 1763 -1.1483287474 -0.2700019134  1.175873998  1.0157486150 -0.633951614
## 1764 -0.2167016276  1.1087243347 -0.845280814 -0.1963189171 -0.179530923
## 1765  1.4433813100 -1.0625693483 -0.307827494  3.8158198842  0.298446420
## 1766 -1.5266333971  0.6887870397  0.028063566  0.3130180745 -0.257561087
## 1767  0.3707208790  1.6931176134 -0.314568178  1.1331621763 -0.667985422
## 1768  0.4269028099  0.1257089046  0.207373227  2.1529599403 -0.190337289
## 1769 -0.5402187237  1.5240574673 -0.768336011  2.1213643612  0.582764054
## 1770 -0.3076840692 -0.4820828756 -0.519707318 -0.6138063246 -1.638174612
## 1771  1.5200800954  0.4864699945 -0.208667222  1.1696141660 -1.694552014
## 1772 -0.1981982317  1.4369037942 -1.108529384 -0.1899248288 -0.143658787
## 1773 -0.0222740436  0.1493224300  0.590262772  1.7646163014 -0.640345046
## 1774 -0.8218820553 -1.3558508354 -0.807466663  0.3219193338  0.352999764
## 1775 -1.5063764004 -0.8822007191  0.348044325 -0.7292250129  2.177815568
## 1776 -1.2223832302 -0.3400284467 -0.105985545  0.1620218905 -0.401046218
## 1777 -0.4603606017  0.9873166662 -0.676595624  0.2025853326  0.275861542
## 1778 -1.6462876169  0.7713162689 -0.390551629  0.1293922068 -0.190664783
## 1779 -1.4469215670 -0.9303787009  1.618789567  0.1749076264  1.767471798
## 1780  1.7186108692 -0.5867481891  1.682031076  1.3618911500 -1.010004060
## 1781  0.5441503305  0.6104634587 -0.747314943  0.6161829992 -0.207936130
## 1782 -0.1728071202 -1.2459754228 -0.471488338  1.0452609436  0.232628790
## 1783  0.4223530991  0.8034352886  0.012117119  0.4127124746 -0.238759492
## 1784 -0.7327002347  2.5224235393  0.020002673  0.2359788965  2.258978114
## 1785 -1.1380083194 -0.7313374646 -0.525522638  0.3106683159 -0.416771802
## 1786 -1.2837228187 -1.3228132415 -0.648890873 -0.4506322210  0.252902419
## 1787 -0.3442577412  1.0062296212  0.175961111 -1.3122266541 -2.169526988
## 1788  1.1498654555 -0.5789843255 -0.645824267 -1.2778217188  0.148090936
## 1789  1.5842787190  1.0996486987  3.684307778 -1.3793221770  0.516505373
```

```
## 1790  1.3955804565 -0.7174829810  0.448934318 -1.0185854609  0.484470742
## 1791  0.1371414215  0.7160582711 -0.414357355 -1.0929044053 -2.453296976
## 1792 -0.0650231685  0.5666961309  0.021913097 -1.4166733292  0.258521519
## 1793 -0.8265298256 -0.1098518106  0.417875137 -1.1262114837  0.564371682
## 1794  1.0964648944  0.9542141999 -0.350407074 -1.0442949922 -2.079804517
## 1795  0.6014743390 -0.0164939505 -0.549458417 -1.2126137559 -0.630522428
## 1796 -0.3636485128 -1.1555857847  0.044288728 -1.6356098452  0.758960806
## 1797  0.9125288811  0.2306583340 -0.889008992 -1.0263877416 -0.429701314
## 1798  0.3239039090  0.1157940666 -0.377389689 -0.9237037830 -0.660929801
## 1799  0.5595018208  0.3236721390 -0.609778907 -1.3145852177 -0.376633416
## 1800 -0.0497125963  1.1672525176 -0.318102162 -1.8424225513 -1.469401398
## 1801  0.6387414939  0.3648076936 -0.789986327 -0.2587495412 -0.819617350
## 1802  1.1172027616  0.8050400691  0.483370382 -0.1743006523 -2.147816700
## 1803  0.3111628294 -0.0014545654  5.414858329 -0.6661467336 -0.697908470
## 1804 -0.8013093774 -1.1886620892 -0.427471988 -1.2769856418 -0.007676960
## 1805  0.2623935600 -0.0977678792 -0.514202688 -1.6049210267 -0.053633467
## 1806  0.9785787495  0.8851748570  2.060052163 -1.3695786578  1.585754502
## 1807 -0.3227215117  0.9801574996  1.526820055 -1.1778113796  0.081185483
## 1808  0.1705282654 -1.4097078267 -0.397273190 -1.7055683980 -0.223934750
## 1809 -0.0229176507  0.0645277732 -0.851931070 -1.8269177371  0.390501778
## 1810  0.4814924195  0.9594737868  0.202958032 -0.3981024281 -1.924495904
## 1811  1.3022320870 -0.4558759375  0.349465376 -1.3169287221  1.958412260
## 1812  0.9930632499 -0.0127096548  0.671550384 -0.9881300120 -2.358884519
## 1813  1.3726367774  1.3983168946 -0.652318541 -0.8076128391 -0.409677259
## 1814 -0.1080959517  0.2274871425 -0.812055059 -1.5298603521 -0.170145265
## 1815  1.0537090012 -0.9467660937 -0.705913708  0.0555881710  0.441870574
## 1816 -0.1805134001 -0.9980797542 -0.241627002 -1.6723505690  0.315432053
## 1817  0.3291772367 -1.0374917361 -0.798681527  0.3943559977  0.246302082
## 1818 -0.5184853420  1.8715383914  2.231879748 -1.4346334140 -2.283036889
## 1819  1.3843891376  0.4724872387  0.152569035 -0.9489991034 -2.053384579
## 1820 -0.3340572485 -0.9234206990  1.893862897 -0.9859227244 -0.066237544
## 1821 -0.1142176189  0.6037507364  0.303600153 -1.3246732509 -0.365809260
## 1822 -0.0297392850 -0.5161584452  0.285032904 -1.1685174939  0.300399008
## 1823 -0.3837662852 -1.4493522121 -0.889436202 -1.4238530903  0.867278991
## 1824  0.3489157082  2.4344985493 -0.406433069 -1.6019719344  2.662026394
## 1825  0.9303987005 -1.6336289381 -0.915354945 -1.1060416446  0.116032409
## 1826  1.6328029930  0.1528211783 -0.426577101 -0.5936257087  0.270219043
## 1827  1.5770307865  0.5356101553 -0.384229962 -0.3098862884 -0.036796562
## 1828  1.5518288622  0.5939427136  0.571946541 -1.0930514748 -0.480561631
## 1829  1.1183151735 -0.9974263019  1.336870187 -1.3575396153  0.644130452
## 1830  1.0920455913 -0.2228277515 -0.565037883 -1.0389937606 -0.492197849
## 1831  1.0383639326  0.3381869933 -0.175166755 -1.0946270092 -0.282979535
## 1832  0.6109001011 -0.9393795728 -0.597022820 -1.2399395582 -0.251868485
## 1833 -0.0944853469 -0.0536647252 -1.053781985 -1.6163905046 -0.473441039
## 1834 -0.0241679913 -1.2831698077 -0.595458402 -1.1892391182 -0.630263068
## 1835  1.4309754127  0.0863029822 -0.421229981 -0.8036711919 -0.202747803
## 1836  0.0067514193 -1.1093643389 -0.336919132 -0.4279679720 -0.004519918
## 1837  0.9685389499 -1.1127315966 -0.530644227 -0.2137160130 -0.043269670
## 1838 -0.3015433388 -0.5840750226  0.533405962 -1.8415262858 -0.020443895
## 1839  2.1079496714  0.4472667453 -0.468102306 -0.1188112394 -1.192963298
```

```
## 1840  0.6591142589 -1.0623768365 -0.882966256 -1.1154017218 -0.004996870
## 1841  0.8119179408 -1.2333069846 -0.409418008 -0.5459099816  0.016750128
## 1842  0.4763160974  0.1309585911 -0.223559934 -1.1928088435 -2.421865597
## 1843  0.0293246505 -1.6093250201 -0.913149689 -1.5924188994  0.178343290
## 1844  0.8921690476 -0.7100954409 -0.283748954 -0.9364786251  0.076843724
## 1845  1.6368418468  1.2606073746 -0.043765801 -0.1225190351 -0.250287575
## 1846  1.1029445633  0.2143003074 -0.246421004 -0.6860934017 -0.307632793
## 1847 -1.1576100008 -1.4908424916 -0.611090160 -1.3660030584 -0.207635108
## 1848  0.8669293716  0.7675678473 -1.148904546 -1.2049147246  0.608065117
## 1849  1.3346675198  0.4952553358 -0.633350637 -0.9888139904 -0.110214944
## 1850  0.7308085615  0.4517197302 -0.830581109 -1.5610994518  0.106887075
## 1851  1.0799568908 -1.0112518632  1.077877767 -1.0980290492 -0.057575732
## 1852  0.4278495730 -0.2124283072 -0.634265965 -1.6094058690 -0.465181095
## 1853  1.2763640945  1.1496874133 -0.447312931 -1.3293562433 -1.668642163
## 1854  0.7479657476  0.8070091459 -0.276086844 -1.1078062571 -2.122115916
## 1855  1.2274807312 -0.7571933745 -0.336311904  0.0785549356 -0.095755035
## 1856  2.4939870204 -0.3238333007 -1.258375953 -0.5906850113  1.475739474
## 1857  0.8322305533  0.9218179509 -0.885023357 -1.1047503764 -0.547995284
## 1858  0.8138527542  0.0610480332  2.179890709 -1.2072008114  0.778329840
## 1859  1.4203581359  0.8354102575 -0.614752466 -1.0202734738 -0.457755279
## 1860  0.6023089675  0.9105519587  0.290662617 -0.2312344527 -0.221275628
## 1861  1.1205598499 -0.3219247602 -0.634602284 -0.7803603237  0.396470201
## 1862  1.2175612939  0.7222570036  3.524654577 -0.7051644866 -0.049538133
## 1863  1.1876340137 -0.9559758430  1.160906414 -0.3207466726  1.968799160
## 1864  0.7784586995  0.0071865810 -0.157152037 -1.4023774054  0.390955563
## 1865  0.9420593915  0.4123089889 -0.313608443 -0.9234682391 -0.005760002
## 1866  1.0332516184 -0.4438890049 -0.435712076 -0.9812134950 -0.586620936
## 1867  1.2686530760  0.7063974126  0.042402404 -1.2479344606  1.618585265
## 1868 -1.0938305367  0.4582740314 -0.727020830 -1.5610568005  0.071321748
## 1869  2.2511191680  0.1331393458  1.322548190  0.1660330053 -1.187602812
## 1870 -0.5885218767 -1.1427156628 -0.749762582 -1.3595115324  0.177238805
## 1871  0.3758905205  0.2406309352 -0.650117685 -0.7680264319 -0.001325694
## 1872 -0.6968379062 -0.6078698058  1.481620620 -1.0956013353 -0.922508345
## 1873  0.4158851080  0.6546149197  4.498067628 -1.2460878217  0.383853596
## 1874  0.0354185240 -0.4360263063 -1.048137114 -1.7642056717  0.648177150
## 1875 -0.9286357109 -0.9876740066 -0.305267842 -1.3679496701  0.249076881
## 1876  2.2326530294 -0.7360845245  0.203447222  3.7979586280 -0.144838868
## 1877  1.3961518831  0.8210443816 -0.416233453 -1.2740737547 -1.665115735
## 1878  0.4133129078  1.6794743497 -0.313042435 -1.4126268966 -1.480472368
## 1879 -0.1507568616  1.0619533796 -1.084602347 -1.3359767513 -0.473046669
## 1880  1.0662164095  0.3392761117 -0.672629321 -1.1258035590  0.365201403
## 1881  1.3057405050  1.0110271139 -0.564140702 -0.9735487184  0.042830495
## 1882  1.5081467164  0.3161730610 -0.592800557 -0.2960648043 -0.297737998
## 1883 -0.0996732090 -0.0872265048 -0.071036407 -1.0371648062 -0.037530560
## 1884  0.2121975198 -1.0878556986  1.947853490 -1.5334260151 -1.621722310
## 1885  1.3686724931  0.2789187481 -0.311732231  0.0892692368 -2.001948274
## 1886  0.6244431245  1.0401156915 -0.759604324 -1.1780363499 -0.706627162
## 1887  0.6230449318 -1.0900515400  0.231990008  0.4372076559 -0.511785036
## 1888  1.2136699710  1.2911360862 -0.101404616 -0.5951832558 -0.895920505
## 1889 -0.1808047764  0.7480557113 -0.861242056 -1.5492769798  0.359417997
```

```
## 1890  0.0003125275  0.3805312492  0.373724760 -1.3159729147  1.668393967
## 1891 -1.0821571230 -1.2488077505 -0.495020623 -1.1051969497  0.073736061
## 1892  1.3746045306 -1.2407465578 -0.130597611 -0.8029263236  0.062310937
## 1893  1.3449977440  0.1988557511  0.104064937 -0.6265173482 -0.322785317
## 1894  0.1748077395  0.1536514481 -0.908792985 -1.0036738484  0.426152512
## 1895  0.4832763084  1.2670108890  0.845436178 -1.5748294022 -1.872968196
## 1896 -0.6326605769 -0.1834526014 -0.826133862 -1.0191965228 -0.556628038
## 1897  0.4935874400  0.6029298590  1.590263605 -2.1781512354  0.615070725
## 1898  1.6494914526  0.3854416458 -1.091445936 -0.5297033191 -0.362066470
## 1899 -1.2836178685 -1.4057044109  0.083962616 -1.1939376676 -0.373139139
## 1900  0.7078565777  0.6249219847 -0.217800160 -0.9284924917 -0.458402655
## 1901  0.8205242995 -1.1349604779 -0.557717529 -1.3789956410  0.118406592
## 1902  1.4638759901  0.2455081718 -0.432678183 -0.2246678246 -2.270318444
## 1903  1.1921788357  0.6080052311  0.033048166 -0.1882756714  0.260957801
## 1904  1.2200863239  0.5856210007 -0.186490617 -0.8941928112 -1.894997168
## 1905  1.4777104463  1.4290694879  0.852008346 -0.3894293222 -1.281420748
## 1906  0.6343332048 -0.2027179550  0.089995304 -0.9582960069 -0.149586614
## 1907  2.2714014537  0.8007746590  1.144069595  2.1458110435 -2.154674662
## 1908  0.9395233528  0.3051419493 -1.111915672 -1.4318552794  0.253247568
## 1909  1.6436090817  0.3199634526 -0.813757781 -0.5030981547  0.127593798
## 1910 -0.8052924942 -0.3769083509  0.654022277 -1.5724991315 -1.344597130
## 1911  1.1162634671  0.1485945614  1.142728808 -1.3210617798  2.744344822
## 1912  0.6528678238  0.0157650608 -0.658502889 -0.9546721614 -0.580017562
## 1913  1.0149338213  1.5957135973 -0.775855937 -1.4492095761 -2.017217023
## 1914  1.1897013367 -1.2708102844 -0.883023296 -0.8568942665 -0.039248463
## 1915  0.2711628793  0.2726372169 -0.740004929 -1.0308154948 -0.232607262
## 1916  1.4242675422 -0.8183279324 -0.185114679 -0.8221557697 -0.019156943
## 1917  0.9353463572 -1.0469060335 -0.504811750 -1.4079631279 -1.676362397
## 1918 -0.1164121296  1.6372513612  0.966012043 -1.4194779606 -1.958292206
## 1919  0.7908191487 -0.7866612909  2.116443246 -1.7437275750  2.350752089
## 1920  0.9853495632  1.4772855019 -0.932812714 -0.3171552327 -0.394872272
## 1921  1.2589814291 -0.4641236219 -0.689337258 -1.0298139274 -0.411840577
## 1922  1.4274813279  0.2935802092  0.527633252 -0.6651813646 -0.465884505
## 1923 -1.0494527719  0.5039783615  0.554721048 -1.4272036526  0.213244438
## 1924  1.2325408620 -0.4516914219 -0.850818500 -0.9956863073 -0.745015613
## 1925  0.2308497808 -0.0030713318  0.311021998 -1.7311899145  1.809542713
## 1926  1.6939990752  0.8226272216 -0.660157124 -0.4277227528  0.042325876
## 1927  1.5060053712  0.4767863436  0.162650005 -0.4663503674  0.124631798
## 1928  1.4689264433  0.5406722146  0.739663554 -0.6684003861 -1.693983123
## 1929 -0.0374702452  0.7871564546  2.761166178 -1.7926258582  1.996036252
## 1930  1.4181264708 -0.1721972736 -0.364206600 -0.8063928936  0.277621293
## 1931  1.6423089549  1.0823927864 -0.471878552 -0.2549390790 -0.476505297
## 1932  0.2466784926  0.5488811330  0.348290977 -0.6103410987  0.109460329
## 1933  1.5816592149 -0.6223597089 -0.596752477 -0.3026463129 -0.059377144
## 1934 -1.2936733904  1.1151097759 -0.222339532 -1.4320945190 -0.308114894
## 1935  1.3298270355  1.8801360092  0.514549311 -0.7351815187 -0.338252412
## 1936  1.9286018381  1.2078696840 -0.421108011  0.8601667428 -0.223454613
## 1937 -0.2704078618 -1.2009333563 -0.637135369 -1.5057161467  0.201854581
## 1938  1.4730896189 -0.3769090640  2.163899542 -0.6672561127  0.201449826
## 1939  0.5411978306  0.7559117476 -0.012354671 -1.0857818440 -0.533934553
```

```
## 1940  1.6413019421  1.7293379049  0.335593678 -0.8234459249 -1.876047424
## 1941  1.8231216388 -0.6051127262 -2.686627582 -0.8242460161  5.213300308
## 1942  0.9153307710  1.0881251974 -0.644658996 -1.7041425752 -1.683505203
## 1943  0.8645521161  1.0294739741 -0.527812026 -0.5914374933 -0.531717326
## 1944  1.3009166950 -1.1961071704 -0.739028441 -1.0768798890 -0.019337098
## 1945  1.5202450241  0.6990889317  0.126371187 -1.2022077087  0.361549273
## 1946 -0.2666761100  3.1519912592 -0.222202787 -1.8695031375  0.206065755
## 1947  1.6117745752  0.2400226776  3.046504228 -1.6429353047 -1.129128325
## 1948  0.3125857966  0.9965922164  0.027406877 -1.4382896286 -1.639323465
## 1949  0.7649119366  0.1656249447 -0.862044188 -1.5700089055 -0.108302852
## 1950  1.6330670638  0.6884326835 -0.331189943 -0.4221835290  0.134679467
## 1951  1.5248658706 -0.0617344218  0.368004953 -0.4079243493 -0.390937234
## 1952 -0.2072146445 -0.0893696958  0.012556025 -1.5805020944 -2.013166381
## 1953 -1.0938858623  0.1563079242 -0.404180423 -1.5370857829  0.112849011
## 1954  1.4779551859  0.5403231763 -0.821252668 -1.0843584694  0.068290996
## 1955  0.0825013179 -0.6260034242  1.420736139 -0.2253354263 -0.625919411
## 1956 -0.1023842276  0.5215851775 -0.351153380 -0.1977114331 -0.831732447
## 1957  0.6696494148  1.2143892072 -0.084526874 -1.1881826482 -1.972313039
## 1958 -1.1168563878  1.7997015608 -0.383164421 -0.8215917695 -0.784061176
## 1959  0.6962570808  0.1360702602 -0.802200535 -0.9501552646 -0.156739230
## 1960  1.4590434521 -0.5475783959 -0.533141316 -0.2267580836 -0.151936352
## 1961  1.3569350218 -0.0400459339 -0.765516119 -1.0558419532 -0.326213736
## 1962  1.0978509725  1.4641444754  1.878427176 -1.2332474871  0.260973821
## 1963 -0.6218171818  3.1976661894  0.719448530 -1.7792695130  2.130792877
## 1964  0.3647944336 -0.7899014517 -0.632591819 -0.9299880083  0.452974337
## 1965  0.6555488393 -0.5139636402  3.840834293 -0.9887758705 -0.261204129
## 1966  0.9563514913  0.0421313930 -0.468352623 -0.5877195650 -0.407669803
## 1967 -0.2286503003  0.7598734624  0.394175004 -1.2348620429 -2.121446533
## 1968  0.1175033100  0.9292167390  1.593360940 -1.4776139574 -1.750225368
## 1969 -0.3023232893 -0.9246139139 -0.554772370 -1.1104202238  0.112256307
## 1970 -0.6246137176  0.1525147200  0.432815836 -1.0119412637 -0.515833818
## 1971  1.0934210012  1.3449620353  0.444260403 -0.3162004966 -0.450538627
## 1972 -1.0035367089  1.0359978207  1.452432536 -1.3535970201  1.682190724
## 1973 -1.0709706354 -0.1327863006 -0.691028268 -1.3560878724 -0.032576624
## 1974  1.5623577395 -0.3590427315 -1.005030441 -1.0839642052  0.018616928
## 1975  1.5082524314 -0.6713089482  2.003659795 -1.0181850232  0.560759189
## 1976  1.7115618272  0.2456170766 -0.339295926 -0.6550568099 -1.974137380
## 1977 -0.9407910561  0.2301975241 -0.118563255 -0.6435660030 -0.681692299
## 1978 -0.0037112336 -0.6443040947 -0.114583329 -0.7560381022  0.403588173
## 1979  0.6391098564  0.3181197051 -0.709492996 -1.5038097403 -0.262591953
## 1980  0.9441928681  0.3439796582 -0.910037979 -0.9822376568 -0.042854607
## 1981 -0.3321120264  0.2259706563  0.812451618 -0.6675159947 -0.150201147
## 1982 -1.0053080636 -0.6505701672 -0.144549805 -0.7324239259 -0.058666651
## 1983  1.6928713533 -1.1545117956  0.751198891  0.0403866683  0.250550286
## 1984 -1.0880788681 -0.3367640406 -1.024738851 -1.4947771404 -0.110902094
## 1985 -0.1263179008 -0.1054326233  1.111978484 -1.8269427780  1.750563367
## 1986  1.5706863647 -0.3258398949  1.679244153  0.8730166380 -1.465024752
## 1987 -0.0765694508 -1.0832429605 -0.201765252 -1.6828090981  0.584552074
## 1988  0.7920108568 -0.3621754521  2.794571821 -1.7074394280  0.747556904
## 1989 -0.0858787909  0.1024632051 -1.157419736 -1.6277804723  1.440913642
```

```
## 1990  1.2351299593 -0.1661454919  1.297398000 -0.1645216632 -0.005272919
## 1991  1.1134387696 -0.2667682499 -0.741010232 -0.7642635810 -0.691327344
## 1992  0.9689313354 -0.6507608875  0.178873740 -1.2511725005  1.013813612
## 1993  1.4119203107 -0.2917659398 -0.852692791 -0.7366411073 -0.253379174
## 1994  0.7673699523  1.5279332115  1.083953774 -1.2711924476 -1.690683694
## 1995  0.2646262555 -0.0516516597  2.739083966 -1.2999536980 -0.912197967
## 1996  1.6192536128 -0.5374202983 -0.116932773 -1.1236933454  0.570976894
## 1997  0.9995519108 -1.2137051984  0.362800016 -0.9859532279 -0.086194945
## 1998  0.7496839939 -0.9003290072  1.014919816 -0.1628073170 -1.476480168
## 1999  1.5782129723  1.1713194814  0.633024662  0.2955843475 -0.143698132
## 2000  0.9231794062  0.4604860577 -0.935612644 -0.9118179522 -0.151118042
## 2001  0.8389611327  0.4772255591 -0.124371886 -0.9584437238 -0.464485525
## 2002  0.9613597921 -1.1459238863  0.612208973 -1.1939375534  0.244328185
## 2003 -1.3334704810  0.8620765323 -0.591959518 -1.1578751129 -0.194153948
## 2004  1.1189195489 -1.0265757087 -0.776207144 -1.0237190148  0.635474354
## 2005  0.9086246871 -1.3118753562 -0.185478746  0.0615423477 -0.230485382
## 2006 -0.2360211178 -0.2569935472  2.131579211 -1.0262835734 -0.205785417
## 2007  0.3657185769  1.6276397861  1.659383942 -1.5510639194  0.312819016
## 2008  0.0587664559 -0.4056490652 -1.184439857 -1.7301696110  0.016780934
## 2009  0.9970388721  0.8914294749 -0.466661270 -0.9698922833 -0.075910497
## 2010  0.7987528656  1.2903203532 -0.091909236 -1.3556905767 -2.247229878
## 2011 -0.0914209913 -1.6031073878  2.133066222 -0.4328557307 -0.115163549
## 2012  0.7311634572  1.0809743236  0.651021704 -0.7109188306 -0.608509159
## 2013 -1.1868082649  0.6492000208 -0.116436305 -1.2646439239 -0.192288667
## 2014  0.7926339796 -0.4072498442 -0.414591723 -0.9532574164 -0.712921881
## 2015  1.3861783442  0.0675608823 -0.948568712 -1.0911665389 -0.132597792
## 2016  0.7020430846  1.4444586316 -0.806441331 -1.4889789114  0.324413758
## 2017  0.7500773894  0.1223965687 -1.018767526 -1.5459173449 -0.109915520
## 2018  1.3968352917 -0.4535043436  1.361573839 -1.3260631268  0.549080730
## 2019  0.9347965885  0.6646672926 -0.280525335 -1.3578917733 -0.272338979
## 2020 -0.9718113772 -0.3755649085  3.356943217 -1.4628479050  1.809757981
## 2021 -0.2468924402 -0.8191393877 -0.794075872 -1.5337748186  0.275490424
## 2022  1.5879284106  0.9117426606 -0.264401370 -0.2734229887 -0.278215390
## 2023  0.2133214545  0.8553720511  0.546970420 -1.1530993529 -1.575680369
## 2024  1.5913642936  0.6859363371 -0.543947015 -1.0359406637 -1.714370119
## 2025  1.1549438657  0.1230448752 -0.077312605 -0.2032089073 -0.364788994
## 2026  0.6720704518  3.1039612691  0.255166264 -0.7357977640  2.880091772
## 2027  1.1585506921  0.1445628589  1.792261523 -1.1086251035 -1.905146138
## 2028  1.5737590193  1.0556070290  0.651606425 -0.3615235700 -1.917713424
## 2029 -0.5028422156  0.7505731836 -0.921051078 -0.8239232972 -1.017335781
## 2030 -0.6882001097 -0.4215616593 -0.762604570 -1.3681072539 -0.598455866
## 2031  1.4523957392 -0.1764504410  0.063656551 -1.1861914942  0.035103509
## 2032  0.2599820547 -0.7227706819  1.674090750 -0.6769047442 -0.554916922
## 2033  1.0413929057 -0.1535984300 -0.655194164 -1.4344402362  0.287316324
## 2034  1.5770079444  0.8404666202  4.334748725 -1.7743458186  1.120488036
## 2035  1.3696474562  0.5490291941 -0.582345918 -0.6752205802 -0.039101270
## 2036  1.1098084362 -0.0393518473 -0.792136613 -1.3061750938 -0.165433200
## 2037  1.0170263019 -0.3773824160  0.891788485 -0.7635423067  0.328276294
## 2038  0.5492776892 -1.2645243131 -0.944445678 -1.3393626486  0.253537274
## 2039  2.1013652916  0.0598389574 -0.615087229 -0.7806603958 -1.569130825
```

```
## 2040 -0.2352051779 -0.4496947668 -0.145570593 -1.3554753112 -0.666985716
## 2041  0.3312164985 -0.3174920355  0.676523657 -1.0009288097 -1.018919341
## 2042 -0.4510362994  0.0429732208 -0.977187020 -1.6867833275 -0.108764814
## 2043  0.5813768530  0.0369329043  0.418440406  0.5749236446  0.111867494
## 2044  0.8998372633 -1.0089686253 -0.844683224 -1.4262607449  0.220906715
## 2045  0.3071444178 -1.2113080093  0.996527164 -1.3285868335  0.340704658
## 2046  1.4331870369  0.0894583874 -0.702196616 -0.4098598787 -0.426399805
## 2047  2.1978552220 -0.5767433479  0.072697241  2.1697300294 -0.312407248
## 2048  1.3048661309 -1.1606372280 -0.204650878 -1.0217016787  0.267399766
## 2049  0.0127238542 -1.3386353355  2.266674766 -1.5183708643  0.111079447
## 2050  1.1407905204 -0.2817519913 -0.107238631 -0.8546021227 -0.648306486
## 2051  0.8418070846 -0.8032043826 -0.873555642 -1.5351598257  0.208652025
## 2052  0.8039736775  0.4991882536 -1.129912778 -1.6294591628  0.210181564
## 2053  1.4673166808 -0.3510417261 -0.399095628 -0.1091624091 -0.072743858
## 2054 -1.1072066606  0.3913522975 -0.332369304 -1.3936421470 -0.089163029
## 2055  1.1649033774 -1.2750711301 -0.904310843 -1.0121716358  0.338354557
## 2056  1.2755053126  0.7644518021 -0.849807891 -0.3351698669  0.227966274
## 2057  0.2585400501 -0.7408163616 -0.083309752 -1.5169826032 -1.658727000
## 2058  1.5649213422  0.3993856201  2.892729536 -1.1799891546  0.676704570
## 2059  1.0899843320  0.9334274896 -0.575921358 -0.9912018435  0.203673354
## 2060  1.0012118378  0.6289730218 -0.521893618 -1.1648288996  0.124149669
## 2061 -0.8900645806 -0.9996942065 -0.040764228 -1.5094186531 -0.153597033
## 2062  1.4988778858 -0.5758395469  0.432285589 -1.6235368167  2.171269817
## 2063  1.3958180684  0.8372478503 -1.021908187 -0.8691121613 -0.565253949
## 2064  1.5524886956 -0.3041850026  0.071229392 -0.9784888991  0.239998393
## 2065  0.6086872125 -0.6937551656 -0.041572345 -0.9398493885  0.518343456
## 2066 -0.2721753463  0.6434896232 -0.635676754 -0.7458305301 -0.253316161
## 2067 -0.2193884760 -1.0520173975 -0.646306728 -1.3464152995  0.326723581
## 2068  0.7604106045 -0.9985134598 -1.017666570 -1.3279733244  0.137055210
## 2069  1.0348508501 -1.2404782926  3.916495701 -1.1411530287  0.568702464
## 2070 -0.0100213115  1.1041237833 -0.997047294 -1.5990589400  0.371131476
## 2071 -0.1177537764  0.5472787105 -0.364538708 -1.1729495540 -0.229868910
## 2072 -0.3813606250 -1.1280910162 -0.178988430 -0.1195148139 -0.638831466
## 2073  0.8573690197  1.0395254725  1.208666559 -0.5299599698  0.461669829
## 2074  0.0537494428  0.2533667564 -0.332929674 -1.9031289288 -1.599991812
## 2075  0.8016046186 -0.0480875637 -0.684405150 -1.4384002464 -0.054600769
## 2076  0.9094469542  0.2688393632 -0.362368848 -1.5779019433 -1.265463737
## 2077  1.5474758295  1.1313663829 -0.389164525 -0.1694020503 -0.257953497
## 2078 -0.3998180952 -0.0275793791 -0.964886177 -1.5938411803  0.602789309
## 2079  1.2512863326 -0.1149606971  0.129716628 -1.0784274580 -2.218525803
## 2080 -0.0180533493  0.9714664664  0.461866820 -1.4508664725 -0.143812504
## 2081  0.4940923784 -1.4165414331  0.094007493 -0.4951958137 -0.034142023
## 2082  1.5039000559  1.6642465419 -0.740197950 -0.6149519042 -0.320577211
## 2083  1.2375407529 -1.0505333881 -0.761770234 -0.9257397477  0.876106378
## 2084  1.2843278793 -0.3163402827  0.136542084 -0.6744893718  0.326886275
## 2085 -0.1591629176 -0.6128480913 -0.276225275 -1.8239098460  0.476871541
## 2086  2.0779452580 -0.5152308362  0.357807324 -0.5217057683  1.340857905
## 2087  1.0872829291 -1.0548373240  1.062577031 -0.3491654400  1.917886098
## 2088  0.1201128490  0.3038727119 -0.793719779 -1.4401854971 -0.096648141
## 2089  1.7208047498 -0.2326277004  0.010670244 -0.8487736103 -1.245836453
```

```
## 2090 -0.5106448760  0.9568730568 -0.364204246 -1.2763920059 -0.136766605
## 2091  1.0454194160  0.6534402979 -0.440548817 -1.3900725689 -1.682567037
## 2092  1.4106405101 -0.5147984419 -0.660566539 -0.4493628566  1.563632107
## 2093  0.1166645343 -0.8472213155 -0.954100508 -1.4672853978  0.745261623
## 2094 -0.7059064845 -1.3055861037  0.997239859 -1.1204716400 -0.339389086
## 2095  0.7766183107 -0.1931703949 -0.671434549 -1.4939587062 -0.141897023
## 2096  2.2814246211 -0.0760068300  0.081389030  1.6057211896  0.029072694
## 2097  0.2671157157  1.5033339429  0.496611206 -1.0772740021 -0.382225703
## 2098  0.4837885485  0.2036953595 -0.734164537 -1.6216666754 -0.180337407
## 2099 -1.0977608980 -0.9749931839  0.203773951 -1.0456278337 -0.283783929
## 2100  1.2581075562 -1.0599313108  0.002224347 -0.8985784354  0.777005756
## 2101  1.0576454534  0.1490175237 -0.944238073 -0.7230071724 -0.041669571
## 2102  1.4453755421  0.0734633979 -0.814569354 -1.0294738222 -0.298707553
## 2103  0.9199490172 -1.2218362929 -0.846619076 -0.5913376794 -0.159097934
## 2104  1.5436385484  0.3648676362 -0.580672642 -0.8055353990  0.269787171
## 2105  1.7811040224  2.0554142713  3.301713757 -1.3278508486  1.016820769
## 2106 -0.2274545827  0.4795821677 -0.669113484 -1.3257177245 -0.658319495
## 2107  1.6570129861  0.3478115073 -0.259669162  0.2961867530 -0.352664015
## 2108 -0.2111023472  0.9985621672  0.718923115 -1.7614082109  0.430154747
## 2109  1.5486531503 -0.7428359480 -0.534145057 -0.2848224534 -0.139765279
## 2110 -0.6441732400 -0.9938217410 -0.524706207 -1.2591267640 -0.123243636
## 2111  1.6589792907  0.3112955288  2.014131978 -1.5494993308  2.773592984
## 2112  1.4256264506  0.1609805221 -0.606311929 -0.8498610280 -0.379402370
## 2113 -0.3435653516 -0.2482305328  1.344761577 -1.6326164482 -0.912334834
## 2114 -1.0164923965  0.3304485515 -0.125476080 -1.3789208387  0.017536542
## 2115  0.5205018297 -0.7931031409 -0.381400977 -0.7257391697  0.784523354
## 2116 -0.2460896657  0.3088482857 -0.119456657 -1.3902668412 -0.011078844
## 2117  1.5404527474  0.7974057512 -1.110295887 -0.8068449931 -0.347338999
## 2118  1.4128756138 -0.7323805637 -0.870640276 -1.2057227955  0.383179853
## 2119  0.9697532850  0.4197525866  1.753384791 -1.3072306465 -2.035189410
## 2120  1.4344701271  0.4489840663  1.606898044 -0.7611833059  2.382947374
## 2121  2.1349865590 -0.7364535985 -0.448936672  1.5741532432 -0.097650163
## 2122  1.5997820147  0.6019152292  0.888621351 -0.8027042648 -1.686589851
## 2123 -1.0461692318  1.0156161692  0.910018635 -0.5127220914 -0.850571185
## 2124 -0.0449594201  1.2260570313  6.388701384 -0.9040566549 -2.521296774
## 2125  1.0462548088 -0.4039687300 -0.262075424 -0.9249000022 -0.197726152
## 2126  0.0278029786 -1.2630520015 -0.100225512 -1.4139982865 -0.453905493
## 2127  0.8591660760  1.5070213874 -0.826531974 -1.3628114425  0.348848089
## 2128 -0.1193962865 -0.3518126310  0.552405703  0.6256313840 -0.791852042
## 2129 -0.8697136186  0.7879208275  1.884599723 -1.7632686125 -0.294574381
## 2130  0.8995873157 -0.1874116886  0.452869721 -0.8542429324 -0.421569837
## 2131  0.8734936554 -0.7316073682 -0.864753466 -1.2704167751  1.593157740
## 2132 -0.1552214538 -0.9279149045 -0.111589023 -1.2968383202 -1.774401855
## 2133  1.0903198776  0.4655216918 -0.579888020 -0.3772348199 -2.054195447
## 2134  0.8208627862 -0.7029640505  0.123815907 -0.8123405684  0.277230880
## 2135 -0.9225866545  0.1667380770  1.267370934 -1.3932170490  0.125081266
## 2136  0.4804685830 -1.5169634696  0.058916232  0.1606265308 -0.292149821
## 2137  1.1087695540 -0.1748332936  0.066211323 -1.3523476388  0.031101612
## 2138  1.5800310543  0.8082869379  0.428209223 -1.3641638711 -1.519673657
## 2139  1.2138023075 -0.9647031631 -0.652869448 -1.0848741556 -0.010389111
```

```
## 2140 -0.2481507256 -0.1153301508  3.165347350 -1.5413346267  1.808815843
## 2141  0.2445252492  1.1087514047 -1.150235029 -1.4065689282  0.411176951
## 2142  1.1326372624 -0.0145333278 -0.258274922 -0.3310870780 -0.313777347
## 2143  1.2670079973  0.7522420684 -0.403695179 -0.2875984040 -0.829168579
## 2144  1.2936318910  0.0524781950  0.325610353 -0.1622921104  0.060168685
## 2145  1.1404814664 -1.7715343924 -1.603604140 -0.7394475859  4.921050454
## 2146  1.4055921136  0.0786470501  3.219495784 -1.1297620093  2.536834819
## 2147  0.9370792024  0.3195777233 -0.271752518 -0.7432244791 -0.372608570
## 2148  0.6807348928 -0.4659744918  0.832621012 -1.6097524050  0.259257943
## 2149  0.2382140331  1.9351659757  0.306825725 -1.1912942041  1.357084285
## 2150  1.0067649045 -0.0262239679 -0.106196184 -1.0082626547 -0.007876589
## 2151  1.0172035661  0.6662028285  0.143984600 -1.4619870282 -1.619514198
## 2152  1.7225566009 -0.7848332325 -0.848021100 -0.4599440603  0.517330381
## 2153  0.2245125862  1.8092328538 -0.746295537 -1.1886284974  0.271813147
## 2154 -1.1915829007 -0.1987992643 -0.376554646 -1.5218357762 -0.519979919
## 2155 -0.0250491047  0.9697856911 -0.303346693 -1.0381660795 -1.870418358
## 2156  1.0365954958 -0.3555767446  1.017421770 -0.9951602565  2.741265515
## 2157  0.3282513758 -0.9563721787 -0.187297710 -0.7439754797  0.505106975
## 2158 -0.4757076417 -0.3335465338 -0.079674005 -1.1769142423 -0.939376057
## 2159 -1.2568717559  1.2723073426 -0.850154841 -1.2423070946 -0.047805040
## 2160 -0.4254086108  2.4701779845  0.629377328 -0.8011454747  2.371192062
## 2161  0.8728963059 -1.6208912110 -0.093237439 -1.4123730764  0.284650399
## 2162  1.9110094307 -0.4789114713 -0.173832870 -1.0204338564  3.054493894
## 2163 -0.6508129203  1.4431556961 -0.626315799 -1.2648539644  0.624368020
## 2164  1.4808211660 -1.1335091023 -0.316865954 -1.3358269132  0.523065691
## 2165  0.2251811906 -0.5932492304  4.375338125 -1.6235536356  0.735301556
## 2166  1.2323795037 -0.0886222488 -0.047665623 -0.8408518840 -1.965699463
## 2167  0.7348858137  0.1741843219  2.567287736 -0.9286087583 -0.103354133
## 2168  1.6647285811 -0.4036796357 -1.000875139 -0.7029000928  0.098399513
## 2169  1.3684645424 -0.9243830064 -2.526778219 -1.4680678100  3.146870499
## 2170  0.7835762561  0.8872970342  1.474026079 -0.7646979623  0.070103293
## 2171  0.2620083443 -0.9862075890 -1.015726132 -1.2182348378  1.052093210
## 2172  0.8266542711  1.1572550685 -0.162121498 -1.0656587812 -0.032896134
## 2173  0.3944690282 -0.4353972547 -1.135463754 -1.3000512558  0.001199327
## 2174  1.4610901092 -0.8972549595  0.194364025 -1.1952630890  0.143591619
## 2175  0.7889805949 -1.1882246956  3.267677947 -1.3958807191  0.579925438
## 2176  1.0146929735 -0.5323396915 -0.833328339 -0.9353147668 -0.745207838
## 2177  1.3638699101  0.8784047705 -0.455066000 -0.8747447420 -0.396386947
## 2178  1.5930849188  0.3199130095 -0.839973808 -0.5949459738  0.156656573
## 2179  0.4151356523  0.4806949986 -0.802721829 -1.2500623038 -0.455379486
## 2180  0.7935458050  0.7214836455 -0.412805964 -0.7654117962 -0.228222724
## 2181  0.1206310745  0.9754420308  0.222846537 -1.1902378654  1.674949649
## 2182  0.2173728882 -0.4927776981 -0.639496397 -1.2689796241  0.534066562
## 2183 -0.4752937006 -0.6818183700  0.425418945 -1.0560019941  0.257235795
## 2184  0.1198917396  1.4225519190 -0.815807146 -0.3312923542 -0.704770133
## 2185  1.4787375160 -1.3087922064  1.105097353 -1.3422753815  0.440424266
## 2186  1.5700564771  0.5691070768 -0.358574633 -0.9187718712  0.759114227
## 2187  0.7938128086 -1.0140471774  0.772798381 -0.8101908229 -0.328841466
## 2188 -0.7391108197 -0.5303170970 -0.336240944 -0.7830003761 -0.160044178
## 2189 -0.2165375682  1.9887132783  0.089994185 -1.7059119285  2.065078117
```

```
## 2190  0.0622550057 -0.9554075198  0.404794602 -1.4897568679  0.298149475
## 2191  0.0920066155  0.1817060132 -0.547781734 -1.0061040194 -0.299390211
## 2192  0.6356641040  0.7983434602 -0.933901150 -0.9879194714 -0.067373405
## 2193 -0.9469413117 -1.3610251212  0.824719156 -1.6220844392  0.816225662
## 2194  0.9671957025  0.8883948180 -0.054247281 -1.3100606719 -2.071756866
## 2195  1.4531664556  0.8625340742 -0.710399333 -1.3943469228 -2.018385002
## 2196  1.2863334343  0.7764262559 -0.429362206 -0.8038181792 -0.131603771
## 2197 -0.0003629330  0.8804684611 -0.359815685 -1.6875099392  0.347325295
## 2198 -0.1332835666 -0.5792305111 -0.356520746 -1.6998957524  0.346441117
## 2199  0.1284455845 -1.0117582699 -0.736664355 -1.1138758999 -0.085464364
## 2200  1.5672079701  0.7178595976  0.006791179 -1.2544145976  1.997356491
## 2201 -0.0288896840  0.5285985513  1.232673212 -1.6686863223 -2.065250489
## 2202  1.3380766621 -0.3616226215 -0.340712561 -0.9898819052 -0.390335230
## 2203  1.4829606762  0.6556946042  0.012589843 -0.8584858024 -0.445524018
## 2204  0.7445773956  0.0158677750 -0.597841164 -0.4246225956 -0.637534880
## 2205  0.7026046209 -0.2387289514  0.044873732 -1.5233489590  0.274341023
## 2206  1.3335837538  0.5780457862 -0.015370210 -1.6044967239  1.996428100
## 2207  1.0775798307 -0.0913883911  0.792496300 -0.6237335604 -0.296367830
## 2208  1.1182979530 -0.2572509787  0.417422432  0.7823501515 -0.464315050
## 2209  0.7732388073 -1.2510718465 -0.431618269 -1.5468636263  0.180317915
## 2210  1.0570449550 -1.2831464994  2.135298049 -0.9524294484  0.445676723
## 2211  0.7251365690  0.7374991202  0.671609563 -1.3187948092 -0.605750007
## 2212  1.4261370568  0.8301385244 -0.237779778 -0.9394369310 -1.674194917
## 2213  1.3382568432  1.1162852275 -0.094560481 -1.1610583253  0.179950350
## 2214 -0.1411502464  0.1758532993 -0.172212141 -1.6680372794  0.043118010
## 2215  0.2861777400 -0.4866354376 -1.063151511 -1.2668046135 -0.275828500
## 2216  0.9639872030  0.2983131548  0.897694332 -0.9645208890 -0.320558925
## 2217  1.4196239876  1.1521791372  2.377769210  0.3309539312  1.575282830
## 2218  1.0644851914 -0.1673619612 -0.179391010 -1.3173341620 -0.391083559
## 2219  0.3125583212  1.9952352866 -0.141233838 -0.7753724117  0.771687569
## 2220  1.5844967800  1.3986902056  1.395940971 -0.6224576826 -2.305434098
## 2221  1.0059881669 -0.1376154389  1.174489678 -0.4073326626 -0.243911041
## 2222  0.2775357033  0.5917360524 -0.225466006 -0.9966471199 -0.253197426
## 2223 -0.4572178447 -0.9786683661  0.776828157 -1.2560308581 -0.033527649
## 2224  1.3871574935  1.1811325885 -0.782663129 -0.3380916266 -0.492814819
## 2225  1.5445706144 -0.9917633938  0.635786994 -1.2237359651 -1.428274280
## 2226 -0.4036007477  0.8579100054 -0.545461728 -1.8049913942 -0.423299472
## 2227  1.8815786625  0.9880460321 -0.637476581 -0.7466575878 -1.491498606
## 2228  0.6689573931 -1.3061811176 -0.666597259  0.2464484043  0.990735495
## 2229 -0.8252829535 -0.9282898174 -0.742728054 -1.7897007621  0.241630077
## 2230  0.5621813137  0.1540961154 -0.686112250 -1.4276942337 -0.330286364
## 2231  1.0646991501 -1.1997210127  0.027697410 -0.9877871919 -0.014317139
## 2232  0.5459104347 -0.4974727173  0.150858199 -1.5658303986 -1.097557684
## 2233 -0.9469827247  1.1388346453 -0.713149210 -1.0070506500 -0.862470269
## 2234  0.1190806055 -0.2687243136  1.855418023 -0.8174704985 -1.047006829
## 2235  2.1686447769  0.9701725732  0.005138746 -0.2168387333  0.895819811
## 2236  1.3684970410  0.5374082924  0.361783368 -0.7540236297  0.183362650
## 2237  1.2317689966  0.1696770741 -0.564325009 -0.9654999130 -1.738425911
## 2238  1.7332102788  0.5209214843  0.158741559 -0.4609427336 -2.057469802
## 2239  1.6483395759 -1.2427406933 -0.339755305 -0.6091180420  0.416635065
```

```
## 2240 -0.0635146482 -1.2825382349 -0.257632618 -1.1800919541 -0.068117063
## 2241  0.2082101863 -0.9393847897 -0.164040490 -0.6004416270  0.493849901
## 2242  1.7663922992 -0.3420711740  2.699784481 -1.2298555575  2.845475619
## 2243  0.1250762859  0.5223167122  0.003726915 -1.4059016116 -1.439146526
## 2244  1.2177934601  0.0808640754 -0.549743996 -0.3784997074 -0.471167486
## 2245  1.2888528727  0.7760421363 -0.506644781 -1.0293905963  0.084573273
## 2246  0.8571105711  0.7331929475  0.088631968 -0.6374739564 -2.174522752
## 2247  0.7813443724  0.4766598160  1.280669378 -0.0157272738  0.557655048
## 2248 -0.0237831006 -1.1273263914  0.473390257 -1.7286091210  2.566491215
## 2249  0.4480401365 -0.8535063235  0.112358820 -0.5501768429  0.184398965
## 2250  0.8031486733  1.4383647659  1.085946626 -0.3985535594  0.018700180
## 2251 -0.3777453552 -1.4962854921  1.993464680 -1.4986779859  0.856027185
## 2252  1.0651041568 -0.3348592480 -0.504488801 -1.1383284249 -0.050476156
## 2253  1.5058232952  0.9906096319  1.444354290  0.4142196302 -0.568776464
## 2254  0.7067298070 -0.6438366964 -1.113978953 -0.9555514173  0.065746764
## 2255 -0.9863788536  0.4202434812  2.612697045 -1.9785753851  0.130826424
## 2256  1.5312479598 -0.4571486068  0.158544280 -0.9801422216 -1.526740686
## 2257  1.4584448947 -0.6498552551  0.214128117 -1.0231071980 -1.499673528
## 2258  0.5905258055  0.2574413675  0.922341616 -1.2988634560 -2.102406749
## 2259  1.6935105416  0.7182173897 -0.035825111 -0.4170955052  0.183605479
## 2260  1.6390020139  0.4407180851 -0.618795176 -1.2457098152 -1.559621016
## 2261  0.2888192376  1.1112582869  1.142548441  0.2832975605  1.984833293
## 2262  0.7380978383 -1.4119483115 -0.597556150 -1.1558326571  0.637844164
## 2263  1.3822659508  0.9384860474 -0.561871822 -0.9380189161 -1.091836171
## 2264  0.5958822897 -1.4263893813  1.569396598 -1.3493835157  0.316314995
## 2265  1.4520341045 -0.7581901634  1.454752789 -0.7381717985  2.781344974
## 2266  1.0928815609 -0.0940786546  1.343952024 -1.1055956851 -0.303763035
## 2267  1.3206034585 -0.4459950483  0.100507597 -1.0875677873  0.278270968
## 2268  0.0036556118 -1.1398369141  1.146825449 -0.8717226325 -0.528543138
## 2269  0.3255913226  0.2111698715  0.806931441 -1.4206575307  1.944208395
## 2270 -0.1129933285  0.1457699518 -0.302300826 -1.2381850958 -2.185859489
## 2271 -0.6528949819 -1.0784251555  0.434500346 -0.4640601917  0.108763469
## 2272  0.1154048423 -0.3028852274  0.545412049 -0.9509347748 -1.755831321
## 2273  0.3787266214 -1.0470783194  0.881491325 -1.0139961205  0.095571683
## 2274  0.2565193919  1.1172166078 -0.257495151 -1.1932121287  2.464858924
## 2275  1.3954250161  0.1225647978 -0.378319075 -1.1058405183  0.025142541
## 2276 -0.1713436502 -0.2611559529 -0.124826303 -1.3202500944 -0.026190066
## 2277 -0.1941189666 -1.5498398828  1.106600358 -1.6983750863 -0.128058522
## 2278  1.6703473660 -1.3897195497 -0.259855023 -0.8331640472  0.461579611
## 2279  1.4635930610 -0.1011570185 -0.551368038 -0.1148134886 -0.288731338
## 2280  0.5615857712 -1.2576216245 -0.486994652 -1.4442141209 -0.295269856
## 2281 -0.0073839519  0.5142924720  0.859042338 -1.5705498506 -0.120776934
## 2282  1.3519795323  0.8922697204 -0.676616219 -1.1012858500  0.098916148
## 2283  0.4725258162  0.8573284756 -0.385634226 -1.3845433815 -0.146351461
## 2284  1.3333207154  0.5527432015  2.294686464  0.5641209652 -0.951814274
## 2285 -0.8397476266 -1.1414408305  0.696005326 -1.5573181195  0.653448031
## 2286 -0.0259078035 -0.5028675277 -0.158424049 -1.1614222683  0.050832333
## 2287  0.3837099880  0.3750572649  0.860512726 -1.2612880988 -0.012700915
## 2288 -0.1613062106 -1.3794710067 -0.744036259 -1.2594801990 -0.384429072
## 2289  1.0671870510  0.1599656495  0.072427332 -0.7539033674  0.013545212
```

```
## 2290  1.0688414858 -1.3331771529 -0.772037775 -0.0576950111 -0.066749087
## 2291  1.6440721796  0.1901516916  0.957567554 -1.1180681212 -1.600103939
## 2292  1.6137588327  0.7716586973 -0.591494728 -1.1940152833 -1.641747119
## 2293 -0.0637945015 -0.6236972674 -0.041784807 -1.3822832891 -1.507816118
## 2294  0.6711049565 -0.6329289387 -0.522792904 -1.2688445974 -0.551213815
## 2295 -0.5441081055 -1.5828233453  0.206611135 -0.4804039793  0.811043689
## 2296  0.8879188446 -0.0003640740 -0.258742174 -1.0104034016 -0.122098819
## 2297  0.8685328501  0.4354261727  0.128711436 -1.3319582558 -1.902938934
## 2298  0.2584027948  2.2140392027 -0.604015140 -1.6850233115  0.057187315
## 2299  1.4050668547  0.4833180490  0.390710912 -1.2643659163 -0.235054376
## 2300  1.1287141381 -0.7219410289 -0.353284692 -1.1047094809  0.685201342
## 2301  1.5265503971  0.2656111829 -0.093134145 -0.1788152038 -0.132199654
## 2302  1.1208803750  1.1892425368  0.548075241 -1.1349880741 -1.986020391
## 2303  1.3875630024 -1.2110392728  0.696024020 -0.9066919021 -0.015130703
## 2304  1.5708323219 -1.0975312058 -0.741288297 -1.0880710194  0.496303800
## 2305  0.3526136618  0.8760930741  0.638124538 -1.3566414266  1.904076270
## 2306  0.0337180069  1.2209398821 -0.834135893 -1.4151211535  0.300091798
## 2307  1.4425213395  0.0464453005 -0.584687984 -0.8397630309 -0.459438458
## 2308  0.3589999957 -0.9013172669  7.087597459  0.9490582585 -0.721539778
## 2309  0.0412407934  1.0242365732  1.800152413 -0.2942245586 -0.295780701
## 2310  0.7375069042 -1.2942523157 -0.687218122 -1.7097899984  0.509060670
## 2311  0.6559687481  0.7113733100  0.420879721 -1.5004372250  2.197611121
## 2312  0.3839138516  1.0500733004 -0.044224766 -1.1979370198 -0.354369496
## 2313  0.8627068498  0.4749008164  0.560422780 -1.2021463302 -2.365057745
## 2314  0.7401769665 -0.0799915427  0.708669355  0.0660085479 -0.404929100
## 2315  1.0408296252 -1.2796038552  1.078433095 -0.8187019323 -0.155230610
## 2316  0.0553455309 -0.0623737965  2.338161210  0.0160384760 -0.482851025
## 2317  1.5606777821 -1.2078491821  1.536934720  1.5066290237 -0.276990665
## 2318 -0.5395241526 -0.6473071122  0.316906430 -1.1284132245 -0.939470401
## 2319  0.0967344180  0.2274441312  2.000429790 -0.4163596121 -1.057699750
## 2320 -1.0723663778  1.8501215039  0.562617648 -1.4461001874  0.428978911
## 2321  1.2774137828  0.8088842069  0.582659714 -1.1859654928 -1.763409849
## 2322  0.1950280473 -0.0874898278 -0.264905651 -1.2148301834 -0.708710428
## 2323  1.1274355326  0.5793831724  0.369281054 -0.5578773464  0.051537189
## 2324 -0.3876021393 -0.8571593790  0.261503060 -1.3378422065 -0.082058245
## 2325 -0.8484876342 -0.3916417639 -0.162494787 -1.7390145573 -1.629085892
## 2326  1.5015625066 -1.5351967738 -0.857539514 -1.0579965406  0.032749007
## 2327  0.1019914172  0.3007506189 -1.104256531 -1.3333186557 -0.122971135
## 2328 -0.2228165980 -0.5875231947  0.005589103 -0.8613813339  0.135325901
## 2329  0.2508282955 -0.1029708193 -0.274584550 -1.2272586916  0.784934463
## 2330  1.6931899765  0.5760043994 -0.961547837 -1.0017293081  0.513887298
## 2331  1.6740395926  2.2644225153 -0.901937698 -0.4420063035 -0.073562259
## 2332  0.6644357427  0.3763450289 -0.870866697 -0.9476812935 -0.590970138
## 2333  1.5182940482  0.6291838224  0.096192915 -0.8201261115  0.152324806
## 2334 -0.8263789857 -0.0053177816  1.052922211 -1.7750590954 -2.075956214
## 2335  0.1465474366 -1.3708254831 -0.610671677 -1.6107213430  0.418569184
## 2336  1.1672916180 -1.6171090712 -0.025262040 -0.5434553044  0.471730626
## 2337 -0.1431654554 -0.2076284539  0.943312469 -1.1487462885 -0.087139415
## 2338 -0.0096523930 -1.0102094392 -0.823735636 -1.3899724564  0.269932273
## 2339  0.8654490392 -0.7403334309  0.303754137 -0.6772735678  0.014122018
```

```
## 2340 -1.1692232254  2.3911794632  4.281366301 -1.4159901992  2.197044466
## 2341  1.0490048102  1.4318353787  0.061967785 -0.7895422864 -0.317406185
## 2342  1.5029631371  0.0477372191 -0.342605075 -0.8043227202 -0.028714099
## 2343  0.9180650255  0.5442428438 -0.667556056 -1.2872114230 -0.305443509
## 2344 -0.3734775610  1.2109688361 -0.096894057 -1.5724605402 -0.582505390
## 2345  2.0023680358 -0.7479369417 -0.011481247 -0.0263744345 -1.020304400
## 2346  1.0600713865  0.1661871252 -0.611521576 -0.0046964163 -0.715125873
## 2347  1.2666900643 -0.7658136549  0.081272820 -1.1182460044 -1.832059939
## 2348  0.9321004261 -0.0582440542  0.416491652 -0.7186573405 -0.427756384
## 2349  0.5943202232  0.1028949569 -0.540268003 -1.4142553846  0.031375592
## 2350  0.0762401296 -0.6183928656  0.164574064 -1.6714744249 -1.779292666
## 2351 -0.4586626800  0.2565813398 -1.151554454 -1.7177438876  0.510596966
## 2352 -0.1081528792  0.5885827103  0.916670336  0.7554474290 -0.602574897
## 2353 -0.8763654132  0.2665383825 -0.246763629 -1.0382807055 -0.479002015
## 2354 -0.8470215780 -0.6821533991 -0.156964675 -1.0356937284  0.564881993
## 2355  0.7612636530 -0.5050976962 -0.600987827 -1.3362119100  1.107408154
## 2356  0.8184737942 -0.2342835355  0.160478786 -0.5468378180 -0.517932975
## 2357  1.1169593077 -0.7269661199 -0.442971740 -0.9233802046  0.418063412
## 2358  1.5194114057 -0.8776138233 -0.319975757 -0.8473573508  0.563946423
## 2359 -0.5361537387 -0.6050866201  2.592011481 -1.6587481005  0.100161302
## 2360  0.2622853573  1.4185595395  0.255689773  1.2427726338 -0.044575225
## 2361  1.3943705611  0.6638836003 -0.995002797 -0.8546302042  0.052559314
## 2362  1.3288716687 -1.3710172697 -0.068818174  1.8141048004 -0.474747921
## 2363  1.1353591117  0.3434924678 -0.631021964  0.0456234990 -0.625259156
## 2364  1.4577998888  1.0953592373 -0.924259834 -0.1968195798 -0.092141406
## 2365 -0.0906233017  0.0354766714  1.300860568 -1.9648738192  0.655954910
## 2366  1.5503366255 -0.2897712688 -0.066971226  0.1440712462 -0.442165525
## 2367  0.5532178473 -0.0489777495  0.204694674 -1.2964441163 -0.358513164
## 2368 -1.0463025926  0.6355200095 -0.068572422 -1.5538135904 -0.405343943
## 2369  1.1559551128  0.3660240862 -1.844099596 -0.9156640762  4.388348784
## 2370  0.8810022955 -0.1569962219 -0.018903587 -0.6336994343 -0.640028935
## 2371 -0.0695371216  1.7982297960 -0.145166117 -2.1302335922  2.428448019
## 2372  1.2363963276 -1.4830896258  0.435612475 -1.1957716790  0.248705782
## 2373  0.0347912681  0.3254405792  0.461103320 -1.5575076433 -0.577877227
## 2374 -0.0864390735  0.2451504755  4.464054218 -1.6763569023  2.163377827
## 2375  1.3940903608 -1.3924400799 -0.553035979 -1.1760089664  0.177181350
## 2376  1.3060472989  0.6659076834  0.222467441 -0.9344497998 -0.024007820
## 2377  1.5238492343  1.9296100357 -0.172463481 -0.6922034738 -2.059147321
## 2378  1.5333501643 -0.7334230613  0.180917182 -1.0397089134  0.165988970
## 2379  1.5811738413 -0.5722705209 -0.293403957 -0.6187179099 -0.037404751
## 2380  0.2783784349  0.3657008394 -0.791336066 -1.5231252058  0.015217658
## 2381  1.5837299745  0.2558462400 -0.381453231 -1.2302997106 -1.780807112
## 2382 -0.2251907545 -0.9484231238  0.222937854 -1.1720712398  2.197046623
## 2383  1.8083423042 -0.4031113333 -0.519512440 -0.5168897060 -1.818993400
## 2384  1.3706707597  0.3671595275 -0.416594907 -1.5250154315 -1.569351760
## 2385 -0.6969882848  1.3936994565 -0.365825028 -1.2097402988 -0.605264296
## 2386 -0.3316479778 -0.3654586020 -0.931230432 -1.7441072742 -0.226226999
## 2387  1.1338164016  0.2224624064 -0.353471237 -1.1631102109 -0.350923055
## 2388  0.6843312547  0.4704467498  2.815361759 -1.5511172164  0.479231446
## 2389  0.3853739352  0.5847285164 -1.214405016 -1.4439027653  1.435791790
```

```
## 2390  1.1802912883  0.9714749583  0.921810312 -1.3388376459 -1.802864589
## 2391  0.6088667932 -0.7850422132 -0.814627643 -1.4892181234  0.755122955
## 2392  0.8241841449  0.1616891091 -0.666919864 -0.8718602441 -0.395805595
## 2393  0.2440169393 -1.4721498355  0.695697257 -1.3013795012  0.155330332
## 2394  0.8742965232  0.5329761882 -0.899536974 -1.3448231064  0.090000571
## 2395  1.4052135125  1.1071894904  0.012936183 -1.0851149878 -1.871878201
## 2396  1.2682916421  0.3573949681 -0.981778223 -0.7344278638  0.046606063
## 2397  0.1198945672  0.2225510856  0.298400832 -1.8566580490 -1.423527247
## 2398  1.3127734213  0.3124318070 -0.767359313 -0.9128881749 -0.130734225
## 2399 -1.1734661509  0.3254641284  0.342540258 -1.3269383439 -0.139211615
## 2400 -0.5320244075  1.1155476090 -0.618670566 -0.8052533037  0.183912365
## 2401  3.1195878749  0.5485822819 -1.195453743 -0.1224770475  0.708022297
## 2402  0.4544100445  0.2586733316 -0.072921258 -0.7608626654 -0.437127918
## 2403 -0.2958551264  0.6699805112 -0.930915111 -1.8415105531  0.215257250
## 2404  0.3356328832  0.9249627832 -0.642178592 -1.3330658565 -0.504700952
## 2405  0.5690261700 -1.1880572002  0.943745824 -1.4328664856  0.062251819
## 2406  1.4615700238  0.4027773377 -1.019310773 -1.0322340718  0.026844939
## 2407  0.9408500783  0.1875656704 -0.441202399 -0.7888806910 -0.223712663
## 2408  1.3258346279  1.0402192217  0.225955823 -0.9460983657 -2.032718175
## 2409  0.6543086171 -0.1656559486 -1.012219021 -1.2132957000 -0.454648105
## 2410  1.0434246396  0.7056901636  1.179072010  0.0028297034  0.002059685
## 2411  0.4816191691  0.5371569182 -0.466912580 -0.4410732192 -0.750835616
## 2412  0.7580633473 -0.3540329699 -0.877022866 -1.4753284503 -0.519402220
## 2413  0.7803146482 -0.2983764713  0.741836040 -1.6457289855  0.136818579
## 2414  1.4947971930 -1.1682659941 -0.438372242 -0.8866663949  0.211110050
## 2415  0.0431260844 -1.3685628768 -0.789456297 -1.6188658247  0.199291700
## 2416  1.6309337237 -0.8265814772 -0.382972389 -0.7372000498  0.367651438
## 2417  0.0219131639 -1.0595108267  1.430322997 -1.7290290383 -1.559902139
## 2418  1.4834182375 -0.9401464792 -0.407181369 -1.1166808765  0.460863993
## 2419 -0.3281162341  1.9235045849 -0.364056954 -1.2078183772  0.199987365
## 2420  1.2287410971  0.2693986690  1.647744422 -0.8856458097 -0.213923185
## 2421  1.2485412597 -0.1435660057 -0.950220383 -0.1925807777 -0.462975438
## 2422  0.7453236493 -0.9678930262  2.613879181 -0.7518568955 -0.584935959
## 2423 -0.3771520778  1.3537817696 -0.909179444 -1.1754831191 -1.168824906
## 2424 -0.0028459415  0.6802906259  0.955548793 -1.6130559074  2.096422019
## 2425  0.3586121536  0.9193093507  1.214749904 -1.4083254885 -0.559841186
## 2426  1.2589626232 -0.0167459850  1.722866413 -1.9030016934  1.299190298
## 2427  1.3594297723  0.3442242375  0.044119143 -0.4857857751 -1.642414574
## 2428 -0.6856430243  0.9665666772 -0.618849757 -1.2859798597 -0.021749643
## 2429  0.8703598093  0.3667112615 -0.666420725 -1.2784595849 -2.053602248
## 2430  0.7305119411  0.2332611960 -0.333253861 -0.6018861754  2.671791932
## 2431 -0.2449962395 -0.3644035070 -0.798001631 -1.6555663240 -0.429973903
## 2432 -0.3583642627  1.8441513579  0.072059880  0.7822140142 -0.092951854
## 2433  0.9671186086 -0.1239352730 -0.194738038 -0.8008091113 -0.101749488
## 2434  1.1203350167 -0.1213281982  0.033330820  0.4797891676 -0.340978143
## 2435  0.9873697437 -0.0463821926 -0.021881967 -0.8698009596 -0.113869073
## 2436  0.5960101871  0.4423508677  2.134657077 -1.8153674330  0.656393585
## 2437  1.0405267785  0.2897134781  1.379228814 -0.9479099941 -0.295043523
## 2438  0.5492029291  1.0058417183 -1.100112705 -1.3361275521 -0.559167599
## 2439  1.0442418554 -0.0840220861  0.090793708 -0.6395767843 -0.458345824
```

```
## 2440  0.3359657800 -0.3283579442 -0.659943267 -1.2659487375  0.178097429
## 2441  1.6937136696  0.7989527382 -0.071615204 -1.4469026860  2.295764214
## 2442 -0.5040560479 -0.7814739513 -0.100384065 -1.0589315889  0.419596465
## 2443  1.3487793457 -0.2267063118  0.294239308 -1.3828534995 -1.247028702
## 2444  1.6075654213  0.1135054054  0.159253463 -0.2282752806 -0.001537286
## 2445  0.8982851146  0.3962127235 -0.501586563  1.2439471789 -0.219105432
## 2446  1.2593634376 -0.9784453916  0.789489527 -0.9249939751  0.138547192
## 2447  1.2706810009  0.6647162895 -0.045948088 -0.9893130639 -0.303076659
## 2448  1.5316369041 -0.9307903461 -0.888158078 -1.1315330752  0.418288201
## 2449  1.3335133807  0.1225168473  0.633657150 -0.3918768758 -0.274788110
## 2450  1.7771515142 -1.4581713259 -0.780072281  0.5471292008 -0.020695167
## 2451  0.6705078527  1.0553933309  3.572013407 -0.3856979515 -0.278188954
## 2452  1.4367683909  0.5174384471  0.091853592 -1.3612867976  2.496073583
## 2453  0.5801356366 -0.7011204643 -0.695542765 -0.6057438228  0.143669704
## 2454  0.9729252088  0.3284178204 -0.240199744 -1.7601951295 -1.473192002
## 2455 -0.7856747460 -0.9719144723  5.035877816 -0.6851444148  2.015778697
## 2456 -0.8488734398 -0.1550137527 -0.629398670 -2.0642884937  0.402255749
## 2457  0.8289687101 -1.0465995847 -0.963828035 -1.0479926306  0.020564763
## 2458  0.7072748836  0.0291985000 -0.966963842 -1.3757536027 -0.280140676
## 2459  0.7895171266  0.4055580978  0.393568060 -0.3573167128 -0.409083164
## 2460  0.6246208725  0.0142589518 -0.523781676 -1.1955488491 -2.181089555
## 2461  1.1327437951 -0.9385835881  1.182760013 -0.9071877822  1.263535773
## 2462  1.6803024179 -0.2545447852 -0.749173256 -0.7071711628  0.667241527
## 2463 -0.1075339364 -0.3769251012 -0.165573081 -0.7438009455 -0.423565721
## 2464  0.2800871266  1.3707041407  0.340418380 -1.8043208853 -1.620300415
## 2465  1.4814992605  0.7606231403 -0.008355563  0.3628857022 -0.502847415
## 2466  1.7382187806  0.3613595293 -1.280774198  1.5200713296  2.111604709
## 2467  1.0185801897  1.0615024895 -0.936966334 -0.1556956158 -0.728122422
## 2468  0.9278101460  0.6977406342 -0.186611965 -1.2780631321 -2.170174651
## 2469  0.6630434433 -0.6368284795  3.028935981 -0.8650426564 -2.131565718
## 2470 -0.1727113386 -0.2040278014  0.854973305 -1.5733516927 -2.471522944
## 2471  2.2242622099  0.4879754755 -0.858399890  2.2280881909 -0.188554567
## 2472  1.0839288741  0.8295661619 -0.012079364 -0.8364002054  0.144118977
## 2473  0.4055154491 -0.8456333429  0.439026750 -1.1578867540  0.173883326
## 2474  1.6276710801  0.6902869421 -0.778388627 -1.0079258523  0.459300226
## 2475  1.5063549195 -0.1829610139 -0.351183503 -0.8109925194  0.018583427
## 2476  1.1098670151  0.7069030212 -1.056431742 -1.1906406055  0.105949551
## 2477  0.7724493276  0.5208721830 -0.041883304 -1.2705366028 -0.321992394
## 2478  0.8104791642 -0.5244107901 -0.232644645 -1.4161227438 -0.162120107
## 2479  0.8691313701 -0.0952719553 -0.302154114 -1.4272066911 -2.435696575
## 2480  1.5993809173  0.7059785626  0.735780596 -0.8097171227  0.454761788
## 2481  0.9205947632 -1.0680138469  1.384295398 -1.1718250964  0.287304486
## 2482  1.3276613738  0.0533385634  0.335475024 -0.8932762189 -0.426445268
## 2483 -0.0215764246  1.5113852531  0.012946030 -0.4389130681  0.246954022
## 2484  0.1176562675  0.6505586636 -0.455433593 -1.4885149762 -2.443215060
## 2485  0.5861118701 -0.7981284373  2.142261257 -0.7873882300 -0.222074811
## 2486  1.3110082424 -0.1418424071 -0.140709031 -0.8535868735 -0.558777434
## 2487  0.0461860738 -0.1145828597  0.809621564 -1.4938892162  0.160956729
## 2488  1.1283061151 -1.1510233089 -1.093983412 -0.7802885552  0.534771950
## 2489  0.8818604827  0.3673587857  0.134904138 -1.1490248095 -0.437376682
```

```
## 2490 -0.0664849412 -0.3943069613  0.386189405 -1.4494166510 -0.191947134
## 2491  0.3758973735  1.3842994228  0.144741381 -1.7084626707 -1.593026525
## 2492  0.9352992756  0.0350703451 -0.572519849 -1.0888232833 -0.496922050
## 2493  1.1602185538  0.1821842383 -0.739866081 -1.4736324175 -1.039918090
## 2494  0.1973845106 -0.3880105785  0.427558285 -0.9755215912  2.502855374
## 2495  1.1679642346  0.5555608726 -0.784406515 -0.6372677486 -0.298124328
## 2496  0.2735806273 -0.0190692984 -0.561744073 -0.7375881442 -0.039496142
## 2497 -0.9712088455 -0.3757532559 -0.129789380 -1.3118373810  0.412948973
## 2498  0.1946679693 -0.8446003036  2.785132271 -1.3714428862  2.495762107
## 2499 -0.0190516981 -1.1375494924  2.506394365 -1.3353305526  0.260962038
## 2500 -0.2820424580 -1.1851039704  1.386180973 -1.5314830124  3.602138342
## 2501 -1.3877205872  1.2318249900 -0.342255862 -1.1197735557 -0.723998748
## 2502  0.8125590540  0.7946111221  0.753271970 -0.7636689886 -2.002047217
## 2503  1.6741647972  0.4782131330  0.480153706 -1.4290111271 -0.898451286
## 2504  1.4036835165 -1.4408768062 -0.933250918 -0.9100810879  0.052930014
## 2505 -0.1088549626  0.1755279913  1.542691912 -1.7470010550  0.432833927
## 2506  1.1806316450  1.2158231152  0.361400235 -0.9830417987 -0.031906693
## 2507  1.4880673142 -0.0578096407  0.250696564 -1.3012524504  0.479027465
## 2508  0.7664060059 -1.2246584168 -0.655547086 -1.4312576462  0.093191753
## 2509  0.3088603921  1.1612245793  0.455298235 -1.1266037010  2.070823083
## 2510  0.5464173674  0.2573326308 -0.174768859 -0.5214176509 -0.777786423
## 2511  0.4073095293  1.6691179406 -0.916359683 -0.3804080472  0.558610129
## 2512  1.2547570023  0.6093698022  5.127886115 -0.4768173852  0.039851464
## 2513  1.8322955707 -0.7176719543  0.389891192 -1.0502739351  2.816757298
## 2514  0.6197349089  0.0058188248  2.063076630 -1.2421058639  2.034590099
## 2515  0.0550858353  1.1898211045 -0.167557047 -1.6440933694  0.057516081
## 2516  0.2671302928 -1.0923361120  0.219434415 -0.5714312085 -0.222576106
## 2517  1.5461497952 -0.9589125026  0.183612098 -0.9126647191  0.189656247
## 2518  1.4074088602  1.0549544491 -1.142343866 -1.0865369633 -0.325297036
## 2519  1.5897853424  0.4581474705 -0.052668611 -1.0281578343 -1.744164892
## 2520 -1.0232584038  0.1761123685 -0.592621627 -1.2381438154 -0.456513612
## 2521  0.6094887847  0.3585824359  1.550211589 -0.5774598422  0.147353975
## 2522 -0.0489944406  0.7401138861 -1.079578818 -1.4577308617 -0.754727588
## 2523  0.0127714766  0.8011385558 -0.203188955 -1.3487467208 -0.101357966
## 2524  0.9926156855  1.4259136687 -1.136373740 -1.3837058845 -0.427306595
## 2525 -0.4710503021  0.2371416156 -0.458864222 -1.1160256858 -0.657698114
## 2526  0.2195855655 -0.2925281261 -0.875008945 -1.6049017113 -0.617129815
## 2527  1.2046625346  0.6341726262 -0.565416160 -0.4802273938  0.064053844
## 2528  1.6957392006 -1.0185988383 -0.159747734 -0.1922018594  0.374966416
## 2529 -1.0607607569 -0.9182952529  8.827643385 -0.7254024916  1.188064016
## 2530 -0.4664347886 -1.5837318269 -0.442655323 -1.4506933841  0.224821309
## 2531  0.3369661481 -0.5170931204 -0.367609179 -1.1373409335  0.060635674
## 2532  1.3551113057 -0.1113980852  0.083930118 -0.9053991141 -0.533933482
## 2533 -1.1519078498 -0.2563929621 -0.161638159 -1.0896695373  0.197438182
## 2534  0.4883933660  0.9832082650  1.034777486 -0.6728057992 -0.598727358
## 2535 -1.0825026883  0.1176513521 -0.803276998 -1.1187817058 -0.032766044
## 2536  0.1414081921 -0.2770539978  4.184928086 -1.1979151312 -0.782103953
## 2537  1.0365835265 -0.8361814447  0.270649141 -0.4269126426  0.155879827
## 2538 -0.0321313412 -0.0569063670 -0.397345034 -0.8702196353  0.069472372
## 2539  0.0555055395  1.0375206041 -0.778345960 -1.5836211124 -0.275452482
```

```
## 2540  1.0117358717 -0.9216102525 -0.705392985 -0.8008930132  0.157277483
## 2541  1.0083034406 -0.6395394664  1.577413798 -1.6731204735  2.415973393
## 2542  2.0209281677 -1.3448900487 -0.314222302 -0.0155891120  0.401997467
## 2543  1.4246909848 -0.1132152452 -0.724658040 -0.9470879484  0.004376590
## 2544  1.5329464017 -0.4270104384 -0.462741216 -0.9234138928  0.552370113
## 2545  1.5594420262 -0.7437357119 -0.030582458 -0.8408544978  0.261845687
## 2546  0.5427277706 -1.4170244507 -0.493185710 -0.4108502710 -0.024295403
## 2547  1.3943680914  1.9074394469  1.264132367  0.0054843614 -1.407675194
## 2548  1.4722306448 -1.6754765569 -0.995664208 -1.1543012297  0.199426614
## 2549 -0.7436919999  1.2297372122  3.422191436 -0.4857237045  1.632186837
## 2550  1.0444360271  1.5466930136 -0.484513587 -1.2954786673 -1.523559371
## 2551  0.8307608396  0.4592189075  0.091560414 -0.6548895571  0.280967318
## 2552 -0.1180916778  0.2793713454  0.274864364 -1.3372539365  0.313242199
## 2553  0.0352182633  2.1092616321  0.052295072 -0.4736055381 -2.709996015
## 2554 -0.0521184359  1.2574982410 -0.347136401 -1.8390254216 -1.372181487
## 2555  1.2097582789  0.1224411269 -0.739981560 -1.1001091738  0.649564773
## 2556  1.6867655652 -1.1379369876  0.819192840 -1.0843288440  0.789654494
## 2557  0.9068685536 -0.0964578519 -0.885788687 -0.7791077483 -0.127409939
## 2558  0.8391686780 -0.0006280084  1.602122629 -1.4513697642  0.243795878
## 2559  1.2417273780  0.6903626659  1.389321832 -0.6907423121 -0.192455755
## 2560  1.1779833397  0.8299711325 -0.727939842 -1.3146065134  1.084777775
## 2561  1.2477411310 -0.1227987979  0.041926449 -0.5972592427 -0.374517912
## 2562  0.5022928512  0.1352976996 -0.331063164 -1.1307790245 -0.879834600
## 2563  1.0609218610 -0.6315537298  0.355291176 -1.1895537526  0.075632701
## 2564 -0.1808336098 -1.1069462889 -0.452046270 -1.8048552945  0.087491718
## 2565  0.5470810964  0.3178654726 -0.807096128 -1.0256653675 -0.240822359
## 2566  0.6297690541 -1.1894914374  0.147689221 -1.5312885387 -0.034946868
## 2567  1.3276784626  0.9160869968  0.396810064 -1.4885218820 -1.406139719
## 2568 -0.6469095042 -0.3129327301  0.021230220 -0.7398691023 -0.080164721
## 2569  0.7816650757 -0.5406707482 -0.438763713 -1.1647358325 -0.249314228
## 2570 -0.3587754570 -1.1122558000 -0.388892636 -0.2916494928  0.217931055
## 2571 -0.1357530834 -1.3792896041  0.179269995 -0.5325552510 -0.198033629
## 2572  0.0628375980  1.6647919781 -0.644729643 -0.1810213669  0.154795094
## 2573  0.4851213547 -0.5995354540 -0.274588159 -1.1725267777  0.085302329
## 2574 -0.1961273167  1.3955295301 -0.233782354 -0.9838811131  0.285260164
## 2575  1.0702817678  0.4985551610 -0.416927966 -0.7380694531 -0.158575791
## 2576  0.1501003769  2.4460957515  0.159911626 -0.2302519123  2.628291714
## 2577 -0.6440574928 -1.0318098875 -0.168194050 -1.2207172829  0.293558244
## 2578  0.0944725967  0.9050737414 -0.780122667 -1.2842155259 -0.006818707
## 2579 -0.0168064378  0.9418286211  1.853709108 -0.9818729014 -0.750338505
## 2580  1.6733549659  0.8229292999  0.534035325 -1.1640973231 -1.538584299
## 2581  1.4243835718 -0.9085909739  0.069439470 -0.1195160032 -0.124494775
## 2582  0.1009653690 -1.3498875575  1.736006610 -1.6500593394  0.440663836
## 2583  0.4055407184 -1.0242339273  4.337498376 -0.8126214232 -2.436527863
## 2584  1.4268609277  1.8483904122 -0.276153971  0.8519197202 -2.491440235
## 2585  0.6234878753 -0.0656796870 -0.489019534 -0.8360787196 -0.547416860
## 2586  0.9010106375 -0.8465360039 -0.646664451 -0.6821428325  0.282946754
## 2587  0.5019706917  0.0368906150 -0.747630179 -0.8601560565 -0.115541309
## 2588  0.3928272054  0.1814128785 -0.735103769 -0.8642591833 -0.248380056
## 2589  0.0157178490 -0.9806437248 -0.270053589 -1.3389369878  0.792579435
```

```
## 2590  1.2604758408 -0.2819922585 -0.153401068 -0.8822446662 -0.080288244
## 2591  1.0814488267 -1.1485308468 -0.510801033 -0.6663592057  0.124758018
## 2592  1.5333793334  0.8075443392 -0.347906392 -0.6066758420 -2.033756459
## 2593 -0.5351120266  1.1852795168 -0.230126617 -1.1746831554 -0.736638733
## 2594  1.1455860470 -0.0752483860  5.274089366 -1.2247398740 -1.406391670
## 2595  0.8646915316 -0.9099049982  0.709361365 -1.6921109362  0.512066873
## 2596  1.0824032065 -0.2078616754  0.551880524 -0.7037295686 -0.387155678
## 2597  0.3382442817 -0.7563536152 -0.366035907 -1.3958358493 -1.697202953
## 2598  0.1561640586  2.6264567241  1.324430709 -0.1221376822  2.319896275
## 2599  0.7726198880 -0.2543016900 -0.492290261 -0.9610208241  0.138572941
## 2600  0.4769878354 -1.9221049333 -1.516745900 -0.8168834725  5.407668815
## 2601  0.2034973390  0.4770477660 -0.305568764 -0.7910174795 -1.554737719
## 2602  1.4462964187  0.9851106993 -1.097655052 -0.9500892038 -0.405616898
## 2603  0.1113579468 -0.5320133079 -0.938105499 -1.0792727505 -0.302417189
## 2604  0.8524871797  1.0921665923 -0.282128914 -0.9058648404  0.554868077
## 2605  0.7799680987 -0.3189854599 -0.985919887 -0.9828171243 -0.070282584
## 2606  1.1959058749 -0.5667931442  0.189711233 -1.1916796868 -1.182103009
## 2607  1.3855754925  1.2061888299 -1.162282781 -1.0450006184 -0.269710383
## 2608  0.8852607435 -0.8381734094 -0.247990286 -0.9273363882 -0.192727975
## 2609  1.0932222515  0.1328682293  1.067808240 -1.0219317190 -0.337134825
## 2610  1.7945478844 -1.5431397368 -0.886351062  0.4620033298  0.185510787
## 2611 -0.7570659424  1.9147454259  0.425289279 -1.2502127622  0.489903535
## 2612  0.1102264704 -1.6255009763  0.917772324 -1.6498470005  0.548183383
## 2613  0.5213398569  0.1665047355  0.260966647 -0.4520382410 -0.237698190
## 2614  1.3014150072  1.6079553239 -0.931664865 -0.7577386348 -0.443748015
## 2615  1.0980595760  0.7056502769  4.355083531 -1.4751741284  0.402859580
## 2616 -0.1855171769 -0.2367102532 -0.267783921 -1.5725453589 -0.347541268
## 2617  1.0244674637  0.5465685562 -0.156498336 -1.6647591443 -1.705018968
## 2618  1.1315572618  0.0566288171 -1.095026981 -1.1150818191 -0.223250263
## 2619 -0.3564052534 -0.4599447870  2.094646720 -1.7479148979 -0.028907983
## 2620  0.6002711173  0.1686037431 -0.524026115 -1.5291959980 -0.310270438
## 2621 -0.1802977732  1.1789024719 -0.111358606  1.3133351122 -0.130408282
## 2622  0.8215218088 -0.6413451185  0.204418450 -0.6665538789 -0.506085244
## 2623  1.1843489507  0.5623218034  0.848487001  0.7565635188 -0.786006587
## 2624  1.1799092703 -1.4228025956  0.501805040 -1.1042154354  0.553863905
## 2625  1.4852552245  0.4312432070 -0.076808504 -0.6580288825 -1.182040072
## 2626  1.5762979764 -0.0577552052  0.258882999 -0.6050350307 -0.204538201
## 2627  0.4575554099 -0.1345832773 -0.342423029 -1.5477062384 -0.353585727
## 2628  1.0746381257  0.7191508122 -0.472208380 -1.2686757458 -0.031549091
## 2629  1.5985786935 -0.6917135423 -0.886577739 -0.8813556606  0.520448549
## 2630 -0.3259039916 -0.9673828189  0.252784890 -1.4016983166  0.252472809
## 2631  1.1817386548  1.8269229883  3.255071523 -1.7093990270  0.414981137
## 2632  0.9975548623 -0.6118760969 -0.251555548 -0.7319665951 -0.060677368
## 2633  0.7423121739  0.4622654389 -0.656460568 -0.3117713872 -0.486791673
## 2634  0.3052318288 -1.2853877204 -0.222434220 -0.6305777951 -0.334315756
## 2635  0.7766735877  0.4000147448 -0.937045786 -1.2750284371  0.186154341
## 2636 -0.1861597436 -0.6481256389  0.133139063 -1.5769272153  0.330350575
## 2637  1.0356012142  1.0878296991 -0.319828170 -0.7492987347 -0.539338739
## 2638 -0.1144893444  0.7773192026  0.411627059 -1.4483225931 -1.723941409
## 2639  0.4817921515 -0.2572820817 -0.332735802 -0.5358040267 -0.132953961
```

```
## 2640  0.0605349462 -1.3660252064 -0.289231381 -1.2313788710 -0.195419304
## 2641  0.4801003435 -1.0900902319 -0.167390543 -0.1378159505 -0.010534710
## 2642  1.3446459513  0.6074287047 -0.879270114  0.2762356342  0.100299363
## 2643 -0.0382361417  0.2076442893  3.342487639 -1.6469274962  2.806189913
## 2644  1.2289153530  0.1759138508  0.656553275 -0.9725284994  0.353059066
## 2645  1.3265374654 -1.3686219470 -0.417570478 -0.9899655444 -0.285993947
## 2646  0.3224401170  1.6752354377 -0.786759201 -1.2099708834 -0.336847397
## 2647  1.6415177321  1.6100791810  1.928972742 -1.5001376827  2.627513320
## 2648  0.5246981696  0.3256010927 -0.601821096 -1.2513974751 -0.566080663
## 2649  0.8806438816  0.9391874009  2.824034386 -0.7675963132 -0.205787597
## 2650  1.1442479280 -1.5826584821 -2.580631530 -0.8954422738  4.753740589
## 2651  1.0003773329  0.1157837423 -0.994796888 -1.0932652223  0.021780610
## 2652  0.5451547902 -0.7000248955 -0.280017210 -0.2771062065 -0.344000417
## 2653  1.2467098620 -0.4820649603 -0.905513985 -1.2038280923 -0.191097994
## 2654  0.5925799627 -0.0141299005 -0.156600624 -0.3400253675 -0.407666017
## 2655 -0.4604416312 -0.8671069132  2.491639041 -1.6237822550  0.065430593
## 2656  1.6124158734  0.6299735816 -0.141121747 -1.1341177764 -1.623686038
## 2657  1.4487954658  0.1466045040 -0.564360166 -0.6387545295 -0.424499502
## 2658  0.7251956844 -0.7122941914 -0.134916514 -1.5259677904  0.453469987
## 2659  1.1764561973 -0.2495830951 -0.316545767 -1.0032039605 -0.366087713
## 2660  0.9604791940 -1.0007402776  3.744432420 -1.8715641314  3.161597689
## 2661  0.1794241114 -1.2545857478  1.085879218 -0.8492566960 -0.296233992
## 2662 -0.1442879547 -1.3067636983 -0.378158405 -0.9382021333 -0.560889246
## 2663 -0.1117547429  0.5625583451  0.531785873 -1.1290050963  0.717806669
## 2664 -0.5285818955 -1.1708736627  0.224421900 -1.4195216794  0.006131104
## 2665  1.4350246692  1.2738873102 -0.757151645 -0.3309030057  0.278196221
## 2666  1.4193769490 -1.2273387833 -0.927076229 -0.8113366997  0.111493691
## 2667 -1.1245922566 -1.3548879415 -0.909803734 -1.4847320932  0.205821268
## 2668  0.6526823422 -0.3326196686 -0.295456197 -0.8384016220 -0.918407004
## 2669  1.2962134129  0.4054179044 -0.763208710 -0.9213939408 -0.131420144
## 2670  1.0697034404 -0.8015335279 -0.362466077 -0.3823141898 -0.118244511
## 2671  1.0218248261  1.3872892501  1.143659167 -1.2316995093 -0.036871735
## 2672  0.9978395239 -0.2833936289 -0.193639635 -0.9047571892 -0.718027170
## 2673  0.1599492275  1.3345904465 -0.707605647 -0.9253488162 -0.483197694
## 2674  0.8981560120  0.5778927060 -0.017726087 -1.8049668515 -1.733061839
## 2675  0.0876277951  0.6026379484  0.544740171 -1.8505602759 -1.559147318
##                PC6           PC7
## 1    -0.8351143123  6.794734e-01
## 2    -0.4825179639 -5.958651e-01
## 3    -0.3467336743 -5.256952e-01
## 4    -0.1807446192 -1.270486e+00
## 5    -0.3904060845 -8.005606e-02
## 6    -0.5236566803 -1.374255e-01
## 7    -0.3027996991 -1.535717e-01
## 8    -0.4123146739 -3.173713e-01
## 9    -0.0087662447 -6.236502e-01
## 10   -0.0097526041 -8.763665e-01
## 11   -0.7584133251  1.188227e+00
## 12   -0.5656222035 -4.198627e-01
## 13   -0.0103642012 -1.819515e+00
```

```
## 14   -0.0240872524 -1.682208e+00
## 15   -0.4321154530  1.732312e-01
## 16    0.2805845305 -9.554358e-01
## 17   -0.4417908402  1.759707e-01
## 18   -0.4077434871 -1.570786e-01
## 19    0.1233026100 -1.167751e+00
## 20   -0.0267698930 -3.386657e-01
## 21    0.2478808327 -7.377958e-01
## 22   -0.5292168147 -9.127790e-01
## 23    0.3253617370 -5.986679e-01
## 24   -0.1165780710 -1.348310e+00
## 25   -0.3329884544 -1.033318e+00
## 26   -0.2068021263  1.316441e-01
## 27   -0.3543255798 -5.896385e-01
## 28    0.3775029362 -9.067720e-01
## 29    2.0255983875  2.902393e-03
## 30   -0.3112693929 -7.460583e-01
## 31   -0.1185236471 -4.140444e-01
## 32   -0.8967537819  6.639086e-01
## 33   -0.7998385900 -3.597107e-01
## 34   -0.1935730330 -6.756277e-01
## 35   -0.5333761347 -1.631536e-02
## 36   -0.5898068421  1.750047e-01
## 37   -0.3297985131 -2.332046e-01
## 38   -0.7611881070  8.760655e-01
## 39   -0.5496249020  2.085092e-01
## 40   -0.3437208848 -2.481499e-01
## 41    0.0512412720 -7.377599e-01
## 42   -0.5135671030  8.037442e-01
## 43   -0.5948280704  3.991071e-01
## 44   -0.7803206509 -1.322754e+00
## 45   -0.2652910042  4.603236e-02
## 46   -0.3378675564  7.411213e-01
## 47   -0.3453005425  9.834357e-01
## 48   -0.2295622280  3.736931e-01
## 49   -0.0113699752  7.295132e-01
## 50    0.2792864402 -4.382963e-01
## 51    0.2644117667  6.001996e-01
## 52    1.0903687318 -4.138590e-01
## 53    1.2502639029  1.317859e+00
## 54   -0.7533450387  7.589185e-04
## 55   -1.2025902623 -2.345520e-01
## 56   -0.9550451766  2.517436e-01
## 57   -0.3351828020 -1.010040e+00
## 58    0.2184967032 -2.625200e-01
## 59   -0.1674836612 -1.207387e+00
## 60    1.1197840262 -4.582784e-01
## 61    0.4507656638  9.947747e-01
## 62    0.0167485514 -3.087407e-02
## 63   -0.1874568005  5.418471e-01
```

```
## 64    0.0873368090 -3.519759e-01
## 65    0.5153316563 -4.563866e-01
## 66   -0.4059350722  1.089246e+00
## 67    0.1731705739  8.444750e-01
## 68    0.3624259300 -3.084987e-01
## 69    0.7712385515 -1.438598e-01
## 70    0.2444268786  2.066656e-01
## 71    0.6897248732  2.176343e-01
## 72    0.2110596763  4.404663e-01
## 73    0.8809049483 -1.238246e-01
## 74    0.9148730545 -1.690194e-01
## 75    0.4531521538  8.862613e-02
## 76    0.7182963283  7.782931e-01
## 77    0.9082416346 -3.618769e-01
## 78    0.9852734069  2.624717e-02
## 79    0.4969807439  1.006956e+00
## 80    0.7609128921  6.700574e-01
## 81    1.0897657696  1.398427e-01
## 82    1.2817802461 -1.478884e-01
## 83    0.8932548708 -7.805098e-01
## 84    2.8685232547  1.096251e+01
## 85    0.7080366228  1.165443e-01
## 86    1.4209906938 -4.314902e-01
## 87    0.8625515394  1.050434e+00
## 88    1.3611959407 -2.408996e-01
## 89    1.4176911443 -7.041468e-01
## 90    1.4117914997  2.053525e-01
## 91    0.9359988936  9.172171e-01
## 92    0.9925352426  2.000609e-01
## 93    1.0438442449  1.170046e+00
## 94    1.0679043082  1.642014e-01
## 95    0.9600637442  8.282726e-01
## 96    1.6055597764 -3.732487e-01
## 97    3.2504863899  1.025023e+01
## 98    1.2943322452  2.017402e-01
## 99    1.1911764111 -7.402298e-01
## 100   1.5990497478 -5.788123e-01
## 101   1.7404374246  1.274450e-01
## 102   1.3163750100  4.545801e-01
## 103   1.6807918569 -6.164214e-01
## 104   1.2456917861  7.723055e-01
## 105   1.6797041082 -6.259953e-02
## 106   1.4715575226 -3.327467e-01
## 107   2.3612421692 -8.018764e-01
## 108   2.0165749389  8.903392e-01
## 109   1.7711245388 -2.059696e-01
## 110   2.2830405300 -4.246600e-02
## 111   2.4952161045 -6.109477e-01
## 112   2.4053610610 -1.714481e-01
## 113   2.5802710725 -6.398893e-01
```

```
## 114   1.8742439427  8.572025e-01
## 115   1.9145122926  1.192843e+00
## 116   2.4479956063  2.991978e-01
## 117   2.1291708350  2.686650e-01
## 118   2.6527337193 -7.014061e-01
## 119   2.1042558634 -7.696995e-01
## 120   2.0145303244  9.551577e-01
## 121   1.9784914358  4.828900e-01
## 122   2.5259512852 -5.724450e-01
## 123   1.9758851029  1.038243e+00
## 124   2.2161457243 -4.299200e-01
## 125   2.0866672071  2.706385e-01
## 126   2.7554788347 -1.876765e-01
## 127   1.8980479264  7.062932e-02
## 128   2.0303233660 -1.217163e-01
## 129   1.9360439316  4.030010e-01
## 130   2.1297995955 -8.855977e-01
## 131   2.2758211951 -1.159790e-01
## 132   2.2448026128 -1.090734e-01
## 133   1.8850799496  1.279635e+00
## 134   1.8961334166  1.258226e+00
## 135   2.1514406642  1.593682e-01
## 136   2.4899494888 -5.693316e-03
## 137   2.2756941481  2.062290e-01
## 138   2.1389955951  1.485021e-01
## 139   2.3908834323 -4.545735e-01
## 140   2.2725786762 -3.209154e-01
## 141   2.0325176062  6.467322e-01
## 142   2.2473128978  1.170896e-02
## 143   1.9096535419  6.798169e-01
## 144   2.0878346072 -6.445562e-01
## 145   2.4751309286 -1.695419e-01
## 146   2.0918812875  2.786551e-01
## 147   2.0053759366  6.480402e-01
## 148   1.8409259961  8.278408e-01
## 149  -0.7854818951  2.686185e-02
## 150  -1.4118365060 -7.556644e-01
## 151  -1.6596398596  2.252314e-01
## 152  -1.0820294026 -2.791467e-01
## 153  -0.9552842847 -1.600699e-01
## 154  -1.4518122308  7.633142e-02
## 155  -1.2485227163 -5.797403e-01
## 156  -0.6843346043 -5.491423e-01
## 157  -0.9913487499  1.101212e-01
## 158  -1.0625390162 -3.850564e-01
## 159  -1.0994141128 -6.398665e-02
## 160  -1.4694958625 -1.987311e-01
## 161  -1.2340422577 -4.896286e-01
## 162  -1.2633216152 -3.568609e-01
## 163  -1.3268021534 -4.058003e-01
```

```
## 164  -1.2944169770  9.508835e-02
## 165  -1.0113578839  5.056678e-02
## 166  -1.1787430319  1.496399e-01
## 167  -1.4517339448  8.667820e-01
## 168  -0.7906674097 -5.013502e-01
## 169  -1.4768411863  7.879967e-01
## 170  -1.4979659218  8.071734e-01
## 171  -0.7345672517 -4.692052e-01
## 172  -1.1546799771 -5.627013e-01
## 173  -1.4061751784  1.785575e-01
## 174  -1.4459363139 -7.939292e-01
## 175  -1.5112238901  7.630264e-01
## 176  -1.0264185458  2.161220e-01
## 177  -1.1942376677 -2.188780e-01
## 178  -1.0644596408 -4.233162e-01
## 179  -1.0160115198 -7.840463e-01
## 180  -1.2728926979  8.341807e-01
## 181  -1.0279268599 -4.506414e-02
## 182  -0.9043412048  4.135598e-01
## 183  -0.9029797778 -6.059697e-01
## 184  -1.2023282743  5.142898e-01
## 185  -0.7100900235 -5.913923e-01
## 186  -1.2894173812 -6.380403e-02
## 187  -1.3170441074  9.185369e-01
## 188  -1.1889787847  8.851829e-01
## 189  -0.4821623846 -6.257018e-01
## 190   0.8080534540  1.054101e+01
## 191  -0.8194246543 -6.214899e-01
## 192  -1.2590675565  5.259973e-01
## 193  -1.2316053948  5.997944e-01
## 194  -1.3297803215 -9.102982e-02
## 195  -1.0583128045  1.856328e-01
## 196  -0.9833281136 -3.301313e-01
## 197  -0.8025900262 -5.720628e-01
## 198  -0.7793250531  1.839578e-02
## 199  -0.8447877949 -4.279045e-01
## 200  -0.9022616164  5.266987e-01
## 201  -0.7774158716 -4.312039e-01
## 202  -0.6994635386 -8.472894e-01
## 203  -0.5849515408 -2.397504e-01
## 204  -0.9428500951  7.274555e-01
## 205  -0.6422301970  8.062132e-01
## 206  -0.3218319877 -1.367445e-01
## 207  -0.9408661553  1.089894e+00
## 208  -0.7967861768 -8.199298e-01
## 209  -0.8671305793  7.470743e-01
## 210  -0.4984934987  1.607731e-01
## 211  -0.9676997446  1.007586e+00
## 212  -0.9575755615  5.433938e-01
## 213  -0.8059095292  1.194241e+00
```

```
## 214  -0.9435479596  1.411770e+00
## 215  -1.2223688168  1.099986e+00
## 216  -0.6860436884  1.006451e+00
## 217  -0.1795425971 -3.851900e-01
## 218  -0.9826049881  1.087861e+00
## 219  -0.6192160776  1.851472e-01
## 220  -0.5359470188 -5.002965e-02
## 221  -0.6320484423 -2.490856e-01
## 222  -0.7353875482  9.482447e-01
## 223  -0.0667935796 -9.258238e-01
## 224  -0.6070008591  8.939984e-01
## 225  -0.8081047382  9.705401e-01
## 226  -0.6641731367  1.403491e+00
## 227  -0.3393017368 -1.250484e-01
## 228  -0.8274074078 -2.839582e+00
## 229  -0.5006009555 -3.284427e-01
## 230  -0.7908191637  9.788785e-02
## 231  -1.1239996446 -9.360851e-02
## 232  -0.5639402804 -2.137607e-01
## 233  -0.6453198365  6.706009e-01
## 234  -0.6513279329  5.534016e-01
## 235  -0.6177167905 -1.573940e-01
## 236  -0.4689660360 -4.714059e-01
## 237  -0.6883307376  6.222463e-01
## 238  -0.7948296077  1.026702e+00
## 239  -0.2915872663 -3.355491e-01
## 240  -0.6903857907  8.358844e-01
## 241  -0.8972595973  9.707624e-01
## 242  -0.2361722591 -9.238942e-01
## 243   0.0414306315 -5.981288e-01
## 244  -0.0712255973 -8.928403e-02
## 245  -0.1896626784 -6.514292e-02
## 246  -0.5680332334  1.158943e+00
## 247  -0.7158076102  1.110631e+00
## 248  -0.5327566035  6.302349e-01
## 249  -0.4722134451 -2.374060e-01
## 250  -0.5971861029  4.476361e-01
## 251  -0.7064612102  7.668614e-01
## 252  -0.7695940649  9.710012e-01
## 253  -0.2778796569 -1.065467e+00
## 254  -0.4069280045  1.722788e-01
## 255   0.2949658798 -8.022614e-01
## 256  -0.1419117686  1.123056e-01
## 257  -0.6905288680  8.839607e-01
## 258  -0.5591174325  5.317972e-01
## 259  -0.8005435699  4.276572e-01
## 260  -0.4003863855  9.132268e-02
## 261  -0.5171281326  7.316944e-01
## 262  -0.3108633450 -9.876090e-01
## 263  -0.6055577220  7.171263e-01
```

```
## 264  -0.2354963354 -1.996052e-01
## 265  -0.3172931930  7.944400e-02
## 266  -0.3301534815  7.756833e-01
## 267  -0.3955524406  5.268090e-01
## 268   0.1577852092 -2.906294e-01
## 269  -0.4376609583  1.077868e+00
## 270   0.0471061299 -1.620268e-01
## 271  -0.3016537098  6.298057e-01
## 272   0.3268576745 -8.337297e-01
## 273  -0.0767931626  7.041199e-01
## 274  -0.3155597869  2.917170e-01
## 275  -0.1252688344  1.077263e+00
## 276   0.1930370406 -7.542589e-02
## 277   0.1827280257 -2.769237e-01
## 278   0.1814165213 -5.988762e-01
## 279  -0.2756079234  5.350105e-01
## 280   0.5220210428 -1.055961e+00
## 281   0.1772309349 -3.851592e-01
## 282  -0.0865640197  2.435063e-01
## 283   0.4751429585 -5.103275e-01
## 284   0.3972160183  6.105467e-02
## 285   0.0878713434 -7.314999e-01
## 286   0.0275424689  1.513280e-01
## 287   0.1654155573 -1.781154e-01
## 288  -0.0683067832 -4.615690e-03
## 289  -0.0286617930  1.062530e+00
## 290   0.7370029595 -9.568605e-01
## 291   0.5654674000 -7.331774e-01
## 292   0.1714235466  7.143740e-01
## 293   0.9801877180 -6.444353e-01
## 294   0.6338929094 -1.340722e+00
## 295   0.7551536831 -1.506900e-01
## 296   0.5914665011 -8.883142e-01
## 297   0.6224037682 -1.168425e+00
## 298   0.2601517834 -3.218831e+00
## 299   0.8553000467 -9.978514e-01
## 300   0.9794645060 -1.631663e-01
## 301   0.7543490318 -3.974888e-01
## 302  -0.0090022172 -2.718670e+00
## 303   0.4376659786  1.651836e-01
## 304   0.2416507790  5.659114e-01
## 305   0.2874426190  7.922919e-01
## 306   0.2558113254  7.349824e-01
## 307   0.8986428757 -5.298802e-01
## 308   0.1516460476  3.449823e-01
## 309  -1.4091486235  1.002802e+00
## 310  -1.4562986554  9.396792e-03
## 311  -1.4219863805  1.895509e-01
## 312  -0.8379118030 -7.051353e-02
## 313  -0.9757714543  1.271178e-01
```

```
## 314  -1.3084004026 -3.140970e-01
## 315  -1.3695153410  3.706624e-02
## 316  -1.1831155832 -1.123370e-01
## 317  -1.4865100249  5.990270e-01
## 318  -1.5637501198  5.699663e-01
## 319  -1.0862861057  8.599068e-02
## 320  -0.9126078926 -8.822508e-01
## 321  -1.1396082972 -2.352997e+00
## 322  -0.9533536591 -1.005663e+00
## 323  -1.5473396139  7.016673e-01
## 324  -0.9945750468 -9.619167e-01
## 325  -0.9915337592 -9.338232e-01
## 326  -0.9077965365 -2.314288e-01
## 327  -0.6213483750 -2.713630e-01
## 328  -0.9083066130  3.855571e-01
## 329  -1.1704187253  2.847986e-01
## 330  -1.2112956235  1.667884e-02
## 331  -0.8963792458 -2.549350e-03
## 332  -1.1711952977  3.341643e-03
## 333  -0.5597360826 -9.491147e-01
## 334  -1.2488476291  8.284379e-01
## 335  -1.4132037527  7.368204e-01
## 336  -1.2858622555 -4.776375e-02
## 337  -0.9143876115  2.923707e-01
## 338  -0.7290671493 -4.155092e-01
## 339  -0.8787389929 -4.168506e-01
## 340  -1.0908199679 -5.373176e-01
## 341  -0.5844652699 -7.114979e-02
## 342  -1.0262642657  4.547217e-01
## 343  -1.0758308283  3.713512e-01
## 344  -1.0571143465  1.985550e-01
## 345  -1.1011840857  9.167249e-01
## 346  -1.3402310412  7.870485e-01
## 347  -0.9273227171  7.791510e-01
## 348  -1.2627332730  1.020026e+00
## 349  -1.0099518403  1.918518e-01
## 350  -0.9407430517  2.439223e-01
## 351  -1.1344282514  1.146644e+00
## 352  -1.0763080721 -3.672122e-01
## 353  -0.7416922001 -2.002913e-01
## 354   0.2212543214  3.521644e-02
## 355  -0.0184001481 -1.642689e+00
## 356  -0.0396542318 -3.055933e-01
## 357   0.3469141979 -2.341263e-01
## 358   0.2846308595 -1.897471e-01
## 359  -0.3364763390  6.766871e-01
## 360  -0.6181568482  7.185104e-01
## 361   0.1925134284 -7.476381e-01
## 362   0.3350007155 -6.841841e-02
## 363   0.1803117551 -1.196105e+00
```

```
## 364   0.6427373221  1.802781e-01
## 365   0.4976861645 -1.002819e-01
## 366   0.1262193603  1.667906e-01
## 367  -0.8348118553 -1.949609e-01
## 368  -1.0639256687 -4.485273e-02
## 369  -1.3181124625  2.736137e-01
## 370  -1.2956251884 -1.371235e+00
## 371  -1.3830366796  1.155712e+00
## 372  -1.2954027952  7.553777e-01
## 373  -0.5312377774 -5.177139e-01
## 374  -0.7021264930  1.206536e+00
## 375  -0.1365883027  1.203197e-01
## 376  -0.0839117240 -9.649186e-01
## 377  -0.5903708853  4.763542e-01
## 378  -0.3759848929  3.778670e-02
## 379  -0.0822161776 -1.006936e+00
## 380   0.0974460391 -1.550372e-01
## 381  -0.1770186189  4.630932e-01
## 382   0.0858154325 -8.370597e-02
## 383   0.0081668070 -3.937798e-01
## 384  -0.0844250928  2.919650e-01
## 385  -0.0431882480 -2.703570e-01
## 386   0.0367114435 -2.695688e-01
## 387  -0.0778240984  1.354550e-01
## 388  -0.0458060564  4.120581e-01
## 389  -0.2767557374 -5.028692e-01
## 390   0.3543647854 -5.081927e-01
## 391   0.0432746825  3.703882e-01
## 392  -0.2121661836  3.453195e-01
## 393   0.3464713810 -9.369007e-01
## 394  -0.1243672262  3.364744e-01
## 395  -0.1466602783  1.314126e+00
## 396  -0.0846132860  4.149349e-01
## 397  -0.1026144478  9.942496e-01
## 398   0.2507229708 -3.485726e-01
## 399   0.4673190456 -2.105340e-01
## 400   0.3861846846  4.301987e-01
## 401   0.6458259900 -1.654953e+00
## 402   0.4592817097 -4.595180e-01
## 403   0.3119867900 -3.395132e-01
## 404   0.1921310311 -1.202680e+00
## 405   0.1458178731  1.541053e+00
## 406   0.6108485957 -3.172727e-01
## 407   0.8546647380 -3.715555e-01
## 408   0.4308738272  3.866885e-01
## 409   0.7362527656 -3.658617e-01
## 410   0.2286321127  1.082466e+00
## 411   0.2443260231  1.447848e+00
## 412   0.1561927864  9.325791e-01
## 413   0.8643815403  4.012285e-01
```

```
## 414   0.7753168810  4.430904e-01
## 415   0.3860594361 -4.218227e-01
## 416   0.1135497612 -3.931370e+00
## 417   1.3986181359 -4.177406e-01
## 418   0.4856496461  3.610431e-02
## 419   0.9697890195  7.745531e-01
## 420   0.3732120096  1.152105e+00
## 421   0.9087797932 -7.631355e-01
## 422   0.7971477392  1.424251e-01
## 423   0.3642630337  5.960823e-01
## 424   0.3802775395  1.272462e+00
## 425   1.1394285178 -4.719991e-01
## 426   0.6771098594  1.164409e-01
## 427   1.0136459969 -7.959110e-03
## 428   1.1747658027 -1.873996e-01
## 429   0.6826980539 -4.446462e-01
## 430   0.6680955809  1.405962e-01
## 431   0.4280334037  2.516035e-01
## 432   0.4435703327  1.369626e+00
## 433   1.3480562127 -2.093009e-01
## 434   0.7874987883 -4.383027e-02
## 435   1.2672804704 -1.021237e+00
## 436   0.5765477477  2.182773e-01
## 437   0.7986530043  1.765654e+00
## 438   1.2292984593  3.617082e-02
## 439   1.1537887871  2.037923e-01
## 440   0.8611093325  6.901253e-02
## 441   1.2155527397 -5.183825e-02
## 442   1.4774956813 -1.715294e-02
## 443   1.0032379310  1.370343e-01
## 444   1.6491263574 -6.101347e-01
## 445   1.4070957956 -1.480054e+00
## 446   0.8435167283  1.154356e+00
## 447   0.8412323408 -4.901586e-01
## 448   0.9518526838 -3.182570e-01
## 449   1.3944087334 -1.596782e+00
## 450   1.3425266796 -2.218680e+00
## 451   0.9972716516  3.603999e-01
## 452   1.7729910668  8.360839e-02
## 453   1.1504993370  1.043539e+00
## 454   1.6022145110  6.757838e-02
## 455   1.6716130732 -5.890144e-01
## 456   0.8215958546  1.239017e+00
## 457   1.4328719069  7.937029e-02
## 458   0.8822813826  1.112593e+00
## 459   1.8334130743 -3.847411e-01
## 460   1.5120858303  3.516136e-01
## 461   2.0268386507 -2.991439e-01
## 462   1.5017068441  1.241750e+00
## 463   1.8295691776 -3.756948e-01
```

```
## 464   1.7583824055  1.257616e-01
## 465   1.8537766625 -8.824224e-02
## 466   1.7870977608 -1.491882e-01
## 467   1.4142720949  2.572127e-01
## 468   1.6962580489  1.214885e+00
## 469   2.3486412138 -2.725730e-01
## 470   2.1339650491  5.063112e-02
## 471   1.5741973813  7.110364e-01
## 472   1.7033739311  1.818880e-01
## 473   1.9911104134 -4.608421e-01
## 474   1.6900843049  4.283118e-01
## 475   2.1979489305 -2.247423e-01
## 476   2.5174113163 -5.542496e-01
## 477   1.8075437959 -6.844798e-01
## 478   2.0528413432  4.287282e-01
## 479   2.0844142537 -9.038289e-01
## 480   1.8344452730  1.219341e+00
## 481  -2.0855587161  2.531934e-01
## 482  -2.6920399499 -2.425709e+00
## 483  -2.0905743099 -5.753552e-01
## 484  -1.6015875604 -1.793948e-01
## 485  -1.8891877835  6.853942e-02
## 486  -2.3615982552  3.399325e-01
## 487  -1.9358797616 -4.575927e-01
## 488  -2.2360271274  8.394600e-01
## 489  -1.7044872301 -1.745710e+00
## 490  -1.7799556719  4.912227e-01
## 491  -2.0530849799 -1.274149e+00
## 492  -1.7565617842 -6.065987e-02
## 493  -2.1938750592  6.906884e-01
## 494  -1.2595272246 -7.514994e-01
## 495  -1.8969077731  9.230749e-01
## 496  -1.1706944205 -4.533254e-01
## 497  -1.6039929254  1.949791e-01
## 498  -1.7183047312  1.567267e-01
## 499  -1.9937529889 -3.330314e-01
## 500  -1.4275547028  2.749709e-01
## 501  -1.9024999835  9.822162e-01
## 502  -1.5490105749 -5.009233e-01
## 503  -1.5172759577 -1.825506e-01
## 504  -1.4347542601 -1.992490e-01
## 505  -1.4331412218 -7.953056e-02
## 506  -1.5586983298 -1.813371e+00
## 507  -1.3819236690 -1.998145e-01
## 508  -1.8816447106  8.636254e-01
## 509  -1.5272903109  5.066438e-01
## 510  -1.6966736864  9.008264e-01
## 511  -1.3010622914 -1.236671e+00
## 512  -0.5113318007 -7.569700e-01
## 513  -1.0979715503  7.775885e-01
```

```
## 514  -0.8886866538  1.932905e-01
## 515  -1.1556730934  8.965260e-01
## 516  -0.5862215561 -8.781025e-01
## 517  -1.0103596782 -1.338152e-01
## 518  -0.5175676050 -6.803073e-01
## 519  -1.0493295865  1.243994e-01
## 520  -0.4942471828 -9.987738e-01
## 521  -1.1429310848  1.543171e-01
## 522  -0.6774995841 -2.183573e-01
## 523  -0.5220845767 -5.269453e-01
## 524  -0.3751810316  4.156005e-01
## 525  -0.4807047325 -3.528742e-01
## 526  -0.7716906895 -5.884971e-01
## 527  -0.9323484455  5.898234e-01
## 528  -0.7917873092 -2.704267e+00
## 529  -0.0317140678 -1.618801e+00
## 530  -0.2222748071 -5.309547e-02
## 531   0.0378244314  6.319096e-01
## 532  -1.6576779322  2.185144e-01
## 533  -2.0724532134 -1.284321e-01
## 534  -2.0962042200 -7.935383e-01
## 535  -1.8501717530 -1.117820e-01
## 536  -1.9664088188 -1.154682e+00
## 537  -1.5513798022 -8.033812e-01
## 538  -1.7412617927  3.686711e-01
## 539  -1.8032641523  7.733962e-01
## 540  -1.2318877416 -1.118808e+00
## 541  -1.4194879435  7.103436e-01
## 542  -1.3630564397 -2.522889e-02
## 543  -1.5382879506  6.492283e-01
## 544  -1.6837738120 -7.578229e-01
## 545  -0.3045556771 -7.563940e-01
## 546  -1.0077759742 -1.132935e-01
## 547  -0.9220687588 -2.927095e-01
## 548  -1.1508965997  5.909257e-01
## 549  -0.0595537975 -8.423505e-01
## 550  -0.8622003756  1.821806e-01
## 551  -0.9438992531  7.312549e-01
## 552  -0.8380810252  2.181491e-01
## 553  -0.2664303449 -9.836927e-01
## 554  -0.5863402261 -4.634424e-01
## 555  -0.6822658815 -6.049403e-01
## 556  -0.5890075484 -3.141827e-01
## 557  -0.7703229434 -1.028048e+00
## 558  -0.6800817083  1.300931e-02
## 559  -0.2647988085 -9.132322e-01
## 560  -0.5468783845  6.037467e-01
## 561   0.0340321740 -6.007653e-01
## 562  -0.3608177562  1.760155e-01
## 563   0.0989875339 -1.214403e+00
```

```
## 564  -0.2907612487 -1.692651e-01
## 565  -0.1518891314 -9.811003e-02
## 566  -0.1669284179  2.019874e-01
## 567  -0.0593132050 -5.051348e-01
## 568   0.2829856757 -5.734355e-01
## 569  -0.3954906310 -7.966557e-01
## 570  -0.3272216476 -1.144752e-01
## 571  -0.4757414272  3.641064e-01
## 572   0.2810364710 -8.648788e-01
## 573  -0.0939518438 -4.120873e-01
## 574   0.1109020796 -5.582163e-01
## 575  -0.0032513911 -6.618484e-02
## 576  -0.4852400786  4.953135e-01
## 577  -0.0390039236 -7.465746e-01
## 578   0.1549894587 -9.432434e-01
## 579  -0.0879368362 -6.769098e-01
## 580  -0.0965045219 -8.410627e-01
## 581   0.2223656906 -1.884953e+00
## 582  -0.0149369070 -5.950404e-01
## 583   0.1080757870 -5.689895e-01
## 584  -0.0218166463 -1.010494e+00
## 585   0.2868572207 -4.410276e-01
## 586  -0.1952917701  1.615929e-01
## 587   0.4604235368  1.600939e-01
## 588   0.0554212602  6.207906e-01
## 589   0.6154714893 -4.039586e-01
## 590   0.2725895207  2.264108e-01
## 591   0.2321269679  4.582508e-01
## 592   0.0994897296 -7.148093e-01
## 593   0.0600789474  6.455521e-01
## 594   0.2212642923 -2.248370e-01
## 595   0.3298669316  4.855787e-02
## 596   0.6591523881 -8.184520e-01
## 597   0.7673088091 -9.900358e-01
## 598   0.6774395177  9.391545e-02
## 599   0.4957271887 -2.214515e-01
## 600   0.3653992485 -5.377980e-01
## 601   0.8246018039 -5.388567e-01
## 602   0.5874955328 -8.666008e-01
## 603  -1.1383480705 -8.709896e-01
## 604  -1.6389190537 -6.898625e-01
## 605  -1.4435805293 -1.524616e-01
## 606  -1.7041610496  8.327000e-03
## 607  -1.4406054988 -4.422279e-01
## 608  -1.4651332349 -2.049848e-01
## 609  -1.4810965038 -3.474265e-01
## 610  -0.6974374492 -3.945375e-01
## 611  -1.0772589311  3.695827e-01
## 612  -1.1752066730 -8.037389e-02
## 613  -0.8556405656 -1.399687e-01
```

```
## 614  -1.2184956980  2.074173e-01
## 615  -1.0725520267 -2.049203e+00
## 616  -1.1040702859 -2.497912e-01
## 617  -0.7510904392 -1.402969e-01
## 618  -1.1021413925  2.098398e-01
## 619  -1.5900539289 -3.341644e+00
## 620  -0.9365728920  6.357111e-01
## 621  -0.3492888685 -6.412383e-01
## 622  -1.1842173526  9.269853e-01
## 623  -0.9788464486  2.183376e-01
## 624  -0.6763479807 -2.509614e-01
## 625  -1.1415735559  2.024904e-01
## 626  -0.9277177543 -1.508805e-01
## 627  -1.0484543098 -3.152157e-01
## 628  -0.9188267369  2.094763e-01
## 629  -0.8798988091  2.096185e-01
## 630  -0.6123280315 -2.593303e-01
## 631  -0.5771462606 -1.808072e-01
## 632  -0.9038964025 -8.508980e-03
## 633  -0.2729158447 -7.282297e-01
## 634  -0.8799262577 -2.890619e-01
## 635  -0.9400244373 -8.626180e-01
## 636  -1.1904987823  8.084185e-01
## 637  -0.6158711758 -1.318108e+00
## 638  -0.8149287705 -3.035591e-01
## 639  -0.4007699130 -1.512494e-01
## 640  -1.2726526849  3.928494e-01
## 641  -0.6144263579  1.822802e-01
## 642  -0.8147916284 -2.379295e-01
## 643  -0.5595703134  2.710948e-01
## 644  -1.2598880670  1.106070e+00
## 645  -0.4890544132  5.452739e-01
## 646  -0.5072399955 -1.367599e-01
## 647  -0.3934469700 -2.244841e-01
## 648  -0.5501437782 -2.206068e-01
## 649  -0.5350230860  2.404293e-01
## 650  -0.4133263153 -5.918370e-02
## 651  -0.9858173093 -5.527499e-01
## 652  -0.3960788028 -2.127208e-01
## 653  -0.7653387479  6.707774e-01
## 654  -0.6833132655  6.225756e-01
## 655  -0.7858999727  1.029988e+00
## 656  -0.1495996871 -4.397557e-01
## 657  -0.5372904541 -6.869059e-01
## 658  -0.3187637401 -1.314521e+00
## 659  -0.3831763237 -1.527042e+00
## 660  -0.3821340453 -3.474228e-01
## 661  -0.0470190337 -7.317079e-01
## 662  -0.2015921833 -9.407738e-01
## 663   0.5387334272 -5.317880e-01
```

```
## 664   0.3590917948  1.693944e-02
## 665  -0.1334242572  8.260171e-01
## 666   0.8215012828 -9.032199e-01
## 667   0.9781475116 -4.991336e-01
## 668  -0.6683278871  1.168915e+00
## 669  -0.3943600504 -2.609868e-01
## 670   0.0704035639  6.057949e-02
## 671  -0.6619562969 -1.608691e-01
## 672  -0.2086086809 -6.481227e-01
## 673  -0.3926637083  1.718120e-01
## 674  -0.1050956637  4.618779e-01
## 675  -0.2895334210 -5.700529e-01
## 676  -0.2823698587 -1.401251e+00
## 677  -0.7014984988  1.265495e+00
## 678   0.1897231710 -6.532422e-02
## 679   0.3815129404 -5.930304e-02
## 680  -0.3609785320 -3.510182e-01
## 681   0.3782482753  1.522765e-01
## 682  -0.2722020775  1.334274e+00
## 683   0.2798165183 -7.745098e-01
## 684   0.0428073237 -2.856394e-02
## 685  -0.0075851847 -4.338505e-01
## 686   0.2708348203  1.807043e-01
## 687   0.5577181675 -7.603634e-03
## 688   0.6294940182  1.547496e-01
## 689   0.9928549701 -5.870735e-01
## 690   0.5991466298  1.537117e-01
## 691   0.9957015057  1.192695e-01
## 692   0.6926133629  3.533875e-01
## 693   0.8426330639 -3.047115e-01
## 694   1.0340241614  9.670738e-02
## 695   1.3182927007  1.765763e-01
## 696   0.7307750498 -8.112679e-01
## 697   1.3458976654  1.971176e-01
## 698   0.7013030211  1.342671e+00
## 699   1.3260827790  5.210357e-01
## 700   1.1783571412 -1.982170e-02
## 701   1.5345505747 -5.747384e-01
## 702   0.9190429693  6.133125e-01
## 703   1.3093607115  6.405123e-02
## 704   1.5333281263  9.120066e-02
## 705   1.1666610403  1.521097e+00
## 706   0.2446646836 -1.134318e+01
## 707   1.6900263448 -3.013077e-01
## 708   1.9168318225 -3.305237e-01
## 709   1.3879616295 -7.880434e-01
## 710   1.5919759175  2.913555e-01
## 711   1.9852820471  2.833630e-01
## 712   2.3472412303 -4.744241e-01
## 713   1.9431329183  4.489716e-01
```

```
## 714   0.3290141843 -1.943813e-01
## 715  -0.1157940091  3.192769e-01
## 716  -0.2741201087  9.233484e-01
## 717  -0.2230698038 -6.958683e-01
## 718  -0.0415221706  5.161446e-01
## 719   0.4433340683 -1.903773e-01
## 720   0.0472915105 -6.736880e-02
## 721   0.2369837665 -3.989488e-01
## 722   0.5336225001 -5.330542e-01
## 723   0.2286195084  6.562138e-01
## 724   0.0707253484  7.658926e-01
## 725   0.5508324283 -2.781644e-01
## 726   0.7528386657 -3.010700e-01
## 727   0.5565437464  3.571271e-01
## 728   0.4932407971 -5.375943e-01
## 729   0.5138894147 -4.701663e-01
## 730   0.7514887458 -6.337400e-02
## 731   0.6580589836 -1.609374e-01
## 732   0.3123228594  8.752827e-01
## 733   0.7375777106  3.275824e-01
## 734   1.2413676749  2.744042e-01
## 735   0.8721771438  1.078610e-01
## 736   1.0337326066  1.717455e-01
## 737   1.3477033948 -7.954176e-01
## 738   1.0604428963 -4.615486e-01
## 739   1.5104226483  5.754034e-01
## 740   1.0926674098  7.014945e-01
## 741   1.3276409964 -1.286874e-02
## 742   1.2898265638  5.761128e-01
## 743   1.2274238726  8.827227e-01
## 744   1.5892077215 -3.708820e-01
## 745   1.7181904499 -8.385580e-02
## 746   1.5627761196  5.025627e-01
## 747   1.5976663744 -6.985809e-01
## 748   1.9887583401 -1.022362e+00
## 749   1.1888946754  7.176620e-01
## 750   1.3917335141 -3.704920e-01
## 751   1.0612627752  8.894734e-01
## 752   1.6410100591  4.107004e-01
## 753   1.8356405737 -8.476584e-01
## 754  -0.3831381822  1.840129e-01
## 755  -0.0505439837 -3.618707e-01
## 756  -0.2639187234 -9.307873e-01
## 757  -0.2475994683  1.323363e-01
## 758  -0.3293610926  4.235331e-01
## 759  -0.2791970095 -1.287200e+00
## 760  -0.7457632685  1.146561e+00
## 761  -0.7210053580  6.084017e-01
## 762  -0.0374822758 -4.455128e-01
## 763  -0.8074532530  1.201917e+00
```

```
## 764  -0.2891842778 -6.966921e-01
## 765  -0.4648439676 -1.550031e-01
## 766   0.0644018088 -4.202919e-01
## 767  -0.5794729434  8.310857e-01
## 768  -0.6542322381  1.094696e+00
## 769  -0.2937069887 -4.301574e-01
## 770   0.0787703405 -7.947232e-01
## 771  -0.3836136144 -2.821714e-01
## 772   0.0451219871 -2.901003e-01
## 773  -0.7048575193  5.352507e-01
## 774  -0.6096410381  5.378968e-01
## 775  -0.4953235320  5.911773e-01
## 776  -0.4124427314  7.570442e-01
## 777  -0.4845738118  6.462012e-01
## 778   0.0631173968  2.215399e-01
## 779  -0.0947302776 -2.521098e-01
## 780   0.1898169537  3.264101e-01
## 781  -0.3510005610  8.328897e-01
## 782   0.0057466737 -4.166901e-02
## 783   0.2050806414 -2.176152e-02
## 784   0.5021491636 -2.005881e-01
## 785   0.1648856217 -8.310783e-02
## 786  -0.4369391982  1.390276e-01
## 787   0.0126007222  6.739489e-02
## 788  -0.0399265712  6.730683e-01
## 789  -0.2965672278  4.810956e-01
## 790  -0.4573904262 -3.311870e-01
## 791   0.4043457793 -1.265417e-01
## 792  -0.5334322506  9.535742e-01
## 793   0.4660497082 -1.227952e-01
## 794  -0.0724697394 -2.848946e-01
## 795   0.3996175402 -1.711110e-01
## 796   0.5454569039 -3.136142e-01
## 797   0.0302046176 -3.444524e-01
## 798   0.1255821982 -4.207962e-02
## 799   0.3922396290 -5.348459e-01
## 800   0.1137277144  4.990329e-02
## 801   0.2229064896 -8.349538e-01
## 802   0.3589921012  2.748985e-01
## 803   0.2826787299  3.005226e-01
## 804  -0.2632417990  1.209313e+00
## 805  -0.0867098391  3.167660e-01
## 806   0.5796681493 -6.153992e-02
## 807  -0.1719165160  1.025354e+00
## 808   0.2667690161  8.276335e-02
## 809   0.2998878499  3.695075e-01
## 810  -0.0543905541  6.422739e-01
## 811   0.1025087656 -5.246999e-01
## 812   0.4532566765 -2.621677e-02
## 813   0.3466610241 -4.611394e-01
```

```
## 814   0.6096927552 -4.516162e-01
## 815   0.6370788794  1.389928e-01
## 816  -0.0508790801 -1.470176e+00
## 817  -0.2987714059 -3.616491e+00
## 818   0.0670424998  3.774828e-01
## 819   0.7148472400 -5.360622e-01
## 820   0.3877884690  2.569712e-01
## 821   0.4698280861 -1.476458e+00
## 822   0.1502250315  2.754505e-01
## 823   0.5567419000 -4.998731e-02
## 824   1.0634287601 -3.643808e-01
## 825   0.8689630831 -8.254503e-02
## 826   0.8746038189 -7.336276e-02
## 827   0.2194332135 -3.880059e-01
## 828   0.7664312454 -3.696915e-01
## 829   0.8378087449  2.276972e-01
## 830   0.1988718867  1.100630e+00
## 831   0.3961689134  2.206088e-01
## 832   0.8309507995 -3.484714e-01
## 833   0.6896270805  1.161380e-01
## 834   0.1984474354  2.908573e-01
## 835  -0.2902246750 -7.676391e+00
## 836   0.1914413669  1.167872e+00
## 837   0.9914076336 -4.027246e-01
## 838   0.9114347699  2.932084e-01
## 839   0.9093512396 -2.821133e-01
## 840   1.3467306602 -5.260614e-01
## 841   0.8466730392  3.890214e-01
## 842   1.0172555867 -4.841831e-01
## 843   0.4566206704  8.603781e-01
## 844   0.9722196713  3.205826e-01
## 845   1.1248810752 -1.456148e-01
## 846   1.3687887953  5.783446e-01
## 847   0.8729984737  1.102628e+00
## 848   1.2152314063  1.174461e-01
## 849   1.2384772433 -1.913690e+00
## 850   1.2405812933 -3.067802e-01
## 851   1.0604094255  1.997148e-02
## 852   1.4140200744  2.745195e-01
## 853   1.0779524839 -4.594559e-01
## 854   1.0018168925  1.074855e+00
## 855   1.5005264073  3.812120e-02
## 856   1.8772270318 -2.817384e-01
## 857   1.7028642875 -1.647099e+00
## 858   1.3310827829  2.057130e-01
## 859   1.8835989276 -2.517311e-01
## 860   1.5735993352  1.568894e-01
## 861   1.4675289940 -1.592800e-01
## 862   1.8319739032 -7.413500e-01
## 863   1.2319816155 -4.120192e-01
```

```
## 864  -1.6959069543  9.322259e-01
## 865  -0.9547897937 -1.971131e-01
## 866  -1.5360152330  2.481313e-01
## 867  -0.7235441443  1.640926e-01
## 868  -0.9003461528 -2.537772e-01
## 869  -1.0770006039 -2.880253e-01
## 870  -0.8376981052 -3.499167e-02
## 871  -1.0963280091 -9.283274e-01
## 872  -1.1384976206  1.681521e-01
## 873  -1.3221418578 -3.629355e-01
## 874  -1.1267824134 -9.635138e-02
## 875  -1.5897532101  8.703815e-01
## 876  -0.7725848086 -1.271118e-01
## 877  -0.7519194567 -7.885642e-01
## 878  -1.0843585757 -2.707700e-01
## 879  -0.6068401727 -2.660324e-01
## 880  -0.9702586860  2.689662e-01
## 881  -0.7942094675 -1.397804e-01
## 882  -0.4049798767 -9.691369e-01
## 883  -0.3512013101 -4.281127e-01
## 884  -0.7689228304 -5.029145e-02
## 885  -0.7690098262  3.200514e-01
## 886  -0.5819861647 -3.486003e-02
## 887  -0.7061224037  2.188551e-01
## 888  -0.8480688747  3.157761e-01
## 889  -0.5951604329 -4.517962e-01
## 890  -1.0724018712  8.489826e-01
## 891  -0.1137373426 -4.944113e-01
## 892  -0.3695404519 -1.123077e-01
## 893  -0.4908860825  6.748930e-01
## 894   0.0213001874 -5.180039e-01
## 895  -0.4601801774  1.430051e-01
## 896  -0.1172046464 -3.754174e-01
## 897  -0.4455795304  9.796086e-01
## 898  -0.0851196380  3.780784e-01
## 899  -0.3087736956  8.320227e-01
## 900  -0.6967456919  8.346953e-01
## 901  -0.3897582749  2.481394e-01
## 902   0.2001409622 -2.954786e-02
## 903   0.1024525829 -2.031828e-01
## 904  -0.1332641954  3.917137e-02
## 905   0.0537793492 -5.922484e-01
## 906   0.4783375157 -4.254717e-01
## 907   0.3125980367 -2.251710e-01
## 908   0.3072489866 -2.862528e-01
## 909  -0.0331349519  4.866041e-01
## 910   0.3920875680 -3.524351e-02
## 911   0.6490248249 -7.582330e-02
## 912   0.9835561687  7.536698e-02
## 913   0.5608919042 -4.493874e-01
```

```
## 914   0.3838869302 -1.430677e+00
## 915   0.6456604344 -1.228375e-01
## 916   0.9861817889 -1.615904e-01
## 917   0.6019187162  3.608569e-01
## 918   1.0954250347 -5.369921e-01
## 919   1.1929750048  4.273102e-02
## 920   1.4151975657  2.465386e-01
## 921   1.0784096938  2.744315e-02
## 922   1.3559270505 -1.047316e+00
## 923  -0.2170915821  3.159156e-01
## 924   0.2843144756  1.668628e-02
## 925  -1.8020626846 -1.097864e+01
## 926   0.0095053785  1.308228e+00
## 927   0.7805796427 -4.921968e-01
## 928   0.5936485058 -5.991662e-01
## 929   0.3996126880  1.874599e-01
## 930   0.2012774111  8.369374e-01
## 931   0.4529237656 -4.341398e-01
## 932  -0.0025155063  4.518489e-01
## 933   0.6272162963 -4.925758e-01
## 934   0.7996162664  2.064952e-01
## 935   0.5272550990  9.265532e-01
## 936   0.8731157814  2.328909e-01
## 937   1.1559215758  1.122047e-01
## 938   0.9052853825 -2.130353e-02
## 939   1.2920088186  2.923833e-01
## 940   0.9935242967  4.339443e-01
## 941   1.1315905887 -5.932521e-02
## 942   0.9119673683 -5.334575e-02
## 943   1.7155524618 -3.278667e-01
## 944   0.9093076540  1.440730e+00
## 945   0.8890578605  2.441247e-01
## 946   1.2616944991  4.895293e-01
## 947   1.0594983956  1.633811e-01
## 948   1.5974187683  2.643156e-01
## 949   1.7324341743 -1.257079e+00
## 950   1.9236465884 -2.855583e-01
## 951   0.8013601777  1.149930e+00
## 952   1.4092088214  7.396788e-01
## 953   1.8887995250 -1.602537e-01
## 954   1.7638620895 -3.374048e-01
## 955   1.8504167841 -4.161986e-01
## 956   1.6837234394  2.706426e-02
## 957   2.2094074340 -5.461948e-01
## 958   1.9601846471  5.271721e-03
## 959   1.9064098885  6.049445e-01
## 960   1.9049769190 -8.473210e-01
## 961   1.6896892681  1.464264e+00
## 962   2.2899065491 -3.663316e-01
## 963   2.0446882361  1.147444e-01
```

```
## 964   1.6695448955  7.043552e-01
## 965   1.8562108626  1.833533e-01
## 966   2.2380908193 -3.344061e-01
## 967   1.7629167273  1.078219e+00
## 968   2.2665696260 -5.691902e-01
## 969   2.1251821087  1.083157e-01
## 970   2.3225542443  1.899052e-01
## 971   2.0318665769  2.800533e-01
## 972   2.1652730286 -2.894297e-01
## 973   1.8844791442  5.781186e-01
## 974   2.5842966696 -6.279663e-01
## 975   2.0248607979 -1.227970e+00
## 976   2.1671241731 -1.260449e-01
## 977   2.3097154168  6.167100e-01
## 978   2.5136910840  2.924227e-01
## 979   2.3210352440 -2.811702e-01
## 980   2.1949277321 -4.683120e-01
## 981   2.6238417519 -5.401413e-01
## 982  -1.6191469893  1.072252e+00
## 983  -1.7475017757  7.650097e-01
## 984  -1.4419479456  1.298080e+00
## 985  -1.5015072649  5.095474e-01
## 986  -1.5926504248 -1.190575e+00
## 987  -1.3549410598  7.079785e-01
## 988  -1.7445485467  8.244250e-01
## 989  -1.1617765812 -5.540518e-01
## 990  -1.0008897288 -1.559375e-01
## 991  -1.5987243382  9.359658e-01
## 992  -0.8243647574 -6.125801e-01
## 993  -1.1390137780 -4.469781e-01
## 994  -0.7133871946 -6.106679e-01
## 995  -1.1295843487  2.120264e-01
## 996  -1.0876614385 -4.165625e-01
## 997  -0.8957072976 -4.138557e-03
## 998  -0.5088801740 -3.255191e-01
## 999  -0.2397850759 -6.934317e-02
## 1000 -0.6292023292 -1.102830e-01
## 1001 -0.4453488454  1.846922e-01
## 1002 -1.0316254238  1.132894e+00
## 1003 -0.4611505285 -1.626847e-01
## 1004 -0.9347858926 -1.626214e-01
## 1005 -0.9024309492  7.814277e-01
## 1006 -0.8281324582 -9.363835e-01
## 1007 -0.4914359688  1.236832e-01
## 1008 -0.7464714652  6.658087e-01
## 1009 -0.2957417559 -4.209263e-01
## 1010 -0.7792414206  9.479209e-01
## 1011 -0.4796888327 -2.192158e-01
## 1012 -0.7284215238  5.243736e-01
## 1013 -0.7143340221  9.509670e-01
```

```
## 1014 -0.6972168251  4.427967e-01
## 1015 -0.3742544403  7.821193e-01
## 1016 -0.4233582013 -6.775161e-01
## 1017  0.0025165791  1.600655e-02
## 1018 -0.4669186310 -1.057143e+00
## 1019 -0.4410569961 -1.281198e-02
## 1020  0.0486338711 -3.498364e-01
## 1021 -0.2490865550  4.991531e-03
## 1022 -0.2623308441 -2.644098e-02
## 1023  0.0036865712 -2.739707e-01
## 1024 -0.0078893491 -1.566269e-01
## 1025 -0.6439515715  4.424978e-01
## 1026  0.1057567106 -2.109315e-01
## 1027 -0.0084276552 -4.691374e-01
## 1028 -0.2951541673  6.886354e-01
## 1029  0.4801611012 -1.850520e-01
## 1030  0.5355276245 -6.739887e-01
## 1031  0.5226799597  1.414030e-01
## 1032  0.6152353302 -1.950503e-01
## 1033  0.0967902349  7.013272e-01
## 1034  0.7312709958 -5.239388e-01
## 1035 -0.0527047053  1.142190e+00
## 1036  0.6105392985  2.276773e-01
## 1037  0.7678701396 -1.480731e-01
## 1038  1.0481670295 -5.319648e-01
## 1039  0.8970378296 -6.725126e-01
## 1040  0.4687859522  4.632954e-01
## 1041  0.6367598919  5.653536e-01
## 1042  1.2164466373 -5.628884e-01
## 1043 -0.6934171234 -4.687076e-01
## 1044 -1.5865951996  6.263213e-01
## 1045 -1.6604573490  1.319029e+00
## 1046 -0.9256780145  3.628749e-01
## 1047 -1.3797591538  4.679308e-01
## 1048 -1.6338850594  8.268247e-01
## 1049 -1.4020269921  7.090486e-01
## 1050 -1.3953742347  1.246824e+00
## 1051 -0.5665396708 -2.025494e-02
## 1052 -1.0727618583  1.252518e+00
## 1053 -0.2859374678 -7.140485e-01
## 1054 -0.6506997551  3.638160e-01
## 1055 -0.7453342923 -1.184132e+00
## 1056 -0.6109899709  3.443993e-01
## 1057 -0.1796426438 -1.999323e-01
## 1058 -0.2678872252  2.010587e-01
## 1059  0.3657230211 -4.151164e-01
## 1060 -0.4260574641  9.888247e-01
## 1061  0.2530035548  6.412347e-01
## 1062  0.0838916365 -3.501524e-01
## 1063  0.0687841091  3.598402e-01
```

```
## 1064  0.1295705559  2.796795e-01
## 1065 -0.2941655552  2.040082e-01
## 1066 -0.1178512484  6.249258e-02
## 1067  0.4973105312 -7.564832e-01
## 1068  0.2881379051  7.238771e-01
## 1069  0.1359728616  2.095068e-01
## 1070  0.5156532870 -2.487359e-01
## 1071 -0.0142387281 -5.630498e-01
## 1072 -0.0649386066  3.951028e-01
## 1073 -0.0166994417  4.422419e-01
## 1074 -0.0904336749  1.115855e+00
## 1075  0.4174163651 -5.605798e-01
## 1076  0.8525144475  5.636900e-01
## 1077  0.5577103533  2.161251e-01
## 1078  0.5497838076  2.087986e-01
## 1079  1.2852274262 -5.647933e-01
## 1080  0.8784308892 -5.506169e-03
## 1081  0.8677632190 -7.908183e-01
## 1082  1.1038999483 -1.243844e+00
## 1083  0.4815545577  6.692595e-01
## 1084  1.2681983682 -6.750084e-01
## 1085  0.8315727092  9.708907e-02
## 1086  1.1151790929 -8.709329e-02
## 1087  1.1287769259 -2.238606e-02
## 1088  1.0335797697  5.918886e-01
## 1089  1.3078604943 -5.247382e-01
## 1090  1.4185682488  2.685478e-02
## 1091  1.5955111766  4.197369e-02
## 1092  1.0024246212  8.401676e-01
## 1093  0.6133802306  3.446967e-01
## 1094  1.2354018969  2.436093e-01
## 1095  1.5597208444 -4.339118e-01
## 1096  0.8066911284  1.746941e-01
## 1097  0.7622186795  6.972489e-01
## 1098  1.3782823072 -1.383104e-01
## 1099  0.9999808409 -3.841395e+00
## 1100 -1.2038669469 -1.362269e+00
## 1101 -0.9486912244  3.863717e-02
## 1102 -0.9886325827  1.611855e-01
## 1103 -0.4328399916 -1.143949e-01
## 1104 -0.4833075393 -5.170384e-02
## 1105 -0.0382119156 -1.017948e-01
## 1106 -0.1397457912 -1.681434e-02
## 1107 -0.7397903285  3.888509e-01
## 1108 -0.1857033574 -1.451034e-01
## 1109 -0.4205699813  1.955157e-01
## 1110 -0.3467801585 -8.920970e-01
## 1111 -0.2599476421  3.690860e-01
## 1112  1.6501674084  9.924658e+00
## 1113 -0.6012693178 -4.530645e-01
```

```
## 1114 -0.3559480145  3.157160e-01
## 1115 -0.4822021940 -6.983023e-02
## 1116 -0.7144651544  9.441459e-01
## 1117  0.0297291567 -5.161967e-01
## 1118  0.0091232070  9.061241e-01
## 1119 -0.2226150427  2.976439e-01
## 1120 -0.2996787193 -3.097384e-01
## 1121 -0.5335533597  1.003356e+00
## 1122 -0.0163203996 -2.499407e-01
## 1123  0.0642077194  2.651259e-01
## 1124  0.4157034185 -2.016016e-02
## 1125 -0.2235491339  8.920728e-01
## 1126  0.0201005542 -8.450086e-01
## 1127  0.0370772279  6.318323e-01
## 1128  0.5141597240 -8.118918e-01
## 1129  0.0710603209  5.445231e-01
## 1130  0.1516482793  2.865317e-01
## 1131  0.4645109237  4.488767e-02
## 1132  0.5580898998 -8.220023e-02
## 1133  0.0239097173  3.307996e-01
## 1134  0.0248575148 -2.041555e-01
## 1135 -0.2126718212  3.474360e-01
## 1136  0.0227903687  8.709206e-01
## 1137  0.5263644531  4.738518e-04
## 1138  0.6067099391 -5.419695e-01
## 1139  0.3639514567  2.529195e-01
## 1140  0.4899746802  6.625699e-01
## 1141  0.7580485258 -4.329294e-01
## 1142  0.6676633384 -2.331229e-01
## 1143  1.0723585629 -1.326748e-01
## 1144  0.7957182486 -1.659127e+00
## 1145  0.5172930871 -3.547444e-01
## 1146  0.8045055143 -3.541471e-02
## 1147  0.4914146276 -4.426985e-01
## 1148  0.4434601199  1.162965e+00
## 1149  0.5166532713  1.116861e+00
## 1150  0.3606225837  1.076839e+00
## 1151  1.1601666409 -7.456752e-01
## 1152  0.3146432542  4.055018e-01
## 1153  0.9323348661 -2.539472e-01
## 1154  0.8250356757  9.144386e-02
## 1155  0.7100667854 -4.592434e-01
## 1156  1.0023919847 -4.903476e-01
## 1157  1.2822115303 -8.983355e-01
## 1158  1.1501279377 -7.868539e-01
## 1159  1.3008199792  5.848418e-01
## 1160  1.7054031820 -5.594644e-01
## 1161  1.0801020325 -1.756053e+00
## 1162  1.1933360077 -4.249179e-01
## 1163  1.3410861886 -5.212366e-01
```

```
## 1164  1.2346828800  1.441535e-01
## 1165  0.9239510838  1.096526e+00
## 1166  1.5412652224  1.046003e-01
## 1167  1.3969874186 -2.845254e-01
## 1168  1.1728504621  1.195049e+00
## 1169  1.4309519632 -1.655779e-01
## 1170  1.6861591078 -7.890322e-01
## 1171  1.1173948732 -2.122968e-01
## 1172  1.8980280697 -9.533747e-01
## 1173  1.1698420229 -3.247034e-01
## 1174  1.1530149809 -1.037236e+00
## 1175  1.3629576368 -3.614476e-01
## 1176  1.8464656029 -1.091299e+00
## 1177  1.0214360809  7.185820e-01
## 1178  1.2965646722 -5.505261e-01
## 1179  1.1008483256 -1.014011e+00
## 1180  1.8210110410 -3.370063e-01
## 1181 -0.1267886549  4.526981e-01
## 1182  0.0407304663  3.680420e-01
## 1183 -0.5811935314  7.127417e-01
## 1184 -0.0812798006 -1.098640e-01
## 1185 -0.3674395371  5.238559e-01
## 1186  0.1078332043  2.947726e-01
## 1187  0.0259848191  4.670651e-01
## 1188  0.3274879437 -8.895889e-02
## 1189  0.2211247624 -3.895976e-02
## 1190  0.0267178630  1.035483e+00
## 1191  0.0435870325 -3.764668e-01
## 1192 -0.2944704958  9.444449e-01
## 1193 -0.0495884072  4.473321e-01
## 1194 -0.1231526891 -3.593752e-01
## 1195 -0.2237219690  1.988744e-01
## 1196 -0.3827434203  4.096998e-01
## 1197 -0.3812537855  1.272730e+00
## 1198  0.4275469733 -3.419979e-01
## 1199  0.2727278079 -3.994256e-01
## 1200 -0.1115398150  1.394862e-02
## 1201  0.5527029759 -1.849811e-01
## 1202 -0.1441566458  1.358885e+00
## 1203  0.0444824234 -2.065490e-01
## 1204 -0.0906255073  4.131735e-01
## 1205  0.3828229397  9.600447e-02
## 1206  0.1593499053 -4.381618e-01
## 1207 -0.1278836105 -3.628503e-01
## 1208  0.0126375715 -4.188586e-01
## 1209  0.6349331721 -5.003692e-01
## 1210 -0.3635680236  8.928203e-01
## 1211 -0.1781204713  2.011912e-01
## 1212 -0.0029603261  3.186557e-02
## 1213  0.4009000959  4.830957e-02
```

```
## 1214  0.0046877250  1.400296e+00
## 1215  0.3700555943  4.072763e-01
## 1216  0.1436063783  3.851960e-01
## 1217 -0.0005666394  1.077448e+00
## 1218 -0.1276256687  1.090592e+00
## 1219 -0.1353383227  1.053588e+00
## 1220  0.5797503435 -7.856862e-02
## 1221  0.7759855786 -7.392895e-02
## 1222  0.8748826306 -1.080584e-01
## 1223  0.7384543650 -8.254463e-01
## 1224  0.7989538514 -6.107040e-01
## 1225  0.4808713185  4.952837e-01
## 1226  0.4674363139  1.076731e+00
## 1227  0.3237332543  2.585378e-01
## 1228  0.5307220198  7.009197e-01
## 1229  0.1331157436  1.744061e-01
## 1230  0.8504935278  6.430285e-01
## 1231  0.9728281219 -5.219610e-02
## 1232  0.9303840197  1.509521e-01
## 1233  0.4876177309  2.583200e-01
## 1234  0.6596009474  9.881032e-02
## 1235 -0.1378819087 -3.578654e+00
## 1236  0.6077391716  6.592903e-03
## 1237  0.2557749382  1.093923e+00
## 1238  0.5734896041  2.396584e-01
## 1239  0.6844426696  9.488200e-01
## 1240  0.1720312217  1.003387e+00
## 1241  0.1952833898  9.776217e-01
## 1242  0.6016393372 -2.720534e-01
## 1243  1.0674825915 -2.548623e-01
## 1244  1.1021350273 -4.715023e-02
## 1245  0.7967940573  4.582704e-01
## 1246  0.4150935523  6.661762e-01
## 1247  1.0792604938 -4.181876e-01
## 1248  0.5866958684 -3.367241e-01
## 1249  0.8977473476  3.847947e-01
## 1250  1.3971967149 -8.717451e-01
## 1251  1.1602468386  4.132264e-02
## 1252  0.7032816304  1.154737e+00
## 1253  1.8357887261  3.649316e-02
## 1254  2.3498296511  6.585161e-01
## 1255  2.2909480692 -9.360474e-01
## 1256 -2.0633532585 -3.042593e-02
## 1257 -2.3816851263  7.378907e-01
## 1258 -2.1828838952 -4.939329e-02
## 1259 -1.5156144580  7.311717e-02
## 1260 -2.5990689272  1.241725e+00
## 1261 -2.5264220221 -1.283550e-01
## 1262 -2.1030061336  2.823814e-02
## 1263 -2.6215424902  8.092062e-01
```

```
## 1264 -1.8139887919  4.218765e-01
## 1265 -1.8832328394 -2.471171e-02
## 1266 -1.7463588427 -1.670956e+00
## 1267 -1.7271492894  1.917534e-01
## 1268 -1.7959410393 -8.603495e-01
## 1269 -2.4051703975  7.169311e-01
## 1270 -1.7066010760 -8.122769e-01
## 1271 -1.7735094698 -1.877662e-01
## 1272 -1.8314124732  8.189028e-01
## 1273 -1.9387758947  8.173916e-01
## 1274 -1.3986367264 -2.238584e-01
## 1275 -1.6408755224  1.553298e-01
## 1276 -1.7559771169 -7.942114e-01
## 1277 -1.7239149922  9.424731e-01
## 1278 -1.5347855877  1.918371e-01
## 1279 -2.0197578655  1.132052e+00
## 1280 -1.5690978908 -2.321632e-01
## 1281 -1.0076352572 -4.875677e-01
## 1282 -1.5644071774 -1.974164e-01
## 1283 -1.7188677059 -9.768057e-01
## 1284 -1.4844892779  1.027153e-01
## 1285 -1.4445633927 -4.168438e-01
## 1286 -1.5391917757 -1.345021e+00
## 1287 -1.5849057668  9.035105e-02
## 1288 -0.5353581212 -9.929848e-01
## 1289 -1.7839904998  1.206892e+00
## 1290 -1.1759132508  6.278625e-01
## 1291 -0.9200574176  1.742296e-01
## 1292 -1.7316756342  9.547818e-01
## 1293 -0.9542914788 -1.573037e+00
## 1294 -1.4614126906  2.514856e-01
## 1295 -0.5461724958 -5.811755e-01
## 1296 -0.5605505233 -6.957705e-01
## 1297 -0.6507425249 -2.755874e-01
## 1298 -1.1391452202 -4.314528e-01
## 1299 -1.1172657740  3.012763e-01
## 1300 -1.1749180883  2.453789e-02
## 1301 -0.9396152728  9.591041e-03
## 1302 -1.1412401072  5.711613e-01
## 1303 -1.0600588799 -3.915037e-01
## 1304 -0.4701197451 -3.674276e-01
## 1305 -1.0412357062 -7.097969e-01
## 1306 -0.8437355184 -1.799459e-01
## 1307 -0.5581085156 -7.860890e-01
## 1308 -0.5460376644 -1.256937e-01
## 1309 -0.7241805960  3.875136e-01
## 1310 -0.2504672410 -9.366474e-02
## 1311 -0.5087777550 -3.328157e-01
## 1312 -0.7446795101 -1.262045e-01
## 1313 -0.5130244248 -1.396347e+00
```

```
## 1314 -0.4987549083 -2.209790e-01
## 1315 -0.7586154134 -1.422426e-01
## 1316 -0.4492794097 -3.533974e-01
## 1317 -0.1891119291 -1.487717e-02
## 1318 -0.6931015117  4.337140e-01
## 1319 -0.3710294066  4.971181e-02
## 1320  0.1498168846 -9.596677e-01
## 1321  0.0047200312  4.121580e-01
## 1322  0.4953955477 -6.143660e-01
## 1323 -0.4193020396 -8.102709e-01
## 1324 -0.4309226686  9.390894e-01
## 1325 -0.1553793997  4.017050e-01
## 1326 -0.4668366871 -4.271527e-01
## 1327  0.5340685395 -2.342938e-01
## 1328  0.4472426775  1.070647e-01
## 1329  0.3682204117 -3.596034e-01
## 1330  0.3132134591  1.761433e-01
## 1331  0.1713411419  7.264586e-02
## 1332 -1.3129058977 -3.339121e-01
## 1333 -1.5446134340 -6.106746e-01
## 1334 -1.5912592723  2.710591e-01
## 1335 -1.5966582274  1.001778e+00
## 1336 -0.9412953197 -1.734699e+00
## 1337 -0.8626909897  2.483606e-01
## 1338 -1.1384214236  1.565348e-01
## 1339 -1.0937662493 -4.204815e-01
## 1340 -0.9014527468 -3.715918e-02
## 1341 -1.0508372412 -6.857097e-02
## 1342 -0.9286952584 -2.890948e-01
## 1343 -0.9305827486 -1.935447e-01
## 1344 -1.2633455337  8.418181e-01
## 1345 -0.4043498882 -2.608058e-01
## 1346 -0.8501055206 -1.272937e-02
## 1347 -0.7696305595 -4.221634e-02
## 1348 -0.5986256817  1.642358e-01
## 1349 -0.2966204298 -6.264432e-01
## 1350 -0.8903393288  4.521668e-01
## 1351 -0.1400671553 -7.530169e-01
## 1352 -0.5454698444 -8.399628e-02
## 1353 -0.6865790113  5.832742e-01
## 1354 -0.4985411735 -1.052644e+00
## 1355 -0.3333617454 -4.280650e-02
## 1356 -0.1893049868 -8.985945e-01
## 1357  0.0361276921 -1.840501e-01
## 1358 -0.1119274057  3.583553e-02
## 1359  0.0243186123 -6.224416e-01
## 1360 -0.4273868211 -9.461656e-01
## 1361 -0.3740304363  1.803067e-02
## 1362 -0.1214393702 -2.257781e+00
## 1363 -0.2770589867  7.361550e-02
```

```
## 1364 -0.0955514985 -2.367020e-01
## 1365 -0.3707480065  4.705901e-01
## 1366 -0.4512567435  3.823821e-02
## 1367 -0.6099215449  6.359522e-01
## 1368  0.2440060808 -1.607226e-01
## 1369 -0.2352154715  8.538205e-02
## 1370  0.2312475167  1.299744e-02
## 1371 -0.2301033265  1.104730e+00
## 1372 -0.3010079590  7.614365e-01
## 1373  0.4693324913 -2.475404e-01
## 1374  0.0348943884  1.873377e-01
## 1375 -0.0972717094  4.218954e-01
## 1376  0.2444773719  2.596868e-01
## 1377  0.8825512507 -7.860901e-01
## 1378  0.5300568917 -3.491521e-01
## 1379  0.3428302269  1.674753e-01
## 1380 -1.5809933063  2.199207e-01
## 1381 -0.9680287754 -3.057289e-01
## 1382 -0.7885636089 -4.971326e-01
## 1383 -1.2898034037  3.984592e-01
## 1384 -0.5996103784 -9.491412e-01
## 1385 -0.9316769590 -5.825013e-02
## 1386 -1.3983371867  1.186567e+00
## 1387 -0.7570132760 -4.798957e-01
## 1388 -1.2113513396 -4.167115e-01
## 1389 -1.1064326783  8.124233e-01
## 1390 -1.0690574131  5.299885e-01
## 1391 -1.1898343735  9.107205e-01
## 1392 -1.2785925848  9.666756e-01
## 1393 -0.5704643067 -9.361118e-01
## 1394 -0.4666008284  7.064511e-01
## 1395 -0.7222492111  9.957087e-01
## 1396 -0.5064675675 -1.109427e+00
## 1397 -0.3592300350  1.308835e-01
## 1398 -0.4281591074  3.224360e-03
## 1399 -0.2996891492 -5.032706e-01
## 1400 -0.1741792700 -7.695674e-01
## 1401  1.3876469859 -2.835444e-01
## 1402 -0.7248927289 -4.359202e-01
## 1403  1.6812465092  8.530183e-02
## 1404 -1.5461466808  9.875015e-02
## 1405 -0.6612857467 -3.264264e-01
## 1406  0.5923316828 -2.710012e-01
## 1407  0.3978656222  3.428787e-01
## 1408  0.1832827244 -7.239079e-01
## 1409  0.9838903626 -4.805814e-01
## 1410 -1.0955728106 -3.106331e-01
## 1411 -1.0018396741 -5.420135e-01
## 1412  1.0260639206 -3.393032e-01
## 1413 -0.2066717067  7.555242e-01
```

```
## 1414 -0.7620850643 -4.042939e-01
## 1415 -0.7935963653 -5.333439e-01
## 1416 -0.5227032411 -1.415392e-01
## 1417  0.3519070233 -1.385496e+00
## 1418 -0.4064326570  3.321263e-01
## 1419 -0.4072973514  5.588199e-01
## 1420 -0.4145179649  1.691927e-01
## 1421  0.1667004230 -4.622692e-01
## 1422 -2.0198557848 -1.995898e-01
## 1423 -0.8504525405 -6.030107e-01
## 1424  0.1425017083  2.938983e-01
## 1425  1.4810039050 -1.551110e-01
## 1426  0.2564015117  1.499616e-01
## 1427 -0.3515901217 -2.269004e-01
## 1428  0.4285163867 -1.240389e+00
## 1429  0.4847730869 -2.705199e-01
## 1430  0.1514935223  1.250142e-01
## 1431  1.5013108251 -8.075597e-01
## 1432  1.2350485532  2.203526e-01
## 1433  0.5606420398 -8.248244e-01
## 1434  1.2079419599  1.516877e+00
## 1435 -1.6362280713  8.766075e-01
## 1436  0.6884446574 -7.100139e-01
## 1437 -0.0680554123 -2.317314e-01
## 1438  0.2846964856  5.173938e-01
## 1439 -0.1336023790 -3.415632e-01
## 1440 -0.0886717225  8.611143e-02
## 1441  0.4536838699  2.736215e-01
## 1442  0.4309826826 -2.563123e-01
## 1443  0.5239366084 -3.991439e-01
## 1444  0.3082831297  2.261568e-01
## 1445  0.8101497225  1.092433e-01
## 1446 -1.5527928736 -1.088241e+00
## 1447  1.5967265135 -2.792078e-01
## 1448  2.5940750996  8.741465e-02
## 1449  1.8753103715 -9.917046e-01
## 1450 -0.7727647808 -1.981600e-01
## 1451 -0.9911139669 -1.118920e-01
## 1452  0.3856319798 -5.337578e-01
## 1453 -1.1061126375  5.061536e-03
## 1454 -0.9543017527  5.061222e-01
## 1455  0.0343054616  1.416885e-01
## 1456  0.2957949017  7.340086e-01
## 1457 -0.0245924461  4.828708e-02
## 1458  0.9245949712 -2.252402e+00
## 1459 -0.4075784785  2.541198e-01
## 1460 -1.4837268259 -5.632601e-01
## 1461 -0.6609437751 -5.604030e-01
## 1462 -1.0064552351  1.331789e-01
## 1463 -0.9686377329 -3.840053e-01
```

```
## 1464 -1.1751520393  6.422566e-01
## 1465  0.3636440893  2.794554e-02
## 1466 -0.8755674692 -1.572083e-01
## 1467 -0.4119420450  5.254410e-01
## 1468  0.5320518972 -6.062010e-02
## 1469 -0.9805184958 -4.418092e-01
## 1470 -0.0980893854  3.361762e-01
## 1471  0.8044304750 -1.481138e-03
## 1472  2.3828743780 -2.224189e-01
## 1473  0.2719448886  6.064222e-01
## 1474  0.6455459944  2.337014e-01
## 1475  1.3247805397  1.226359e+00
## 1476 -0.7243780925  1.969909e-01
## 1477 -1.6672479078  2.655427e-01
## 1478 -1.0779271750 -6.560586e-01
## 1479 -0.6618690483  1.086629e+00
## 1480 -0.6541294456  8.298589e-01
## 1481 -0.6311819723 -7.615020e-01
## 1482 -0.4887024162  9.078881e-01
## 1483  1.9787335831  2.899250e-01
## 1484 -0.2015953868 -1.100278e-01
## 1485 -0.1763198423 -1.266734e-01
## 1486 -0.5844066834  7.085650e-01
## 1487  0.2610078155 -8.380157e-02
## 1488 -0.5856988603  1.529332e-02
## 1489 -0.5904254253  3.201839e-01
## 1490 -0.0657337159  3.581873e-02
## 1491 -0.9285804993  7.921116e-02
## 1492  0.3364466051  2.236954e-01
## 1493  2.1073398532  9.896964e-02
## 1494  1.3344522983 -7.641575e-01
## 1495 -0.2667544919 -8.076501e-01
## 1496  1.6256507417 -8.163392e-01
## 1497 -0.8689337165  1.079899e+00
## 1498 -0.7815190646 -8.038040e-02
## 1499 -1.3186473854  9.821681e-01
## 1500  0.2785345290 -2.111235e+00
## 1501 -0.1350748575 -3.358828e-02
## 1502  1.5685018871 -7.737468e-01
## 1503 -0.8670557541  2.385741e-01
## 1504  0.3460905102 -3.980324e+00
## 1505 -0.1007995378 -1.099946e+00
## 1506  0.0650700290  1.230574e+00
## 1507 -0.4917049670  1.411847e-01
## 1508  0.4242931319 -5.139106e-02
## 1509 -0.4613393361 -3.461798e-01
## 1510  0.2040814786 -7.661857e-01
## 1511 -0.3928155288  3.643832e-01
## 1512 -0.8608235653 -2.160824e-02
## 1513  0.4350538872 -2.372743e-01
```

```
## 1514 -0.9867298659  1.638398e-01
## 1515 -0.5548328783 -3.649189e+00
## 1516  2.3699254660 -6.399947e-01
## 1517  1.4055310988 -4.771052e-01
## 1518 -1.5439847837 -4.149300e-01
## 1519  0.4499299618 -2.452765e-01
## 1520 -1.0397033751 -7.041104e-01
## 1521  1.3335753891 -3.554069e-01
## 1522  1.3838563768 -1.027985e+00
## 1523  1.5895003204 -7.330239e-01
## 1524 -1.5674840277  7.438517e-01
## 1525  0.9983508623 -7.823031e-01
## 1526  1.3029514600 -2.902807e-01
## 1527 -0.6279379530 -6.834374e-01
## 1528 -0.2935697626 -3.411307e-01
## 1529  0.3812191513 -1.333839e+00
## 1530  0.0068962572  3.965712e-01
## 1531  0.5139049245 -1.791951e-01
## 1532 -1.8369004072  4.625434e-02
## 1533  0.9808995487 -2.004923e-01
## 1534  0.9736493233  9.756821e-01
## 1535 -0.9242109142 -5.424199e-01
## 1536 -0.2364324788 -9.014408e-01
## 1537  0.5770288125  1.211358e+00
## 1538 -0.2508363366  1.080753e-01
## 1539  0.3777890541 -5.109005e-01
## 1540  0.4439994120 -8.407029e-01
## 1541  0.0004419363  2.815446e-01
## 1542 -1.4710430502  5.486460e-01
## 1543  0.6994438151 -4.725176e-01
## 1544  0.0836674663 -4.430394e-02
## 1545 -0.1000901397 -2.833730e-01
## 1546 -1.6682512789  4.883189e-01
## 1547  0.8631316023  5.938091e-02
## 1548  2.1637022870 -3.034815e-01
## 1549  2.2011191416  6.213520e-02
## 1550  2.4272528466  1.557281e-01
## 1551  1.6524473689  2.150729e-01
## 1552  0.2007022917  2.083397e-01
## 1553  1.2871065468 -5.111642e-01
## 1554  0.0207310350 -1.013430e+00
## 1555  1.5111414561  4.781331e-01
## 1556  0.6996437309  1.136178e+00
## 1557  0.3554573642  1.246646e-01
## 1558 -0.4435083230  1.858003e-01
## 1559 -0.4777882452  3.044779e-01
## 1560  2.3183784951 -4.830192e-01
## 1561  1.0490567279 -8.345872e-02
## 1562  2.3942285619 -7.419514e-01
## 1563 -0.6949612408 -2.693815e-01
```

```
## 1564  0.4576598793 -2.936948e-01
## 1565 -0.1048872094 -2.806587e-01
## 1566  1.0105268073 -7.120641e-01
## 1567 -0.1114096856  2.617731e-02
## 1568  0.2192908010  3.226631e-01
## 1569 -1.3464713040  1.300721e-01
## 1570  0.5150505733  1.047096e+00
## 1571  0.8523532303 -6.911293e-02
## 1572 -0.4616615660  1.082177e-01
## 1573 -0.2618728560 -3.056517e-01
## 1574 -0.3432243695  5.848774e-01
## 1575  0.2967490702  9.743639e-01
## 1576 -1.7727874655  4.683655e-01
## 1577  2.4658418271 -3.707485e-01
## 1578 -0.7591822742  9.865276e-01
## 1579 -1.7865400572  6.205462e-01
## 1580  0.7750913565 -4.504173e-01
## 1581  0.5340468944  1.423273e-01
## 1582 -0.1712982349  4.796577e-01
## 1583  0.0500891142 -8.292603e-01
## 1584  0.3536960945 -1.788650e+00
## 1585 -0.7927030419 -4.864192e-01
## 1586  0.9357605153 -7.136958e-01
## 1587 -0.4167409391  6.536648e-01
## 1588 -0.1222312720 -9.644569e-01
## 1589 -0.3683108846 -1.126760e-01
## 1590 -0.6826500750  6.935647e-01
## 1591  0.2580115763 -2.160166e+00
## 1592  1.3078483114 -1.466688e+00
## 1593  0.1500722816  2.773316e-01
## 1594  1.6017914551 -3.124259e-01
## 1595  0.1778226313 -2.294722e-01
## 1596 -0.0475310891 -6.660358e-02
## 1597 -0.3232110574  5.797800e-01
## 1598  0.2691067239 -3.818236e-01
## 1599  0.2511110427 -3.982807e-01
## 1600 -0.3878367135  7.254005e-02
## 1601 -1.4030588261  2.706368e-01
## 1602 -0.4805305518 -1.342346e-01
## 1603  1.0846454207  1.118030e+00
## 1604 -0.4153526709  8.030926e-01
## 1605 -0.2303232279 -6.227719e-01
## 1606 -0.5291864348 -6.145613e-01
## 1607  0.3883142735 -3.477028e-01
## 1608  0.0123420826  8.207062e-02
## 1609 -1.1792229738 -2.514408e-01
## 1610  0.8725068834 -7.708200e-02
## 1611  0.3746683238  1.088281e+00
## 1612  1.4230068947  2.607904e-01
## 1613 -0.7710585816  7.997975e-01
```

```
## 1614  0.8540437486 -1.500298e-01
## 1615  0.3736791146  6.257121e-02
## 1616 -0.4934223981  1.149853e+00
## 1617 -0.3884339514 -3.104707e-01
## 1618 -1.2078849853  6.858731e-03
## 1619 -0.5675007387  8.759667e-01
## 1620 -0.5511568109 -1.224611e+00
## 1621 -1.8226204002  9.073237e-01
## 1622  1.5932311698  9.294113e-02
## 1623 -0.8953888461 -6.126049e-02
## 1624  0.8498267080  6.279635e-01
## 1625 -1.3864444541  6.399064e-01
## 1626  0.0519037610 -1.754797e-02
## 1627 -0.5270153213  8.939148e-01
## 1628 -0.0063028920  5.534875e-01
## 1629  0.7894037515  3.667222e-01
## 1630 -1.1823131790  5.665305e-01
## 1631 -0.4419121150  2.708849e-01
## 1632 -0.2252471729 -3.290754e-01
## 1633 -1.0375428688 -2.368271e-01
## 1634 -0.3849008680  6.295192e-01
## 1635 -0.5080775114  1.073397e+00
## 1636  0.0164826519 -7.449659e-02
## 1637  1.0749917023 -9.723059e-01
## 1638 -0.3496527295  1.090482e-01
## 1639 -0.1664688430  4.759971e-01
## 1640 -0.2580112704  6.736172e-01
## 1641 -1.5837440503  1.137828e+00
## 1642 -0.0541706589 -8.049071e-01
## 1643 -0.4615384898  8.569448e-01
## 1644  0.7981879358 -9.720180e-01
## 1645 -0.9907524803 -1.597429e+00
## 1646  1.4422767765 -8.274561e-01
## 1647  1.6974182318 -9.813035e-01
## 1648 -1.0438715366  1.045149e-01
## 1649  0.2841835225  1.155337e-01
## 1650 -1.5254625624  6.119031e-01
## 1651  0.1771152036 -1.117625e+00
## 1652  0.6393273243 -1.038759e+00
## 1653  0.2162080896 -2.974339e-01
## 1654  0.6590745574 -1.211097e+00
## 1655 -0.4983528633  5.267413e-01
## 1656 -1.0400225641 -2.594266e-01
## 1657 -0.8986637786  5.249079e-01
## 1658  1.7573689573  6.661359e-01
## 1659  0.0301296850  5.568366e-02
## 1660  1.2456182577 -3.767453e-01
## 1661 -1.4173654314  9.538131e-02
## 1662  0.3650601117  9.371127e-02
## 1663 -0.8473335879  9.456835e-01
```

```
## 1664  0.1393349129  6.042044e-02
## 1665 -0.7973752738 -1.048988e-01
## 1666  2.1492953524  1.532211e-01
## 1667 -1.0176516112 -2.353903e-01
## 1668 -0.1711853603 -1.066903e+00
## 1669 -1.3659001236  8.586261e-01
## 1670 -0.2436165594  4.753421e-01
## 1671 -1.3334382715  9.870380e-01
## 1672 -1.0475385095  2.396359e-01
## 1673 -0.8532592438  2.174647e-01
## 1674  1.4845843025 -3.950543e-01
## 1675 -0.6106011929  8.693577e-01
## 1676 -0.3039693999 -4.922072e-02
## 1677 -0.8615372101  9.412400e-02
## 1678 -1.1843098264 -6.030344e-01
## 1679  1.2954983642 -3.721558e-01
## 1680  0.2388585596  2.827071e-01
## 1681  1.5154472628 -7.136427e-01
## 1682 -0.8368627392 -1.322995e-01
## 1683 -0.9490218116 -1.249806e+00
## 1684 -0.5120587200 -1.255927e+00
## 1685 -0.7304440810  5.253253e-02
## 1686  0.3113954611  1.187067e-01
## 1687 -0.4679493367 -3.790545e-01
## 1688 -1.0616463803  2.030547e-01
## 1689  0.7464382791 -5.385475e-01
## 1690 -0.1230489968 -9.563766e-01
## 1691  1.4140048512 -1.453505e-01
## 1692  0.5631035814 -1.387936e-01
## 1693  0.8803980223  2.532369e-01
## 1694  0.7862389962 -3.994684e-01
## 1695  0.2050734145 -3.160994e-01
## 1696 -0.5656443662  9.752680e-01
## 1697  0.1657656866  2.034849e-01
## 1698 -0.6785884016  2.878377e-01
## 1699  0.7840291916 -1.377760e+00
## 1700 -0.4043239991  7.158262e-01
## 1701  1.6080764191  2.318646e-01
## 1702 -1.1565730615  1.012725e+00
## 1703 -0.0024560463  4.430260e-01
## 1704 -1.0721970954 -4.900817e-01
## 1705 -1.1432681517 -4.006403e-01
## 1706 -0.7046890566 -4.355924e-01
## 1707 -0.6142904483 -1.784909e-02
## 1708  0.2110210286 -8.706465e-01
## 1709  0.0075242898  9.724944e-02
## 1710  0.8400414403 -1.075558e+00
## 1711  1.0004363021  4.961715e-02
## 1712 -0.9986094416 -4.879288e-01
## 1713  0.6798695098 -9.974697e-03
```

```
## 1714 -1.6670953536 -5.420862e-01
## 1715 -0.0430365165 -1.839925e+00
## 1716 -0.9113759396  1.276386e+00
## 1717 -1.5551915301  9.385095e-01
## 1718 -1.8678255592  8.862981e-01
## 1719  0.1376996580 -6.955641e-01
## 1720  0.8682392990  8.012860e-01
## 1721  0.2681278587  5.290390e-02
## 1722  0.7490180986  1.080355e+00
## 1723  0.4340357357 -1.113408e+00
## 1724 -1.9529658847  1.090978e-01
## 1725  0.0019364387 -2.617554e-01
## 1726  0.3904334818 -3.382839e-01
## 1727 -0.1452292057  5.530450e-01
## 1728 -0.6610890702  1.014070e+00
## 1729 -0.2933956755  2.836751e-01
## 1730 -1.2514723058 -3.740680e+00
## 1731 -1.9478603828 -1.479943e+00
## 1732  0.4945668134  4.342808e-02
## 1733  1.5230362319  9.980740e-01
## 1734 -1.5844404345 -5.115951e-01
## 1735 -0.5466400193 -1.147977e+00
## 1736 -0.5044623968  1.673939e-01
## 1737 -0.6824061599 -6.206015e-01
## 1738  0.8971808069 -4.132616e-01
## 1739  0.7709023080 -1.328473e+00
## 1740  1.3242590613 -9.819271e-01
## 1741 -0.1116138891  2.810177e-01
## 1742  0.6014363977  6.079088e-02
## 1743  0.0640064496  1.263563e+00
## 1744 -0.5608695794  1.892903e-01
## 1745 -0.6433505819  2.774250e-02
## 1746 -1.1755297406 -3.834279e-01
## 1747  0.3497285389  5.229990e-01
## 1748 -0.0106266461 -3.371983e-01
## 1749 -0.5559818169 -4.452765e-01
## 1750  0.2259695752  1.183388e-01
## 1751 -1.3185175597  6.771634e-01
## 1752  1.0119119993  2.243795e-01
## 1753  0.6234268830  2.715956e-01
## 1754 -1.3397773980 -3.196967e-01
## 1755  2.2406188795 -1.412496e-01
## 1756 -0.4693075492 -5.767043e-02
## 1757  0.8491142662  1.105979e+00
## 1758 -1.2887382084  6.691726e-01
## 1759 -0.9849201551 -1.195382e-01
## 1760 -0.9557327183  1.165857e-01
## 1761  0.2589375308  2.120210e-01
## 1762 -1.5173164093  6.607522e-01
## 1763  1.1852862236  1.841270e-01
```

```
## 1764 -1.1858522541 -1.431541e+00
## 1765 -0.7594767483 -5.542721e-01
## 1766 -0.2440844880  9.773753e-01
## 1767  1.5748505868 -1.586373e-01
## 1768 -0.3986984030  6.359253e-02
## 1769 -0.1561238862 -6.568159e-01
## 1770  1.9263676010  1.450446e-01
## 1771 -0.3404065548 -4.634540e-01
## 1772  0.5394566249 -9.389610e-01
## 1773  0.0368663620  9.384296e-01
## 1774  1.8129018420 -1.029731e+00
## 1775  0.0237386546  5.883860e-01
## 1776  0.2111589152  2.284281e-01
## 1777 -1.8301803244  1.772059e-01
## 1778 -0.9609399243 -7.334673e-02
## 1779 -1.0347219528  3.067800e-01
## 1780 -0.8669355119 -5.944704e-01
## 1781 -1.4382179552  3.725202e-01
## 1782  1.4663775565  7.308661e-03
## 1783  1.1807138206 -9.118639e-02
## 1784 -0.9910100342  6.438744e-01
## 1785  0.3433312899 -5.580823e-01
## 1786  0.1596307116  1.742095e-01
## 1787 -1.4083529997  6.150962e-01
## 1788  1.1568640204  8.184051e-01
## 1789 -0.8578599619  8.004485e-01
## 1790 -0.2918151844  7.771146e-01
## 1791  1.0664756757 -3.313626e-01
## 1792 -0.3653770178  3.268744e-01
## 1793  0.4510080291  1.178619e-01
## 1794 -0.8440998581  4.185719e-01
## 1795  0.9651479662 -2.870263e-01
## 1796  0.1000086302 -5.878546e-01
## 1797 -0.3864128758 -7.948938e-01
## 1798 -1.0154551246 -1.024506e-01
## 1799 -1.1494630529 -3.175682e-01
## 1800 -0.0821458289 -5.537669e-01
## 1801  0.5031461483 -3.431585e-01
## 1802 -0.4979698428 -8.315335e-01
## 1803 -0.6868528091  8.073638e-01
## 1804  1.1104410847  2.527938e-01
## 1805  1.6453982019 -2.001526e-01
## 1806  1.3006287349 -5.293572e-01
## 1807  0.2486181291 -2.320867e-02
## 1808 -1.7316095608  1.182333e-01
## 1809  0.2946372372 -1.444535e+00
## 1810 -0.3605580611  1.975035e-01
## 1811 -0.7939891141  9.265514e-01
## 1812  1.1212905555 -7.805460e-01
## 1813 -0.6321724399  6.946947e-01
```

```
## 1814  1.3026205827 -5.957857e-01
## 1815 -1.2205888313  9.083113e-01
## 1816 -0.1624875055 -2.706184e-01
## 1817  1.7573664866 -3.734934e-01
## 1818  1.4991683214 -1.611746e-01
## 1819 -0.2994316677  2.827493e-01
## 1820  0.0666079630  1.040468e+00
## 1821  1.0882005580 -1.862614e-01
## 1822 -1.3436372713 -2.043084e-01
## 1823 -2.0640561268 -1.220220e+00
## 1824 -0.7556581505 -2.658457e-01
## 1825 -0.1740818685 -5.387900e-01
## 1826 -0.1086763349 -5.312985e-01
## 1827 -1.3455945791  1.110769e+00
## 1828  1.9670633855 -2.507600e-01
## 1829 -0.2320577478  9.685228e-01
## 1830 -0.3698881893  3.303768e-02
## 1831 -0.2637883920  9.727856e-01
## 1832  0.0985337893  6.815964e-02
## 1833 -0.2473855033 -1.002665e-01
## 1834  0.3096322936  2.517407e-01
## 1835 -0.5609294279  7.453616e-01
## 1836 -0.4145639336 -8.837543e-02
## 1837 -0.0230533001 -9.817200e-02
## 1838 -0.2180818008 -5.775653e-01
## 1839 -0.8155672370 -4.348869e-01
## 1840 -0.7019726337  9.946098e-02
## 1841  0.6937627120  7.019545e-02
## 1842  0.4114271296 -2.723953e-01
## 1843 -0.6282872575 -8.095985e-01
## 1844 -1.2811370286  7.276766e-01
## 1845 -0.3023623835  4.673442e-01
## 1846 -0.2950813702  3.058960e-01
## 1847  0.9273580658 -5.613739e-01
## 1848  1.5152515388 -8.726738e-01
## 1849 -0.6184164768  6.444023e-01
## 1850 -0.1374597123 -8.259488e-01
## 1851  1.8481684030 -2.138487e-01
## 1852 -0.7926809555  3.148399e-01
## 1853  1.7758394826 -6.262925e-01
## 1854 -1.2346051468 -6.297230e-01
## 1855  0.8511381440  9.152076e-01
## 1856  0.0323286022 -3.128494e+00
## 1857 -0.7255127044 -6.459143e-02
## 1858 -0.4638408418  2.857695e-01
## 1859 -1.1687435773  7.481511e-01
## 1860  1.3614816411 -4.317009e-04
## 1861 -1.2271499690  9.117232e-01
## 1862 -0.6513990349  1.007693e+00
## 1863 -1.4638534155  2.100808e-01
```

```
## 1864 -0.3826296363  7.294207e-01
## 1865  1.4197734411 -1.328159e-01
## 1866 -0.5146265633 -1.030748e-01
## 1867 -0.8347384526  9.453143e-01
## 1868 -0.5824103713  6.108159e-01
## 1869 -0.6148943343 -5.780180e-01
## 1870  0.3962313051 -7.828525e-02
## 1871  1.7278199026 -3.647021e-01
## 1872 -1.5162244214  2.180107e-01
## 1873 -0.3329985188  9.255603e-01
## 1874  0.8836840221 -2.087524e+00
## 1875  1.6113500954 -9.768417e-02
## 1876  1.0014152298  8.343577e-01
## 1877 -0.9569006784  2.763690e-01
## 1878 -0.2834169780  2.759265e-01
## 1879 -0.3079774262 -4.151362e-01
## 1880 -0.3985876723 -1.958201e-01
## 1881 -0.7712902303  6.725621e-01
## 1882  1.1958911150 -2.297958e-01
## 1883 -0.4156153621 -6.093952e-01
## 1884  0.1986238086 -3.488248e-01
## 1885  1.0191714660 -1.198875e+00
## 1886 -0.5848929219 -5.425643e-01
## 1887  1.3159931224  1.289657e-01
## 1888  1.3504356969 -3.977585e-01
## 1889 -1.0384121202 -6.688902e-01
## 1890 -1.5340643772  1.077631e+00
## 1891  0.1533104887  1.180134e-01
## 1892 -1.0078691453 -4.207556e-02
## 1893  1.1019194927 -3.814652e-01
## 1894 -0.4519243142 -1.308186e+00
## 1895 -0.6342509417  2.114077e-01
## 1896  1.5616832908  4.862873e-04
## 1897  1.5914213245 -5.136219e-01
## 1898  0.2548305276 -4.786502e-01
## 1899 -1.2130144916  3.793123e-01
## 1900  0.9385377967  7.459891e-01
## 1901 -0.4574780910 -2.126408e-01
## 1902  1.1014060730 -4.899301e-01
## 1903 -0.4756318575 -8.415994e-02
## 1904  0.9572164301  3.095770e-01
## 1905 -0.1634107646  4.644399e-01
## 1906  1.6847705101 -1.490091e-01
## 1907  1.0825521385  2.671700e-01
## 1908 -0.0354663405 -9.867762e-01
## 1909 -1.0022211039  3.855327e-01
## 1910 -0.4869835276  7.858412e-01
## 1911 -1.2170840048  4.914985e-01
## 1912 -0.6746647362  1.026771e+00
## 1913  0.1734934130 -6.978656e-01
```

```
## 1914 -1.0821856709 -2.347709e-02
## 1915 -1.2610848628  7.880064e-01
## 1916  0.9439589703  9.703885e-01
## 1917 -0.7560257505 -1.096427e+00
## 1918  2.1843013021 -9.008207e-01
## 1919 -0.2767422052 -4.130265e-01
## 1920 -0.1317914896 -4.768631e-01
## 1921 -1.1336329842 -5.850064e-02
## 1922  0.7319879725  9.399844e-01
## 1923 -1.5645850390  7.373268e-01
## 1924  0.7859204827  6.081367e-01
## 1925 -0.6248180731 -1.978324e-01
## 1926  0.3576073758  7.285268e-01
## 1927 -0.6275634509  2.163453e-01
## 1928  1.7196479628 -7.644839e-01
## 1929  1.6808463877 -5.366880e-01
## 1930 -0.3796996081  2.348942e-01
## 1931  0.5807887146  3.009707e-01
## 1932  1.7392784000 -3.610921e-01
## 1933  0.9293923149  9.548742e-01
## 1934 -0.3803096317  6.745790e-01
## 1935 -0.7032552770  9.404709e-01
## 1936 -0.6325203077  2.258694e-01
## 1937 -0.2648426049 -6.254779e-01
## 1938  1.5220485126  5.763270e-01
## 1939  2.0014774844  5.698304e-01
## 1940 -0.8276881000  1.715928e-01
## 1941  2.0850848413  9.871359e+00
## 1942 -0.5987568415  2.384658e-01
## 1943 -0.9124119484  7.175472e-01
## 1944 -1.3515387972  5.148129e-01
## 1945 -0.1803260583  9.308211e-01
## 1946  1.6236651822  1.736349e-01
## 1947  0.3525069549 -9.200903e-01
## 1948 -0.3766120317  7.389560e-03
## 1949  0.1088152250 -2.180335e-01
## 1950 -1.1919170253  1.062398e+00
## 1951  0.2403505076  7.250916e-01
## 1952 -0.3467855935 -3.914581e-01
## 1953  0.4825715800 -4.989485e-01
## 1954 -0.8266913764  1.177399e+00
## 1955 -0.9699502035 -1.086980e+00
## 1956 -0.6963068392  1.314991e-01
## 1957  2.5751463266 -6.130168e-01
## 1958  0.1403914356  8.125928e-01
## 1959  0.2002018879 -5.978838e-01
## 1960  0.1776317673  9.539465e-01
## 1961  0.5965439373 -1.475531e-01
## 1962  1.4924031939  8.885941e-01
## 1963 -1.2701649035  3.450101e-01
```

```
## 1964 -1.5823073834  7.483080e-01
## 1965  0.9227107271  8.241032e-01
## 1966 -0.3585795948  6.031302e-01
## 1967 -0.2599175309 -2.729881e-01
## 1968  1.6479144570 -2.127308e-01
## 1969 -0.6581917375 -3.577946e-01
## 1970  0.5519517556  1.580764e-02
## 1971 -0.1290693917  1.291893e+00
## 1972  0.9658994922 -4.268249e-02
## 1973  0.8265107528 -2.159385e-01
## 1974  0.1183620772 -9.228488e-02
## 1975 -0.5100253774  6.535023e-01
## 1976  1.0536497003 -7.441708e-01
## 1977 -0.2294267695  1.873118e-03
## 1978  1.4391784927  7.565981e-01
## 1979 -0.5539559765  6.534972e-02
## 1980 -0.7817432036  1.310575e-03
## 1981  1.8443509584 -3.407726e-01
## 1982 -1.1100023479  1.088790e+00
## 1983 -0.4946245189 -1.509865e-01
## 1984  0.4018339160 -1.714854e-01
## 1985  0.4673911128 -6.269205e-01
## 1986 -0.6691020832  6.291253e-01
## 1987  0.0052152606 -5.324917e-01
## 1988  0.2428113401 -6.910959e-01
## 1989  0.0064176563 -2.530451e+00
## 1990 -1.3587419109  8.976052e-01
## 1991  2.2170921995  1.690928e-03
## 1992  0.0245891962 -2.461284e+00
## 1993 -1.4260488029  8.789240e-01
## 1994  1.3285846372  7.768607e-01
## 1995  0.3907106359  1.895510e-01
## 1996 -0.6499698245  1.164117e+00
## 1997 -0.1651138685 -2.836590e-02
## 1998 -0.2319517814 -4.170278e-01
## 1999  1.1514377628  1.012543e+00
## 2000 -2.2220313069  6.345832e-01
## 2001 -0.8676132833  7.267559e-01
## 2002 -0.3101529877  1.024428e+00
## 2003 -1.0073039665 -4.968884e-01
## 2004 -0.1176246843 -1.034707e+00
## 2005 -0.4889314761  4.842656e-02
## 2006  0.3197126970 -2.195600e-01
## 2007  0.0175158615 -4.401715e-01
## 2008  0.5620929693 -3.520450e-01
## 2009 -0.9404441132  3.076749e-01
## 2010 -0.3441149131 -6.279041e-01
## 2011  1.4362452306 -7.703088e-01
## 2012 -0.7202033302 -1.024485e-01
## 2013 -0.6368731034  5.950958e-01
```

```
## 2014  1.3501570518 -1.336701e-01
## 2015 -0.8028361105  8.519199e-01
## 2016 -0.2557058166  9.128193e-02
## 2017 -0.0627208026 -1.086005e-01
## 2018 -0.5324139916  7.683176e-01
## 2019  0.0723520830 -6.807202e-01
## 2020  0.9895780340  7.908123e-01
## 2021  0.6643437264 -3.104309e-01
## 2022  1.0907544379  1.212710e+00
## 2023 -0.3471058247  2.971133e-01
## 2024 -1.0782716592  3.376476e-01
## 2025  1.2303755965  8.099064e-01
## 2026 -0.6040532584  2.088018e-01
## 2027 -0.2044697656 -6.115964e-01
## 2028  0.0930634686  3.929786e-01
## 2029 -0.9890167927 -8.292115e-01
## 2030 -0.7330395077 -5.850610e-01
## 2031 -0.5045402854  6.410846e-01
## 2032  1.2698853175  1.187875e+00
## 2033 -0.1879533997 -7.334611e-01
## 2034 -0.4400551938  8.025212e-01
## 2035 -1.1201394183  1.112162e+00
## 2036  1.8210236714 -4.182544e-01
## 2037  0.8728492289 -2.446034e+00
## 2038  1.0435840654  4.392291e-01
## 2039 -1.8509084475 -1.249742e-01
## 2040  1.2871782528 -2.222599e-01
## 2041  0.6211822498 -7.910284e-02
## 2042  0.6537653268 -1.184242e+00
## 2043 -0.5735836091  7.279416e-02
## 2044  0.0091504042 -1.119087e-01
## 2045  0.0420252103 -6.132883e-03
## 2046  0.7001455584 -6.275772e-02
## 2047 -0.1309021392 -3.265203e-01
## 2048  1.8436719157 -3.434620e-01
## 2049 -0.2250321091 -3.460701e-02
## 2050  1.4413898089 -3.966672e-02
## 2051 -0.2810885274  5.622127e-01
## 2052  0.2353889688 -8.998999e-01
## 2053  0.8996416280 -2.015390e-01
## 2054 -1.7219123398  9.481192e-01
## 2055  1.3428267392 -1.183644e+00
## 2056 -0.4880032044  6.325638e-01
## 2057  0.4019807804 -3.511255e-01
## 2058  0.2488151190 -5.204568e-01
## 2059  0.4906800133  1.070825e-01
## 2060 -0.4202661653  6.987770e-01
## 2061 -0.7193490982  1.024080e+00
## 2062 -0.1612631296 -2.916912e+00
## 2063 -1.2173837387  6.729697e-01
```

```
## 2064  1.0930182318  1.254969e+00
## 2065 -0.5472389835  7.194396e-01
## 2066  0.7472029885 -6.729561e-01
## 2067 -0.2643307968  1.573575e-02
## 2068 -0.3651256111 -3.729274e-01
## 2069 -0.6531804269  9.528899e-01
## 2070  0.5885096055 -1.824417e-01
## 2071  0.3153160815 -4.252672e-01
## 2072 -0.7825166642  3.043195e-01
## 2073 -0.3249401096  9.029898e-01
## 2074 -0.3344562972 -4.314309e-01
## 2075 -0.0404642942 -6.406069e-01
## 2076  0.0068548941 -8.376845e-01
## 2077  0.2643246414  6.443151e-01
## 2078  0.5242854750 -1.118695e+00
## 2079 -0.4724883184 -4.032778e-01
## 2080  1.7360679327 -5.752296e-01
## 2081 -0.0786963108 -6.748141e-01
## 2082 -1.1408966563  1.005515e+00
## 2083 -0.0112524855 -4.476159e-01
## 2084 -0.8147238511 -7.386622e-02
## 2085 -0.3489562802  4.704804e-01
## 2086  0.8917504474 -1.033330e+00
## 2087 -1.5714177931  5.181380e-02
## 2088 -0.0941730547 -5.555712e-01
## 2089 -0.7986616859  3.777094e-01
## 2090  1.3542211051  7.134223e-01
## 2091 -0.6662421189  2.143473e-02
## 2092  1.1239233477 -1.285132e+00
## 2093  0.8302708410 -8.026721e-01
## 2094 -1.3913650739  2.102938e-01
## 2095  0.2147374094 -4.818128e-01
## 2096 -0.5541028319  6.370282e-01
## 2097 -0.3921315500  7.387745e-01
## 2098 -0.3996816019 -5.311051e-01
## 2099  0.3445287677  7.522863e-01
## 2100 -0.3285764110 -6.426854e-01
## 2101 -0.7241656328  2.099838e-01
## 2102  1.4648170611 -4.172819e-02
## 2103 -0.8109200751  2.827413e-01
## 2104 -0.8246383647 -5.335949e-01
## 2105 -0.6491548312  2.841605e-01
## 2106  0.2688991759 -3.655502e-01
## 2107  1.0442927054  6.244829e-01
## 2108  1.3998528962 -4.525605e-01
## 2109  0.1759122365  8.727827e-01
## 2110 -0.1151046391 -5.768927e-01
## 2111 -0.6003548829  1.136883e+00
## 2112  0.9052739400  7.832093e-01
## 2113  0.3997425426 -8.180157e-01
```

```
## 2114 -0.5356048664  9.125528e-01
## 2115 -0.6008184271  5.961181e-01
## 2116 -1.6917776211  3.974200e-01
## 2117 -0.1888809823 -2.497060e-01
## 2118 -0.4345168847 -6.284012e-02
## 2119  1.3525847988  1.894909e-01
## 2120 -0.2815012849 -8.090857e-02
## 2121  0.7595714952  7.564292e-01
## 2122 -0.1967253456 -5.094286e-01
## 2123 -1.0013085630  6.468658e-01
## 2124 -0.4805515013  4.594509e-01
## 2125 -0.6834166223  1.036664e+00
## 2126  2.0859903496  1.702346e-01
## 2127 -0.2923120450  1.031839e-01
## 2128  0.1728231484  6.430598e-02
## 2129 -0.4776886776 -2.987972e-01
## 2130  1.2814885763  5.899662e-02
## 2131 -0.5065308624 -2.859299e+00
## 2132 -0.3402186513 -9.689239e-02
## 2133 -1.0071487509 -6.746519e-01
## 2134  1.1379772237  9.422977e-01
## 2135  1.7315472527 -1.041242e+00
## 2136 -0.2397797193 -3.640236e-01
## 2137 -0.2830960748 -4.839727e-01
## 2138 -0.7300429300  3.802058e-01
## 2139 -0.1021598197  8.048021e-02
## 2140 -0.7502955761 -1.302569e-01
## 2141  0.1153370159 -1.598783e+00
## 2142  1.4418164944  6.836677e-02
## 2143  1.0744272177 -5.061994e-01
## 2144 -0.3733707581  7.589496e-01
## 2145  1.3490877284  9.812376e+00
## 2146 -0.5717192959 -4.724229e-02
## 2147  1.0025011630  8.567549e-01
## 2148 -0.3644958296  6.637312e-01
## 2149 -0.8007339866  6.122134e-01
## 2150 -0.1262456542  1.295233e-01
## 2151 -0.4655593183  9.726744e-02
## 2152 -0.5474543656 -5.402772e-01
## 2153  1.0913247642  1.529495e-01
## 2154  2.2266901898  1.717922e-01
## 2155 -0.4497944150  5.559776e-01
## 2156 -0.8589894432  8.909424e-01
## 2157  0.3314775874  4.966922e-01
## 2158  0.3976270360  2.508784e-01
## 2159  1.1943894688 -6.270075e-01
## 2160  0.4929055720  4.512693e-01
## 2161 -0.7769328453 -1.144670e+00
## 2162 -1.1690776044 -1.270948e+00
## 2163 -0.4327908771 -2.455411e-01
```

```
## 2164  0.2861842634 -4.063218e-01
## 2165  0.3283997763 -5.650206e-01
## 2166 -1.2121457434 -1.712548e-02
## 2167 -0.6730385206  6.536762e-01
## 2168  0.2418991513 -5.026671e-01
## 2169  3.6416041460  9.579585e+00
## 2170  0.0506686847 -3.667556e-01
## 2171  0.8015328749 -1.362256e+00
## 2172 -1.2718488716  9.601112e-01
## 2173 -0.3578219599 -1.892701e-01
## 2174  1.0658541275  7.810521e-01
## 2175 -0.0257719682  4.071636e-03
## 2176 -0.6283198599  4.940008e-02
## 2177 -0.7399709133 -4.852813e-01
## 2178 -0.2858402869 -6.608778e-01
## 2179 -0.8731778742 -4.111545e-01
## 2180 -0.2318128062  6.375017e-01
## 2181 -0.7219203990 -6.234751e-01
## 2182 -0.6625506909  9.063898e-01
## 2183  0.0187287316  2.371589e-02
## 2184  1.5433308653  3.902827e-02
## 2185 -1.0059703917  8.092618e-01
## 2186 -0.4844509276  9.382475e-01
## 2187  0.6792163462  1.532907e-02
## 2188 -0.2498130671  3.621740e-02
## 2189 -0.3438573296 -2.618014e-01
## 2190  1.2040339409  2.393503e-01
## 2191  0.2393119565 -5.683651e-01
## 2192  1.7510781462 -4.471851e-01
## 2193 -0.9511732299 -1.349812e+00
## 2194  0.0113050344 -6.620297e-01
## 2195 -0.3101955477 -8.314012e-01
## 2196 -1.0286530878  1.057518e-01
## 2197  0.0542766634  4.518271e-01
## 2198 -0.3740986431  7.775223e-01
## 2199 -0.5481376372  3.132644e-02
## 2200 -1.1009366715  6.970333e-01
## 2201  1.1618386139 -6.288303e-01
## 2202  1.2512550321 -5.532803e-01
## 2203 -1.0592494573  6.509454e-01
## 2204 -0.9227500815  1.142698e+00
## 2205 -0.3830208164  6.348008e-01
## 2206  0.9721785155  4.620150e-01
## 2207  1.0632650113  8.801872e-01
## 2208 -0.5857263203 -7.363810e-02
## 2209 -0.0101778624 -5.598883e-01
## 2210  0.1897823337  3.330071e-02
## 2211 -1.5578134267  6.261351e-01
## 2212 -0.3272782440 -5.690260e-01
## 2213 -0.6811831453  1.014034e+00
```

```
## 2214  0.1470788495 -3.957276e-01
## 2215  0.4410094085 -4.374709e-01
## 2216 -0.6201933852  7.030616e-01
## 2217 -0.4579857494  1.165009e-02
## 2218  1.5777832846 -2.894645e-01
## 2219  0.1705924125 -4.714461e-01
## 2220  0.3130479969 -4.887397e-01
## 2221  0.5291079487 -1.041882e+00
## 2222 -1.0780682490  2.856818e-01
## 2223 -1.1106069594  3.373464e-02
## 2224 -0.4621604423 -4.336273e-01
## 2225 -0.3618298817 -3.853238e-01
## 2226  1.6070343068 -2.046952e-01
## 2227 -1.1944053777  3.767716e-01
## 2228 -0.5856784832 -2.376543e+00
## 2229  1.9530537754 -3.922941e-01
## 2230 -0.2613538223 -2.411806e-01
## 2231 -0.5683867294 -7.904970e-02
## 2232  1.9030725696 -4.314414e-01
## 2233  0.6083352549  1.365505e-01
## 2234  1.2755415528  1.031594e-01
## 2235 -1.7113171233 -5.157449e+00
## 2236  1.3822206403  8.437473e-01
## 2237  0.0406925775 -7.636085e-01
## 2238  0.1969796633  4.751522e-01
## 2239 -0.1172468742 -3.843642e-01
## 2240  2.3136134896  2.078427e-01
## 2241 -1.5692335003 -4.489092e-01
## 2242 -0.6258793818  5.833002e-01
## 2243  0.1333197682 -9.123065e-01
## 2244  0.0626612187 -2.482968e-01
## 2245 -0.3841294813  6.442238e-01
## 2246 -0.8022560442  5.374286e-01
## 2247 -1.0644376009 -1.464624e+00
## 2248 -1.3362813902  5.705478e-02
## 2249  1.6109969058  1.478963e-01
## 2250 -0.3725434269  6.615986e-01
## 2251 -1.4052725456 -4.781606e-01
## 2252 -1.2309229220 -7.234991e-01
## 2253 -0.8849468416  4.465971e-01
## 2254  0.0593328068 -8.173326e-01
## 2255  0.4289104883 -4.565537e-01
## 2256 -1.3683809125  5.175756e-01
## 2257 -0.4756335661 -4.267255e-01
## 2258  1.6794932137 -5.152404e-01
## 2259 -0.7004668774  1.001354e+00
## 2260 -0.2326550101 -5.121896e-01
## 2261 -0.2498916292 -6.288206e-01
## 2262 -1.8088536693 -2.835850e-01
## 2263 -0.4845578162 -1.874329e-01
```

```
## 2264  2.1159179892 -6.841639e-01
## 2265 -1.1141949760 -1.010450e+00
## 2266 -0.5704154881  7.338683e-01
## 2267 -0.5889714177  8.637022e-01
## 2268 -1.5125308908  2.770765e-01
## 2269 -0.2172937914 -3.691987e-01
## 2270 -1.3415685164  1.019047e-01
## 2271  1.0353590835  1.420719e-01
## 2272 -0.7728643508  6.154098e-01
## 2273 -0.8914676285 -2.116376e-01
## 2274 -0.3987604037 -3.197907e-01
## 2275 -0.7095121727  5.291499e-01
## 2276 -1.1221244709 -4.997390e-02
## 2277  0.4401307271 -1.389904e-02
## 2278  0.2817401925 -3.326536e-01
## 2279 -1.1451787191 -1.863191e-01
## 2280  1.9587545883 -7.923219e-01
## 2281 -0.3816653950 -8.010618e-01
## 2282 -0.7457514960  1.056627e+00
## 2283 -0.5576750781  4.040733e-01
## 2284 -0.6848878169 -4.303563e-01
## 2285  0.3917552683  6.475505e-01
## 2286  0.6027988713  8.032787e-01
## 2287 -0.6870346822  6.528329e-01
## 2288 -1.2124527957  9.777603e-02
## 2289 -0.2820030734  4.634684e-02
## 2290 -1.1046547777  1.463736e-01
## 2291 -1.1580731057  3.456267e-01
## 2292 -0.8166061377  4.196443e-01
## 2293 -0.2621196174 -5.069633e-01
## 2294 -1.3747699093 -9.106277e-02
## 2295 -0.3633105112 -1.679654e+00
## 2296 -0.8520496677  1.103493e-01
## 2297 -0.6254336269  1.467569e-01
## 2298  1.6235858810  6.894169e-01
## 2299  0.1481476906 -3.978964e-01
## 2300 -0.4978257521 -6.109038e-02
## 2301 -1.0982920496  6.080319e-01
## 2302 -0.5329386153  2.356963e-01
## 2303  1.1275864813 -7.132126e-02
## 2304  0.0808500734 -2.309133e-01
## 2305 -0.6531289207  7.377951e-01
## 2306  2.7701365638 -4.370870e-01
## 2307  1.0843657184  7.093396e-01
## 2308  0.1183967293 -6.054173e-01
## 2309 -0.9565350648  7.810447e-01
## 2310 -0.2915394042 -9.248668e-01
## 2311 -0.6817196064 -2.154424e-01
## 2312  0.1360901169 -5.125027e-01
## 2313  0.7276618452  3.618620e-01
```

```
## 2314  1.4991915562 -2.497854e-01
## 2315 -0.0461307086 -6.363156e-01
## 2316  1.7071443747 -5.928426e-01
## 2317 -0.1454124262 -5.630482e-01
## 2318 -0.5537856041 -1.110254e+00
## 2319 -0.4082660186  3.128836e-01
## 2320  0.2120416672  5.026640e-01
## 2321 -1.1826176707  8.167756e-02
## 2322  1.3336370059  6.798709e-02
## 2323 -0.5206173951  1.233746e+00
## 2324  0.9572490131 -3.902940e-01
## 2325  1.9526322783  8.939557e-01
## 2326  1.7506492252 -8.453376e-01
## 2327  1.6814692386 -2.723412e-01
## 2328  1.2327277545  1.034715e+00
## 2329 -0.1823336694  7.710586e-01
## 2330 -0.3384865946  5.375916e-01
## 2331  0.9494107831  3.163993e-01
## 2332  1.1741815486  2.354010e-02
## 2333 -1.3104022104  1.128895e+00
## 2334  0.0838525372 -3.691887e-01
## 2335  0.8482973782 -4.382642e-01
## 2336 -0.2351298632 -1.076517e+00
## 2337 -0.2967868499  7.722366e-01
## 2338 -0.3386819635 -9.445855e-02
## 2339 -0.1651435460  1.009496e+00
## 2340  0.5344155130  3.391345e-01
## 2341 -0.5884788269  1.192705e+00
## 2342 -0.6949956417  6.147527e-01
## 2343  0.0684890260 -9.534904e-01
## 2344  0.9633704803 -4.657461e-01
## 2345  0.2834236558 -9.836283e-01
## 2346  0.8290984194  8.900224e-01
## 2347 -0.5242144225 -2.770978e-01
## 2348 -0.0299945036 -5.037894e-01
## 2349 -0.0450849751 -9.837691e-01
## 2350 -0.1747131301 -9.753818e-01
## 2351  0.6937762949 -7.841677e-01
## 2352 -0.3257699502  4.251237e-01
## 2353 -0.5933723249  1.245274e+00
## 2354  0.2283392198 -3.195752e-01
## 2355 -0.6977038766 -4.445967e-01
## 2356  0.7936730291 -2.398630e-01
## 2357 -1.5901044082  3.859047e-02
## 2358  0.7855212135 -5.461126e-01
## 2359  0.2034586109 -2.577633e-01
## 2360  1.0374838689  3.442969e-02
## 2361 -0.4749993003 -4.748309e-01
## 2362 -0.0393680049 -3.909616e-01
## 2363 -0.8016596290  8.878247e-01
```

```
## 2364 -0.8796385175  7.264003e-01
## 2365 -0.7135401887 -1.119589e+00
## 2366  1.5975322211 -2.619865e-01
## 2367 -0.6312197984  5.889697e-01
## 2368 -0.5123255366  7.327937e-01
## 2369  0.5958047681  1.032823e+01
## 2370  0.5456311175 -3.298348e-02
## 2371  0.1504133264  8.686541e-01
## 2372 -0.0124147644 -4.795074e-01
## 2373 -0.3210726816  5.686411e-01
## 2374  0.1955861559 -1.647693e-01
## 2375 -0.2650172088  2.055180e-01
## 2376 -0.9774703490  6.355755e-01
## 2377 -0.6835130506 -6.310439e-01
## 2378  1.3433968648  8.013768e-01
## 2379 -0.6326595831 -4.999495e-01
## 2380  1.3281365564  6.332352e-01
## 2381 -0.6156989105  4.522128e-01
## 2382 -0.8796879218  2.018112e-01
## 2383  0.2554592063 -1.139556e+00
## 2384  0.6516625707 -7.925136e-01
## 2385 -1.4690866556  6.136432e-01
## 2386 -0.3070673209 -2.291556e-01
## 2387  1.2342383129  2.892381e-01
## 2388  0.0920382993 -2.477538e-01
## 2389  0.2139427340 -2.684032e+00
## 2390  0.2877877457 -7.968034e-01
## 2391  1.0833283250 -4.178186e-01
## 2392 -1.2454356262  6.565170e-01
## 2393 -0.0546277296 -6.010859e-02
## 2394 -0.4628597194  1.347743e-01
## 2395  1.0896874706  2.252781e-01
## 2396  1.5656031565 -5.547487e-01
## 2397  0.3561578087 -9.037196e-01
## 2398 -0.5774242103 -2.777015e-01
## 2399 -0.3741752154  4.441366e-01
## 2400  0.8092334197 -2.664879e-01
## 2401 -0.7775115856  6.147778e-01
## 2402 -1.1619529474 -4.857707e-01
## 2403  0.7392177458 -6.459184e-01
## 2404 -0.8001424741  6.533778e-01
## 2405 -1.2237476894  3.437684e-01
## 2406 -0.2892089325  5.797599e-01
## 2407 -0.8692758077  5.632747e-01
## 2408  1.2580260584  5.085969e-01
## 2409 -1.3257821008 -3.133160e-01
## 2410 -0.3907791476 -1.550513e-02
## 2411  0.9048793193  4.272945e-01
## 2412  1.3617104151 -1.699266e-01
## 2413 -0.6503774298 -8.189041e-01
```

```
## 2414 -0.8768207943  5.554420e-02
## 2415  1.8788176254 -7.999346e-01
## 2416 -0.7577731815  8.585997e-01
## 2417  1.2196601888 -1.103843e+00
## 2418 -0.9176471950 -1.630278e-01
## 2419  0.9557518278  3.385356e-01
## 2420 -0.7610798375  6.010375e-01
## 2421 -1.3806199322  1.029909e-01
## 2422 -0.8721492689  1.191644e+00
## 2423  1.2984384223  7.217187e-02
## 2424 -0.1492819517  2.552202e-01
## 2425 -0.1446315099 -7.907951e-01
## 2426  0.2128829671 -1.707120e+00
## 2427  0.1725145862 -6.542933e-01
## 2428 -0.2268785595 -6.783076e-01
## 2429 -0.2633256269 -7.638047e-01
## 2430 -1.5338109508 -1.028703e+00
## 2431  1.9078702385 -2.337398e-01
## 2432  0.8511064691  6.781640e-01
## 2433 -0.4776804466 -3.801207e-01
## 2434 -0.8718819712 -1.808781e-01
## 2435  0.0484628674 -2.520428e-01
## 2436 -0.0730288291  8.238135e-01
## 2437  0.0234582316 -3.707765e-01
## 2438 -0.1101505795 -6.029617e-01
## 2439  1.2292254668  9.619168e-01
## 2440 -0.4976463362  9.999687e-01
## 2441 -0.9352411495  1.027146e+00
## 2442 -1.0293024914  4.570036e-01
## 2443  1.9083606267 -8.230376e-01
## 2444 -1.1511321826  5.372090e-01
## 2445 -0.1487095010 -4.670787e-01
## 2446  1.2845395252  7.355092e-01
## 2447  1.2268642080  7.282261e-01
## 2448  0.0493301525 -2.775202e-01
## 2449 -0.4894026063 -1.960746e-01
## 2450 -1.5517819528  3.819257e-01
## 2451 -0.8120595118 -1.281269e+00
## 2452 -1.5022453926  6.428367e-01
## 2453 -0.9936229440  6.546481e-01
## 2454  0.0226406213 -1.113490e+00
## 2455 -0.1113614438 -5.416181e-01
## 2456  1.4949162684  9.380901e-01
## 2457 -0.4173428944 -1.960238e-01
## 2458 -0.6572239160 -1.817290e-01
## 2459 -0.7311112299  9.625652e-01
## 2460 -1.5902489596  2.423505e-01
## 2461 -0.4961112573 -5.632448e-01
## 2462 -0.0626815018  1.903149e-02
## 2463 -0.3459633335 -3.263273e-02
```

```
## 2464 -0.2771879622  7.649251e-01
## 2465  0.9261842669  6.984872e-01
## 2466 -0.4669205762 -3.083776e+00
## 2467 -0.9871641448  5.164125e-01
## 2468  1.4078908231 -3.989208e-01
## 2469  1.4931903714 -6.204397e-01
## 2470 -0.3509239228 -9.793039e-01
## 2471 -0.9670847779 -6.042164e-01
## 2472 -0.5695121651  1.209977e+00
## 2473  0.4734206052  9.621839e-01
## 2474 -0.1712100866 -1.035306e-01
## 2475 -0.2615072415 -3.951234e-01
## 2476 -1.6074167568  1.335610e-01
## 2477  1.1493776411  3.011865e-01
## 2478 -0.4598483718 -4.754000e-01
## 2479 -0.2096606286  1.987700e-01
## 2480  0.3210069017  1.116502e-01
## 2481 -0.3619626558  1.056260e+00
## 2482  1.7392523073  4.669764e-02
## 2483 -1.1189033626 -5.501353e-01
## 2484  0.1426211234 -1.123149e+00
## 2485 -0.4752126486  1.189873e+00
## 2486  1.4892930968 -4.370241e-02
## 2487  0.3325320980 -2.454039e-01
## 2488  0.0251173080 -1.558275e+00
## 2489  0.2796565395  8.178182e-01
## 2490  1.4831047210 -4.753004e-01
## 2491 -0.2888482518  9.263724e-02
## 2492 -0.6966713758  7.545962e-01
## 2493  1.3584072387 -1.436841e+00
## 2494  1.3557853344 -1.020863e-01
## 2495 -0.1571354456 -4.439962e-01
## 2496  0.3383661111 -8.914910e-01
## 2497 -0.4983630050  9.775222e-01
## 2498  1.1167037198  5.455150e-01
## 2499 -0.1410240954  3.660108e-01
## 2500  0.4088583652 -2.209504e+00
## 2501 -1.2114951874 -2.917132e-01
## 2502 -0.3923200408  3.618578e-01
## 2503 -0.3452185997  7.823410e-01
## 2504 -0.5666012161  8.666934e-03
## 2505  1.7720181825  2.777902e-01
## 2506 -0.5315872505  9.951373e-01
## 2507  1.3757487869  1.040961e+00
## 2508 -0.3109227859 -4.289682e-01
## 2509  0.6081873688 -3.033063e-01
## 2510 -0.0599879503 -3.077376e-01
## 2511 -0.3308188190  1.495467e-01
## 2512 -0.5344255694  6.605075e-01
## 2513 -1.1630698805 -7.824656e-01
```

```
## 2514 -1.5483533596 -2.229620e-01
## 2515  0.0971817755 -8.199637e-01
## 2516 -0.2550165680  1.058922e-01
## 2517  1.7794672790  3.551121e-02
## 2518 -0.1724048156 -2.698917e-01
## 2519 -0.6273045395  4.113202e-01
## 2520  0.3549826832  1.120861e+00
## 2521 -1.3339242456  7.979213e-01
## 2522  0.4297212076 -1.916802e-01
## 2523 -0.2772562039  6.913692e-02
## 2524  1.7856037533 -6.341983e-01
## 2525 -1.2904917916  6.226609e-01
## 2526 -1.2196227535  3.345612e-01
## 2527 -0.8722430446  1.231463e+00
## 2528 -0.6786754607 -3.654296e-01
## 2529 -0.1343413799  2.391222e-01
## 2530 -0.5708129322 -4.594310e-01
## 2531 -0.3729528197 -9.593789e-01
## 2532  0.3718291713  8.863140e-01
## 2533 -1.3045354698  1.040992e+00
## 2534 -0.8803432575  1.484307e+00
## 2535 -1.9972362097 -4.370855e-01
## 2536 -0.3152539142 -3.321314e-01
## 2537 -1.2562068150  8.963226e-01
## 2538 -2.3196749950  1.783617e-01
## 2539  1.9388037220 -7.987221e-01
## 2540 -1.2006939254  9.813387e-01
## 2541  0.9875527239 -1.132257e+00
## 2542  0.3865710614  8.359700e-02
## 2543  1.7118482177 -9.249339e-01
## 2544 -0.6092623772  5.679164e-01
## 2545  0.9044085366 -1.645539e+00
## 2546 -0.2196584621 -8.297686e-01
## 2547 -0.3756593453  4.336870e-01
## 2548 -0.1186476190 -5.998780e-01
## 2549 -0.3763624582  6.398646e-01
## 2550 -0.4704968728  5.604062e-01
## 2551 -1.2633200819  1.439805e+00
## 2552 -0.0937945822 -7.919821e-01
## 2553 -0.7568481399  7.397538e-01
## 2554 -0.0228896018 -8.348986e-01
## 2555 -0.0894066527 -1.556154e+00
## 2556  0.1814077208 -5.187933e-01
## 2557  1.8646354099 -3.167583e-01
## 2558 -0.2998784385  4.756020e-01
## 2559 -0.5247169119  1.167454e+00
## 2560 -0.2103460506 -1.912803e+00
## 2561 -0.1678395534 -3.331907e-01
## 2562  1.0810151345 -3.538005e-01
## 2563 -1.2960297580  9.417066e-01
```

```
## 2564  2.2167613313 -1.729633e-01
## 2565 -0.2250910745 -6.684922e-01
## 2566 -1.1576473215 -1.201247e-01
## 2567 -0.8300191368 -1.052568e-01
## 2568  1.0672699753 -9.356291e-01
## 2569 -1.7788846163 -5.742602e-01
## 2570  1.5313375385  9.928828e-02
## 2571  0.8302565936  1.770857e-01
## 2572  2.1387681576  7.058689e-01
## 2573  0.4546402326 -1.356691e+00
## 2574 -0.8203158745 -4.491780e-01
## 2575 -0.5683693137 -5.060483e-01
## 2576 -1.9926770427  2.252132e-01
## 2577 -0.0643534607  6.250419e-01
## 2578  1.2566660491  6.527355e-01
## 2579 -0.4143643176 -5.108798e-01
## 2580 -1.0114143314  8.073412e-01
## 2581 -0.6730516172  1.002207e+00
## 2582  1.0514989443 -2.137319e-01
## 2583 -0.1044549697 -9.365797e-01
## 2584  0.1116381047  4.438746e-01
## 2585 -0.4056166429  1.899607e-01
## 2586 -0.3216492216  8.961500e-01
## 2587 -0.0580893976 -4.285549e-01
## 2588 -0.4596671036  7.896809e-01
## 2589  0.3825511695 -1.084755e+00
## 2590 -0.3254947559 -4.399274e-01
## 2591 -1.3060624253  9.793541e-01
## 2592  0.9496522518  3.343861e-01
## 2593  0.1164898750 -1.593480e-01
## 2594 -0.7672504673  3.578066e-01
## 2595  0.3610596280 -5.011904e-01
## 2596 -0.9971459206 -1.714546e-01
## 2597 -0.4133944342  2.330599e-01
## 2598  0.3891348523  8.656031e-02
## 2599 -0.9188041436  6.293224e-01
## 2600  1.7183824123  1.053590e+01
## 2601  1.9713617695 -6.776138e-01
## 2602 -0.7277553052  5.053275e-01
## 2603 -0.7372051037 -7.748808e-01
## 2604 -0.5028447667  8.150810e-01
## 2605 -0.5601103254 -9.161556e-01
## 2606 -0.2781703644 -5.593644e-01
## 2607 -0.4188543037  4.089187e-01
## 2608 -0.2426735906 -1.761077e-01
## 2609 -0.6001984306  6.824064e-01
## 2610 -0.0604717945 -8.910152e-01
## 2611  0.8698120992  4.171419e-01
## 2612 -0.4748569947 -5.342520e-01
## 2613 -0.4707054197  6.001261e-01
```

```
## 2614 -0.3603666436  4.204913e-02
## 2615 -0.7502660033  4.220842e-01
## 2616 -1.1802538346  3.517793e-01
## 2617  1.4615999013 -8.159449e-01
## 2618 -0.8131138525 -8.901566e-01
## 2619  0.3639403142 -3.213457e-01
## 2620 -0.5804912904 -4.339019e-02
## 2621  1.2327651079 -2.903434e-01
## 2622 -0.0900426133 -2.043045e-01
## 2623  1.4492205456 -2.526610e-01
## 2624 -0.1629700799 -6.244770e-02
## 2625 -0.4188594958 -1.055219e+00
## 2626  1.6115279880 -3.295214e-01
## 2627 -0.3388174371 -3.637853e-01
## 2628  0.0395127819 -1.145035e-01
## 2629 -0.7713562765  4.026166e-01
## 2630  1.6062697860  1.759973e-02
## 2631 -0.2291574505  6.477244e-01
## 2632  1.1077389508  1.038869e+00
## 2633 -0.5859717368  8.109968e-01
## 2634 -1.3872346239  3.253178e-01
## 2635 -0.4333301874 -1.214392e+00
## 2636 -1.4304820475  8.268721e-01
## 2637 -1.2590415652  8.247920e-01
## 2638  0.0939058086 -5.491416e-01
## 2639 -0.7240640053 -1.012014e-01
## 2640 -1.1459068267  2.100671e-01
## 2641 -0.3720849892  4.550591e-01
## 2642 -0.9371030732  3.991340e-01
## 2643  0.1212816049  6.243645e-01
## 2644 -0.4086524713  7.911067e-01
## 2645  1.0737233720  7.460493e-02
## 2646 -0.4123104700  7.859748e-01
## 2647 -0.3667473403  6.340903e-01
## 2648 -1.3144999974  7.148724e-01
## 2649 -0.6355716078  8.697061e-01
## 2650  1.6617173025  9.956898e+00
## 2651 -0.5680396217  2.803167e-01
## 2652  0.7546649102  9.400714e-01
## 2653 -0.8354288231 -1.982539e-02
## 2654 -1.4214056506  3.793016e-01
## 2655 -1.4744287813  8.176351e-01
## 2656 -0.7058844568  4.447995e-01
## 2657  0.5737310121  7.915989e-01
## 2658 -0.8450351752  2.312329e-01
## 2659 -0.1611001545 -2.402021e-01
## 2660  0.4646492172 -3.953965e-01
## 2661 -1.2029658306  2.179213e-01
## 2662  0.7123251574  1.079942e-01
## 2663  0.0030627806  2.458369e-01
```

```
## 2664  1.1866974993  2.119080e-01
## 2665  0.0012208541 -6.005917e-01
## 2666 -0.8148941863 -6.832366e-01
## 2667  0.2136400881  8.004763e-02
## 2668  1.2888805619 -4.233142e-01
## 2669 -0.9752160656  2.719879e-01
## 2670  0.9272657352  9.688139e-01
## 2671 -0.5493896646  1.081624e+00
## 2672  1.0947449344 -1.951242e-01
## 2673 -0.3822247444 -4.888028e-01
## 2674 -0.2722117691  2.366612e-01
## 2675 -0.3877646568 -7.887654e-01

#new values

#simple way of doing the whole process
##Since we have 4 columns that we are considering for factor analysis , we
are checking
#how will the variance be distributed across 4 factors and if we really need
4 factors
#for our analysis.
library(psych)

##
## Attaching package: 'psych'

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

## The following objects are masked from 'package:scales':
##
##     alpha, rescale

## The following objects are masked from 'package:ggplot2':
##
##     %+%, alpha

fit.pc <- principal(bank, nfactors=7, rotate="varimax")

fit.pc

## Principal Components Analysis
## Call: principal(r = bank, nfactors = 7, rotate = "varimax")
## Standardized loadings (pattern matrix) based upon correlation matrix
##             RC1   RC2   RC4   RC3   RC5   RC7   RC6   h2   u2 com
## age       -0.15 -0.81  0.05 -0.03  0.15  0.09  0.04 0.72 0.28 1.2
## job       -0.10  0.18  0.02 -0.02  0.09  0.48  0.27 0.35 0.65 2.1
## marital   -0.01  0.79 -0.02  0.09  0.20 -0.03  0.02 0.67 0.33 1.2
## education -0.18  0.51  0.03 -0.11 -0.17  0.29 -0.01 0.42 0.58 2.3
## default    0.08  0.07 -0.01 -0.14  0.28 -0.62  0.12 0.51 0.49 1.7
## balance    0.05 -0.09  0.06 -0.09  0.41  0.57 -0.06 0.53 0.47 2.0
```

```
## housing    0.68  0.04  0.00  0.05 -0.25 -0.12 -0.13 0.56 0.44 1.4
## loan       0.21 -0.16 -0.13  0.14 -0.53  0.04 -0.01 0.39 0.61 1.8
## contact    0.01 -0.25 -0.06  0.28  0.62  0.02 -0.06 0.53 0.47 1.8
## day       -0.05 -0.05 -0.08 -0.08  0.11  0.08  0.71 0.54 0.46 1.1
## month     -0.02 -0.02 -0.10 -0.10  0.16  0.07 -0.66 0.48 0.52 1.2
## duration   0.15 -0.06  0.85  0.02  0.02  0.04  0.01 0.75 0.25 1.1
## campaign   0.09  0.05 -0.11  0.70  0.12  0.03  0.05 0.53 0.47 1.2
## pdays      0.70 -0.01  0.17 -0.01  0.08 -0.10  0.05 0.54 0.46 1.2
## previous  -0.07 -0.01  0.08  0.75 -0.09 -0.01 -0.03 0.59 0.41 1.1
## poutcome  -0.72  0.00  0.22  0.03  0.03 -0.06 -0.01 0.57 0.43 1.2
## deposit   -0.47  0.03  0.68 -0.09  0.08  0.04  0.02 0.71 0.29 1.9
##
##                        RC1  RC2  RC4  RC3  RC5  RC7  RC6
## SS loadings           1.85 1.68 1.33 1.22 1.15 1.09 1.06
## Proportion Var        0.11 0.10 0.08 0.07 0.07 0.06 0.06
## Cumulative Var        0.11 0.21 0.29 0.36 0.43 0.49 0.55
## Proportion Explained  0.20 0.18 0.14 0.13 0.12 0.12 0.11
## Cumulative Proportion 0.20 0.38 0.52 0.65 0.77 0.89 1.00
##
## Mean item complexity =  1.5
## Test of the hypothesis that 7 components are sufficient.
##
## The root mean square of the residuals (RMSR) is  0.1
##  with the empirical chi square  6762.75  with prob <  0
##
## Fit based upon off diagonal values = 0.11
```

```
round(fit.pc$values, 7)
```

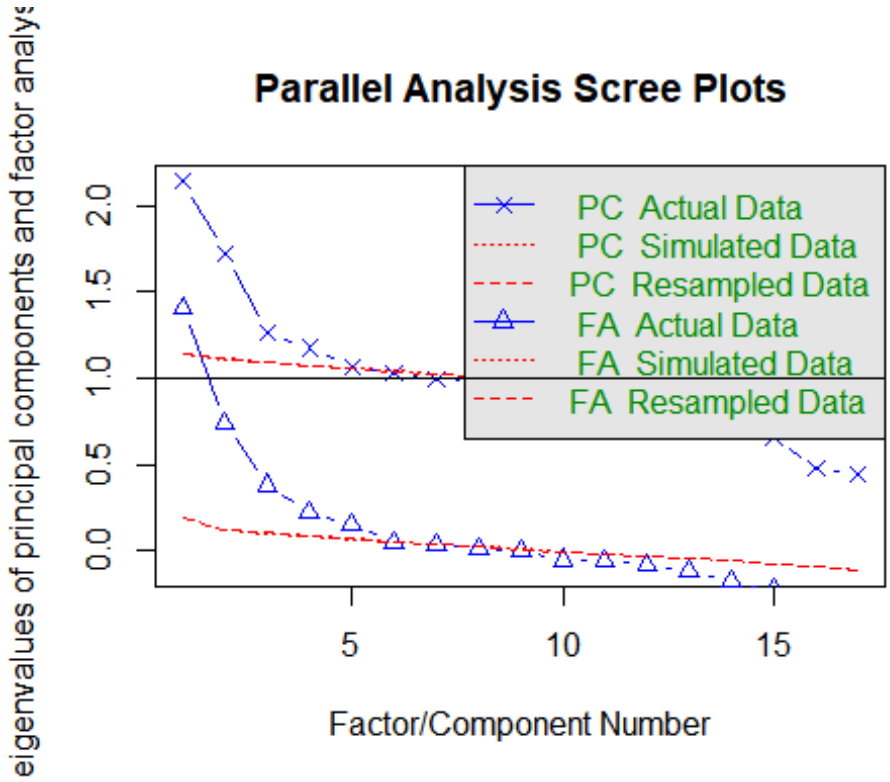
```
##  [1] 2.1417719 1.7221153 1.2608395 1.1766969 1.0648558 1.0271197 0.9894636
##  [8] 0.9856947 0.9672827 0.9127243 0.8930706 0.8260435 0.7434630 0.7222549
## [15] 0.6543682 0.4742054 0.4380301
```

```
fit.pc$loadings
```

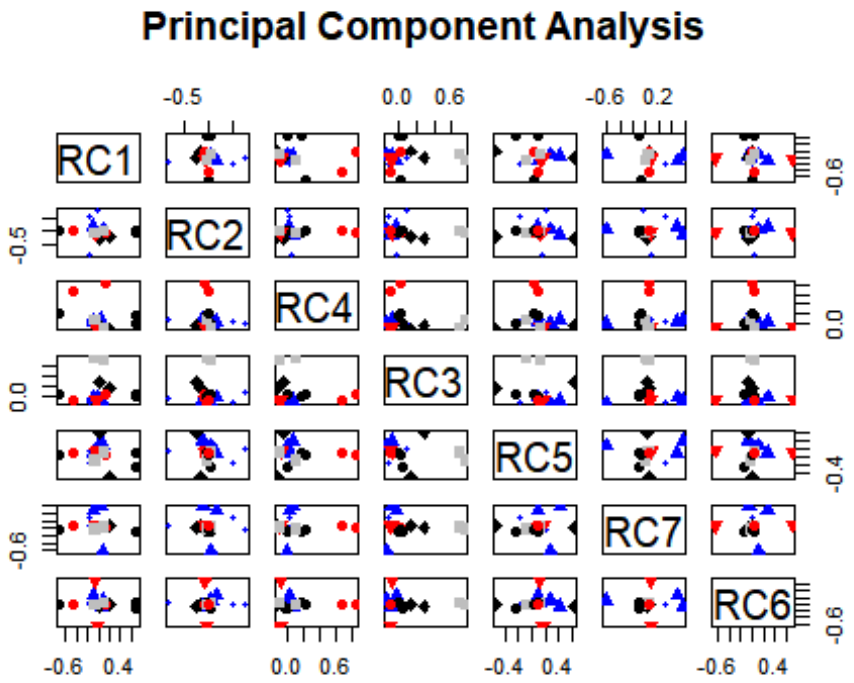
```
##
## Loadings:
##           RC1    RC2    RC4    RC3    RC5    RC7    RC6
## age       -0.149 -0.813                0.147
## job              0.181                       0.477  0.270
## marital          0.787                0.198
## education -0.184  0.508        -0.112 -0.171  0.292
## default                       -0.138  0.277 -0.623  0.120
## balance                              0.415  0.575
## housing    0.681                    -0.253 -0.118 -0.129
## loan       0.207 -0.159 -0.133  0.136 -0.528
## contact          -0.248         0.284  0.620
## day                                  0.114         0.712
## month                    -0.104         0.163        -0.657
## duration   0.147          0.848
## campaign                 -0.108  0.698  0.120
```

```
## pdays      0.700         0.171               -0.100
## previous                       0.751
## poutcome  -0.721         0.218
## deposit   -0.470         0.685
##
##                  RC1   RC2   RC4   RC3   RC5   RC7   RC6
## SS loadings    1.848 1.684 1.330 1.225 1.152 1.087 1.057
## Proportion Var 0.109 0.099 0.078 0.072 0.068 0.064 0.062
## Cumulative Var 0.109 0.208 0.286 0.358 0.426 0.490 0.552

# Loadings with more digits
for (i in c(1,3,2,4,5,6,7)) { print(fit.pc$loadings[[1,i]])}

## [1] -0.1486575
## [1] 0.04759217
## [1] -0.8126932
## [1] -0.0273079
## [1] 0.1472094
## [1] 0.09048169
## [1] 0.03678674

# Communalities
fit.pc$communality

##       age       job   marital education   default   balance   housing
loan
## 0.7167908 0.3513451 0.6685429 0.4202451 0.5104525 0.5268679 0.5617719
0.3852035
##   contact       day     month  duration  campaign     pdays  previous
poutcome
## 0.5346570 0.5441214 0.4831662 0.7476082 0.5270941 0.5392789 0.5859907
0.5725763
##   deposit
## 0.7071499

# Rotated factor scores, Notice the columns ordering: RC1, RC3, RC2, RC4,RC5,
RC6,RC7
head(fit.pc$scores)

##            RC1          RC2        RC4          RC3         RC5
RC7
## 1  0.473857434 -0.477518820  0.1640600  0.366859482  0.64611023 -
0.67947339
## 2  0.375621629 -0.278528442 -0.6941836  0.186922282  2.11944411
0.59586505
## 3 -0.772808420 -0.299877959  1.9256362 -0.526846463  0.07857867
0.52569519
## 4  1.272765909  0.008771825  2.2998699 -0.028017868  0.27628310
1.27048623
## 5 -0.004045125 -0.936079138  0.4545337 -0.004363662 -1.42806631
0.08005606
```

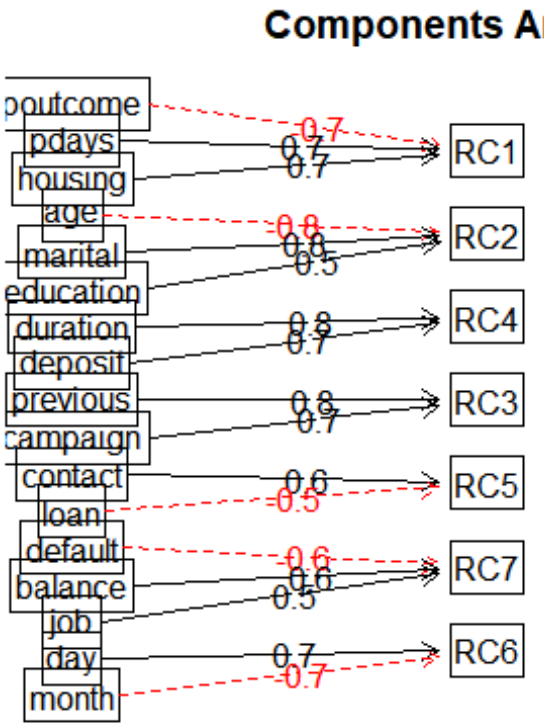
```
## 6  0.268348189  1.222318188  0.8987155 -0.902260305  0.03082845
0.13742552
##          RC6
## 1 -0.8351143
## 2 -0.4825180
## 3 -0.3467337
## 4 -0.1807446
## 5 -0.3904061
## 6 -0.5236567

# Play with FA utilities

#factor rotation only in 4 lines
fa.parallel(bank) # See factor recommendation
```

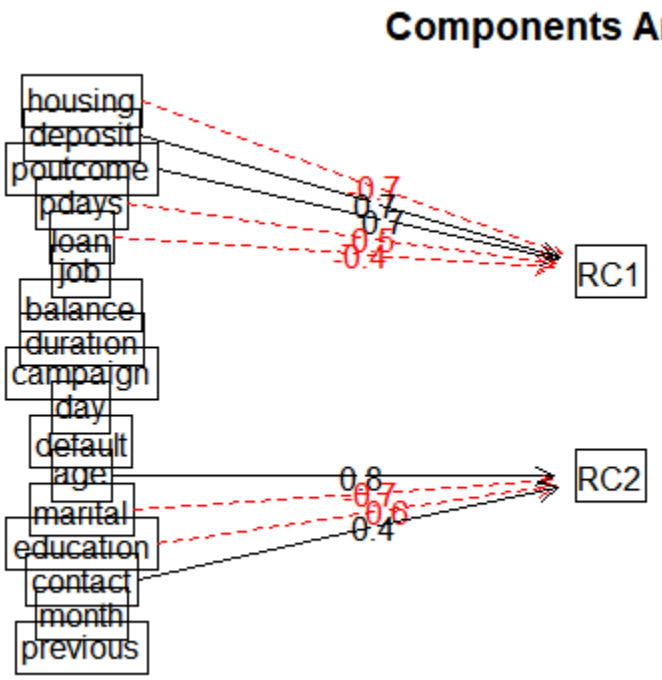



```
## Parallel analysis suggests that the number of factors =  5  and the number
of components =  4

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




```r
fa.diagram(fit.pc) # Visualize the relationship #to decide which rc to keep
look for communalities #so adding it it should be high communalities
```



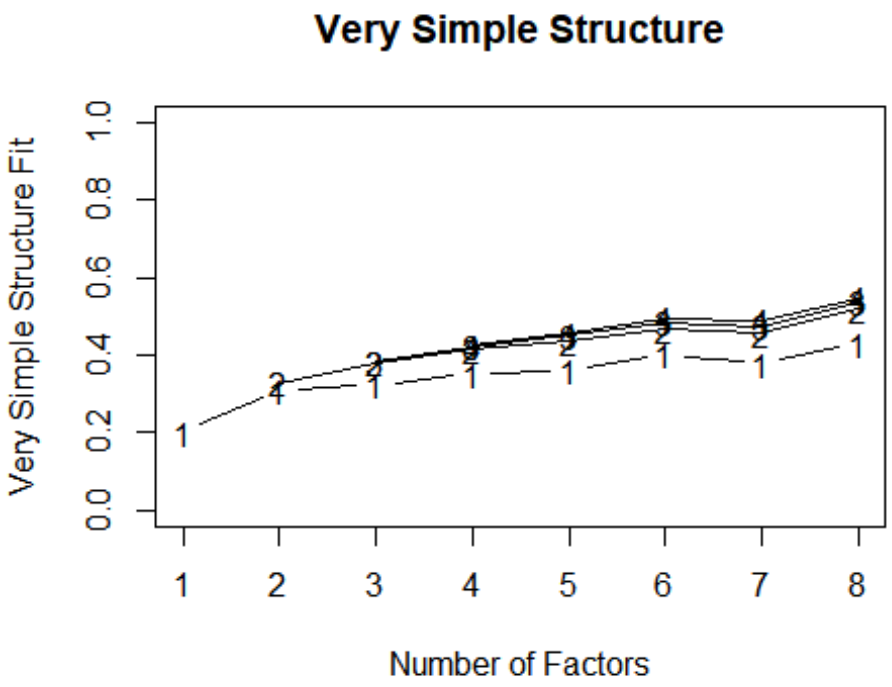


#For 2 factors plot is seen like this.

```
#We can see that the effective one is where there are 7 factors, this
contains most of the information in the dataset.
```

```
#The factors RC1 to RC7  can be helpful in analysing the entire dataset
```

```
vss(bank) # See Factor recommendations for a simple structure
```




```
##
## Very Simple Structure
## Call: vss(x = bank)
## Although the VSS complexity 1 shows  8  factors, it is probably more
reasonable to think about  6  factors
## VSS complexity 2 achieves a maximimum of 0.52  with  8  factors
##
## The Velicer MAP achieves a minimum of 0.01  with  1  factors
## BIC achieves a minimum of  -373.04  with  4  factors
## Sample Size adjusted BIC achieves a minimum of  -178.83  with  5  factors
##
## Statistics by number of factors
##   vss1 vss2   map dof chisq     prob sqresid  fit RMSEA    BIC SABIC
complex
## 1 0.20 0.00 0.010 119  1914 4.2e-321    15.8 0.20 0.075  974.4  1353
1.0
## 2 0.31 0.33 0.013 103   817 1.3e-111    13.3 0.33 0.051    4.5   332
1.2
## 3 0.32 0.38 0.018  88   343  9.4e-32    12.2 0.38 0.033 -351.7   -72
1.4
## 4 0.35 0.42 0.024  74   211  4.3e-15    11.4 0.42 0.026 -373.0  -138
1.3
## 5 0.36 0.44 0.030  61   109  1.7e-04    10.7 0.46 0.017 -372.6  -179
1.7
## 6 0.40 0.47 0.038  49    67  4.5e-02     9.9 0.50 0.012 -319.7  -164
1.7
## 7 0.38 0.46 0.047  38    37  5.1e-01    10.0 0.50 0.000 -262.7  -142
```

```
1.7
## 8 0.43 0.52 0.065  28    20  8.7e-01     8.8 0.56 0.000 -201.0  -112
1.7
##   eChisq   SRMR eCRMS eBIC
## 1   3323 0.0676 0.072 2384
## 2   1139 0.0396 0.045  327
## 3    535 0.0271 0.034 -159
## 4    276 0.0195 0.026 -308
## 5    141 0.0139 0.021 -341
## 6     79 0.0104 0.017 -307
## 7     42 0.0076 0.014 -258
## 8     26 0.0059 0.013 -195
```

```
## Logistic Regression
```

```
##Calling library
library(ggplot2)
#install.packages("cowplot",
lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(cowplot)

##
## ************************************************************

## Note: As of version 1.0.0, cowplot does not change the

##   default ggplot2 theme anymore. To recover the previous

##   behavior, execute:
##   theme_set(theme_cowplot())

## ************************************************************

## Few packages for confusion matrix. Lets look at them one by one
#install.packages("regclass",
lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(regclass)

## Loading required package: bestglm

## Loading required package: leaps

## Loading required package: VGAM

## Loading required package: stats4

## Loading required package: splines
```

```
##
## Attaching package: 'VGAM'

## The following objects are masked from 'package:psych':
##
##     fisherz, logistic, logit

## The following object is masked from 'package:tidyr':
##
##     fill

## The following object is masked from 'package:caret':
##
##     predictors

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

## Loading required package: rpart

## Loading required package: randomForest

## randomForest 4.6-14

## Type rfNews() to see new features/changes/bug fixes.

##
## Attaching package: 'randomForest'

## The following object is masked from 'package:psych':
##
##     outlier

## The following object is masked from 'package:gridExtra':
##
##     combine

## The following object is masked from 'package:dplyr':
##
##     combine

## The following object is masked from 'package:ggplot2':
##
##     margin

## Important regclass change from 1.3:
## All functions that had a . in the name now have an _
## all.correlations -> all_correlations, cor.demo -> cor_demo, etc.

##
## Attaching package: 'regclass'
```

```
## The following object is masked from 'package:lattice':
##
##     qq

#install.packages("caret",
lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(caret)
#install.packages("e1071",
lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(e1071)
#install.packages("pROC",
lib="/Library/Frameworks/R.framework/Versions/3.5/Resources/library")
library(pROC)

#Loading Dataset
bank=read.csv("C:/Users/Shamali/Desktop/RutgersSpring/multivariat/project/New
folder/abc/a/bank.csv",row.names=1,fill=TRUE)

#View(bank)
attach(bank)

## The following objects are masked from bank (pos = 13):
##
##     age, balance, campaign, contact, day, default, deposit, duration,
##     education, housing, job, loan, marital, month, pdays, poutcome,
##     previous

## The following object is masked from package:MASS:
##
##     housing

head(bank)

##   age job marital education default balance housing loan contact day month
## 1  42   1       2         1       0    -247       1    1       1  21    11
## 2  33   8       1         1       0    3444       1    0       1  21    11
## 3  53   6       1         2       0    2269       0    0       0  17    10
## 4  37  10       1         1       0    5115       1    0       0  17    10
## 5  45   3       1         1       0     781       0    1       0  17    10
## 6  34   5       2         2       0    1494       1    0       0  18    10
##   duration campaign pdays previous poutcome deposit
## 1      519        1   166        1        1       1
## 2      144        1    91        4        0       1
## 3     1091        2   150        1        2       1
## 4     1210        2   171        4        0       1
## 5      652        2   126        2        0       1
## 6      596        1   182        1        1       1

str(bank)

## 'data.frame':    2675 obs. of  17 variables:
##  $ age      : int  42 33 53 37 45 34 46 43 33 46 ...
```

```
##  $ job      : int  1 8 6 10 3 5 5 5 10 11 ...
##  $ marital  : int  2 1 1 1 1 2 1 1 2 0 ...
##  $ education: int  1 1 2 1 1 2 2 2 2 1 ...
##  $ default  : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ balance  : int  -247 3444 2269 5115 781 1494 0 1429 149 3354 ...
##  $ housing  : int  1 1 0 1 0 1 0 1 1 1 ...
##  $ loan     : int  1 0 0 0 1 0 0 0 0 0 ...
##  $ contact  : int  1 1 0 0 0 0 0 0 0 0 ...
##  $ day      : int  21 21 17 17 17 18 18 19 19 19 ...
##  $ month    : int  11 11 10 10 10 10 10 10 10 10 ...
##  $ duration : int  519 144 1091 1210 652 596 716 1015 424 522 ...
##  $ campaign : int  1 1 2 2 2 1 2 1 2 1 ...
##  $ pdays    : int  166 91 150 171 126 182 110 198 182 174 ...
##  $ previous : int  1 4 1 4 2 1 3 2 1 1 ...
##  $ poutcome : int  1 0 2 0 0 1 1 1 1 2 ...
##  $ deposit  : int  1 1 1 1 1 1 1 1 1 1 ...

# This shows that we need to tell R which columns contain factors it also
shows us that there are some missing values. There are "?"s in the dataset.
# These are in the "ca" and "thal" columns. First, convert "?"s to NAs...
bank[bank == "?"] <- NA

## For some logistic regression we'll create a very simple model that uses
deposit to predict default
xtabs(~ deposit+default+balance+poutcome+duration, data=bank)

##         default
## deposit    0    1
##       0  883    6
##       1 1782    4

#Customer who doesnot fall into default category are the one bank should
target the most.

logistic_simple <- glm(deposit ~ default+balance+poutcome+duration,
data=bank, family="binomial")
summary(logistic_simple)

##
## Call:
## glm(formula = deposit ~ default + balance + poutcome + duration,
##     family = "binomial", data = bank)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -4.0721  -0.7976   0.4343   0.6827   1.7486
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.550e+00  1.047e-01 -14.815   <2e-16 ***
## default     -8.111e-01  7.422e-01  -1.093   0.2745
```

```
## balance      6.172e-05  1.919e-05   3.216   0.0013 **
## poutcome     1.107e+00  5.870e-02  18.854   <2e-16 ***
## duration     4.251e-03  2.770e-04  15.348   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 3401.6  on 2674  degrees of freedom
## Residual deviance: 2576.0  on 2670  degrees of freedom
## AIC: 2586
##
## Number of Fisher Scoring iterations: 5
```

```
Nodeposit.log.odds <- log(5237 / 5757)
Nodeposit.log.odds
```

```
## [1] -0.09466769
```

```
Yesdeposit.log.odds.ratio <- log((52 / 116) / (5237/5757))
Yesdeposit.log.odds.ratio
```

```
## [1] -0.7076788
```

```
## Now calculate the overall "Pseudo R-squared" and its p-value
ll.null <- logistic_simple$null.deviance/-2
ll.proposed <- logistic_simple$deviance/-2
ll.null
```

```
## [1] -1700.821
```

```
ll.proposed
```

```
## [1] -1288.001
```

```
## McFadden's Pseudo R^2 = [ LL(Null) - LL(Proposed) ] / LL(Null)
(ll.null - ll.proposed) / ll.null
```

```
## [1] 0.2427183
```

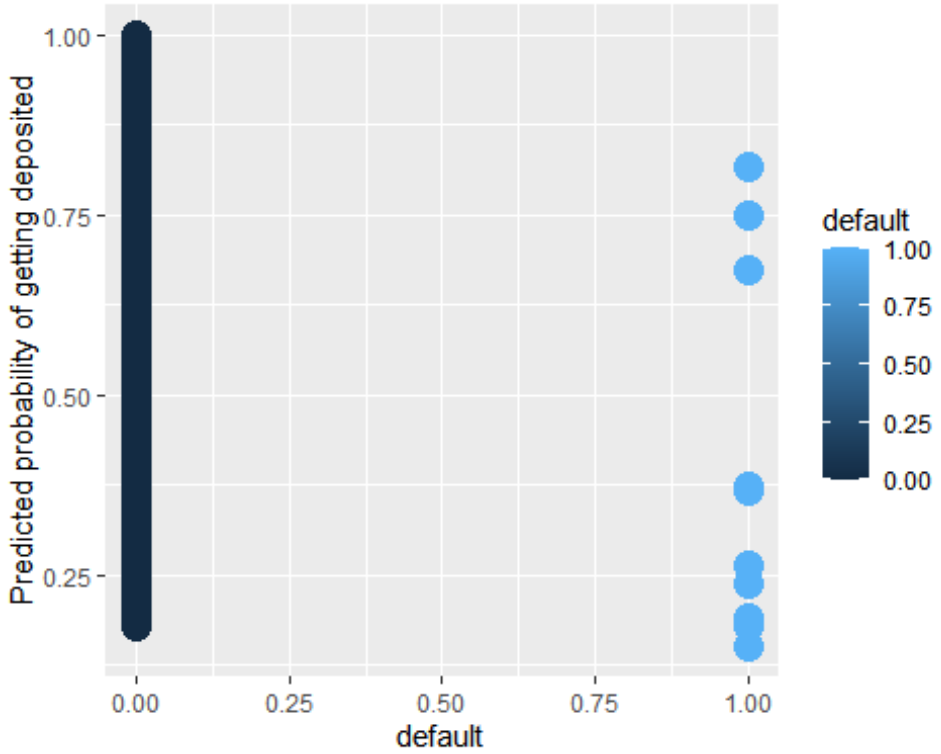
```
## chi-square value = 2*(LL(Proposed) - LL(Null))
## p-value = 1 - pchisq(chi-square value, df = 2-1)
1 - pchisq(2*(ll.proposed - ll.null), df=1)
```

```
## [1] 0
```

```
##
predicted.data <-
data.frame(probability.of.deposit=logistic_simple$fitted.values,default=bank$
default)
head(predicted.data)
```

```
##   probability.of.deposit default
## 1              0.8516468       0
## 2              0.3261522       0
## 3              0.9956853       0
## 4              0.9803421       0
## 5              0.7806876       0
## 6              0.8986564       0
```

```
## We can plot the data...
ggplot(data=predicted.data, aes(x=default, y=probability.of.deposit)) +
  geom_point(aes(color=default), size=5) +
  xlab("default") +
  ylab("Predicted probability of getting deposited")
```




```
## Since there are only two probabilities (one for default and one for not
default),
## we can use a table to summarize the predicted probabilities.
head(xtabs(~ probability.of.deposit + default, data=predicted.data))
```

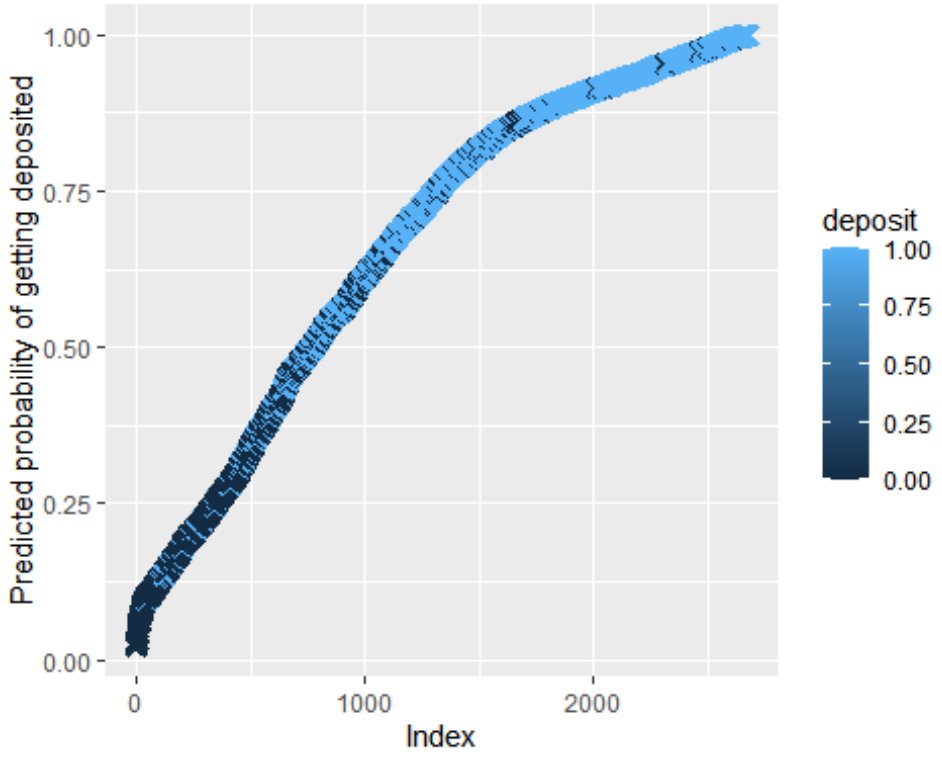
```
##                       default
## probability.of.deposit 0 1
##      0.15079505374929  0 1
##      0.178742485569059 1 0
##      0.179309460483021 0 1
##      0.18062237055141  1 0
##      0.180789038585733 1 0
##      0.181879380842619 1 0
```

```r
## Now we will use all of the data available for prediction. This is not the best way to do this
logistic <- glm(deposit ~ ., data=bank, family="binomial")
summary(logistic)
```

```
##
## Call:
## glm(formula = deposit ~ ., family = "binomial", data = bank)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -3.9918  -0.6676   0.3634   0.6690   2.1581
##
## Coefficients:
##               Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.356e+00  4.017e-01  -3.376 0.000735 ***
## age          3.952e-03  5.116e-03   0.773 0.439746
## job          2.378e-02  1.606e-02   1.481 0.138517
## marital     -2.625e-02  9.522e-02  -0.276 0.782757
## education    3.526e-01  8.483e-02   4.156 3.24e-05 ***
## default     -4.942e-01  7.336e-01  -0.674 0.500472
## balance      3.839e-05  1.942e-05   1.977 0.048069 *
## housing     -1.199e+00  1.109e-01 -10.813  < 2e-16 ***
## loan        -7.044e-01  1.644e-01  -4.285 1.83e-05 ***
## contact     -4.014e-01  2.090e-01  -1.920 0.054841 .
## day          5.024e-03  6.294e-03   0.798 0.424735
## month        2.537e-03  1.451e-02   0.175 0.861185
## duration     4.481e-03  2.841e-04  15.773  < 2e-16 ***
## campaign    -1.754e-01  3.920e-02  -4.473 7.71e-06 ***
## pdays        4.231e-04  4.341e-04   0.975 0.329723
## previous     1.274e-02  1.415e-02   0.900 0.368025
## poutcome     9.684e-01  6.404e-02  15.122  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 3401.6  on 2674  degrees of freedom
## Residual deviance: 2355.8  on 2658  degrees of freedom
## AIC: 2389.8
##
## Number of Fisher Scoring iterations: 5
```

```r
## Now calculate the overall "Pseudo R-squared" and its p-value
ll.null <- logistic$null.deviance/-2
ll.proposed <- logistic$deviance/-2

## McFadden's Pseudo R^2 = [ LL(Null) - LL(Proposed) ] / LL(Null)
(ll.null - ll.proposed) / ll.null
```

```
## [1] 0.3074572

## The p-value for the R^2
1 - pchisq(2*(ll.proposed - ll.null), df=(length(logistic$coefficients)-1))

## [1] 0

## now we can plot the data
predicted.data <-
data.frame(probability.of.deposit=logistic$fitted.values,deposit=bank$deposit
)
predicted.data <- predicted.data[order(predicted.data$probability.of.deposit,
decreasing=FALSE),]
predicted.data$rank <- 1:nrow(predicted.data)

## Lastly, we can plot the predicted probabilities for each sample having
ggplot(data=predicted.data, aes(x=rank, y=probability.of.deposit)) +
  geom_point(aes(color=deposit), alpha=1, shape=4, stroke=2) +
  xlab("Index") +
  ylab("Predicted probability of getting deposited")
```




```
#confusion matrix
confusion_matrix(logistic)

##          Predicted 0 Predicted 1 Total
## Actual 0         581         308   889
## Actual 1         187        1599  1786
## Total            768        1907  2675
```

```r
pdata <- predict(logistic,newdata=bank,type="response" )
head(pdata)
```

```
##         1         2         3         4         5         6
## 0.5384912 0.1847171 0.9983800 0.9748327 0.7867121 0.8886700
```

```r
head(bank$deposit)
```

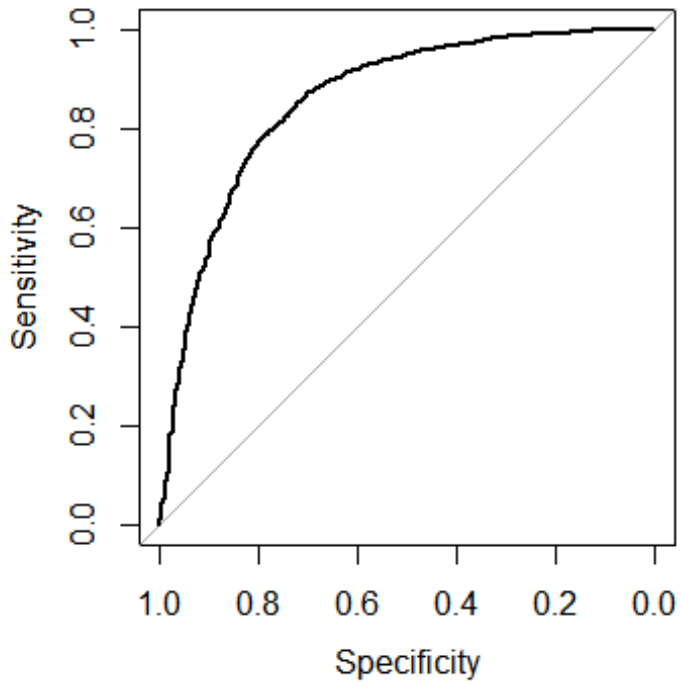
```
## [1] 1 1 1 1 1 1
```

```r
pdataF <- as.factor(ifelse(test=as.numeric(pdata>0.5) == 0, yes="Deposit",
no="NotDeposit"))

roc(bank$deposit,logistic$fitted.values,plot=TRUE)
```

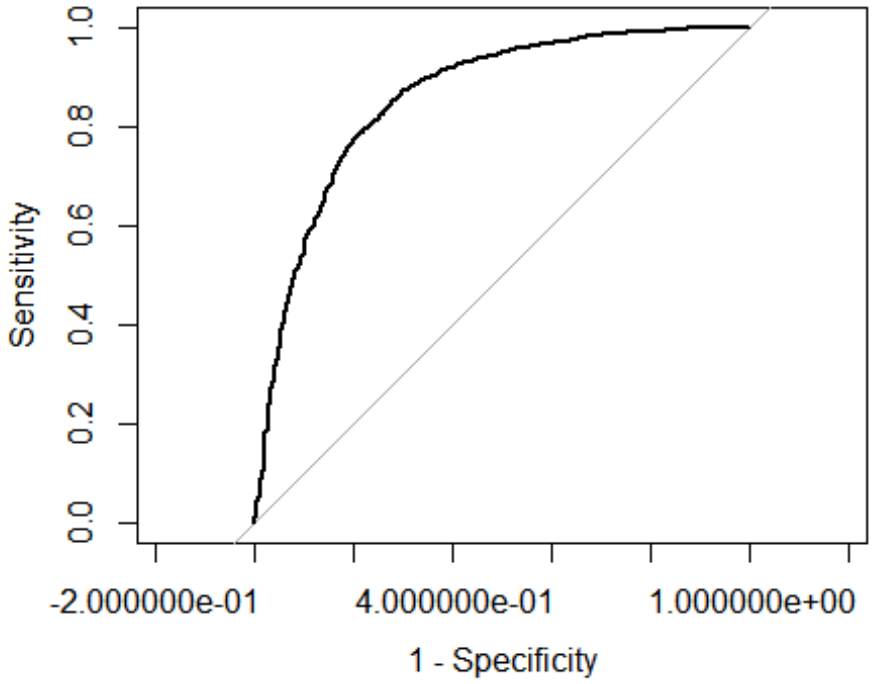
```
## Setting levels: control = 0, case = 1

## Setting direction: controls < cases

##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565
```

```r
par(pty = "s")
roc(bank$deposit,logistic$fitted.values,plot=TRUE)
```

```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```



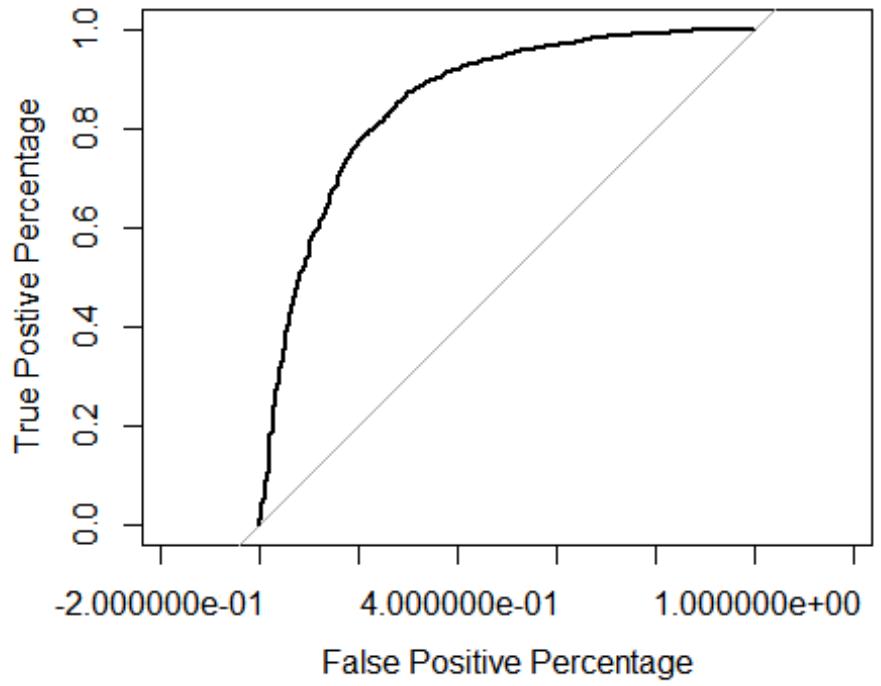

```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565

## NOTE: By default, roc() uses specificity on the x-axis and the values
range
## from 1 to 0. This makes the graph look like what we would expect, but the
## x-axis itself might induce a headache. To use 1-specificity (i.e. the
## False Positive Rate) on the x-axis, set "legacy.axes" to TRUE.
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE)

## Setting levels: control = 0, case = 1

## Setting direction: controls < cases
```




```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE, legacy.axes = TRUE)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565
```

```
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage")
```

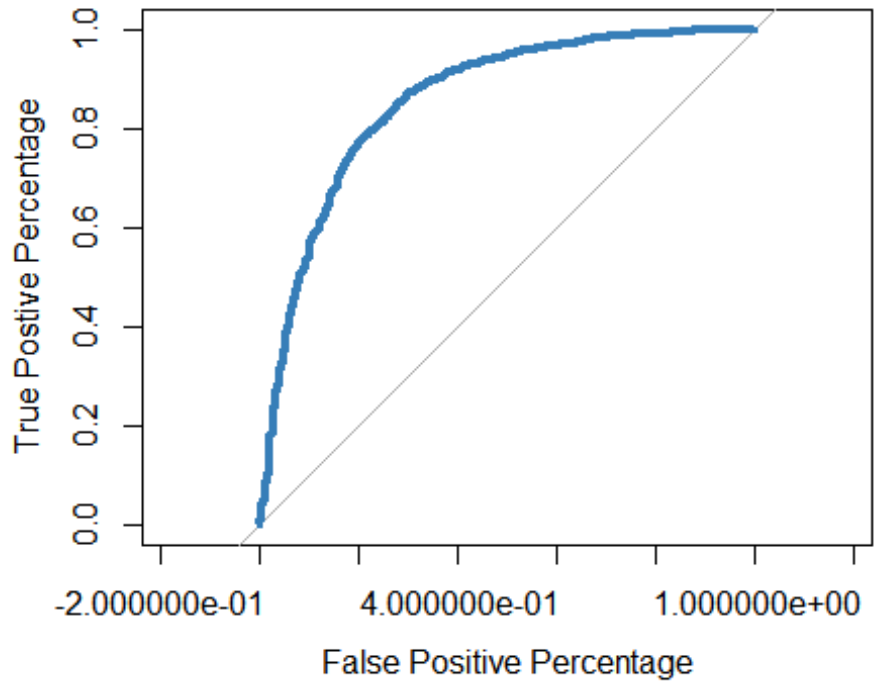
```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```




```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE, legacy.axes = TRUE, xlab = "False Positive Percentage",     ylab
= "True Postive Percentage")
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565
```

```
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4)
```

```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```




```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE, legacy.axes = TRUE, xlab = "False Positive Percentage",     ylab
= "True Postive Percentage", col = "#377eb8", lwd = 4)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565
```

```
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4)
```

```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```

```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
plot = TRUE, legacy.axes = TRUE, xlab = "False Positive Percentage",     ylab
= "True Postive Percentage", col = "#377eb8", lwd = 4)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 0.8565
```

```
## If we want to find out the optimal threshold we can store the
## data used to make the ROC graph in a variable...
roc.info <- roc(bank$deposit, logistic$fitted.values, legacy.axes=TRUE)

## Setting levels: control = 0, case = 1

## Setting direction: controls < cases

str(roc.info)

## List of 15
##  $ percent           : logi FALSE
##  $ sensitivities     : num [1:2676] 1 1 1 1 1 1 1 1 1 1 ...
##  $ specificities     : num [1:2676] 0 0.00112 0.00225 0.00337 0.0045 ...
##  $ thresholds        : num [1:2676] -Inf 0.0231 0.0262 0.0293 0.0315 ...
##  $ direction         : chr "<"
##  $ cases             : Named num [1:1786] 0.538 0.185 0.998 0.975 0.787
...
##   ..- attr(*, "names")= chr [1:1786] "1" "2" "3" "4" ...
##  $ controls          : Named num [1:889] 0.3782 0.1745 0.0324 0.1734
0.4651 ...
##   ..- attr(*, "names")= chr [1:889] "1787" "1788" "1789" "1790" ...
##  $ fun.sesp          :function (thresholds, controls, cases, direction)
##  $ auc               : 'auc' num 0.857
##   ..- attr(*, "partial.auc")= logi FALSE
##   ..- attr(*, "percent")= logi FALSE
##   ..- attr(*, "roc")=List of 15
##   .. ..$ percent           : logi FALSE
##   .. ..$ sensitivities     : num [1:2676] 1 1 1 1 1 1 1 1 1 1 ...
##   .. ..$ specificities     : num [1:2676] 0 0.00112 0.00225 0.00337 0.0045
...
##   .. ..$ thresholds        : num [1:2676] -Inf 0.0231 0.0262 0.0293 0.0315
...
##   .. ..$ direction         : chr "<"
##   .. ..$ cases             : Named num [1:1786] 0.538 0.185 0.998 0.975
0.787 ...
##   .. .. ..- attr(*, "names")= chr [1:1786] "1" "2" "3" "4" ...
##   .. ..$ controls          : Named num [1:889] 0.3782 0.1745 0.0324 0.1734
0.4651 ...
##   .. .. ..- attr(*, "names")= chr [1:889] "1787" "1788" "1789" "1790" ...
##   .. ..$ fun.sesp          :function (thresholds, controls, cases,
direction)
##   .. ..$ auc               : 'auc' num 0.857
##   .. .. ..- attr(*, "partial.auc")= logi FALSE
##   .. .. ..- attr(*, "percent")= logi FALSE
##   .. .. ..- attr(*, "roc")=List of 8
##   .. .. .. ..$ percent      : logi FALSE
##   .. .. .. ..$ sensitivities: num [1:2676] 1 1 1 1 1 1 1 1 1 1 ...
##   .. .. .. ..$ specificities: num [1:2676] 0 0.00112 0.00225 0.00337
0.0045 ...
##   .. .. .. ..$ thresholds   : num [1:2676] -Inf 0.0231 0.0262 0.0293
```

```
0.0315 ...
##   .. .. .. ..$ direction    : chr "<"
##   .. .. .. ..$ cases        : Named num [1:1786] 0.538 0.185 0.998 0.975
0.787 ...
##   .. .. .. .. ..- attr(*, "names")= chr [1:1786] "1" "2" "3" "4" ...
##   .. .. .. ..$ controls     : Named num [1:889] 0.3782 0.1745 0.0324
0.1734 0.4651 ...
##   .. .. .. .. ..- attr(*, "names")= chr [1:889] "1787" "1788" "1789"
"1790" ...
##   .. .. .. ..$ fun.sesp     :function (thresholds, controls, cases,
direction)
##   .. .. .. ..- attr(*, "class")= chr "roc"
##   .. ..$ call              : language roc.default(response = bank$deposit,
predictor = logistic$fitted.values,      legacy.axes = TRUE)
##   .. ..$ original.predictor: Named num [1:2675] 0.538 0.185 0.998 0.975
0.787 ...
##   .. .. ..- attr(*, "names")= chr [1:2675] "1" "2" "3" "4" ...
##   .. ..$ original.response : int [1:2675] 1 1 1 1 1 1 1 1 1 ...
##   .. ..$ predictor         : Named num [1:2675] 0.538 0.185 0.998 0.975
0.787 ...
##   .. .. ..- attr(*, "names")= chr [1:2675] "1" "2" "3" "4" ...
##   .. ..$ response          : int [1:2675] 1 1 1 1 1 1 1 1 1 ...
##   .. ..$ levels            : chr [1:2] "0" "1"
##   .. ..- attr(*, "class")= chr "roc"
##  $ call              : language roc.default(response = bank$deposit,
predictor = logistic$fitted.values,      legacy.axes = TRUE)
##  $ original.predictor: Named num [1:2675] 0.538 0.185 0.998 0.975 0.787
...
##   ..- attr(*, "names")= chr [1:2675] "1" "2" "3" "4" ...
##  $ original.response : int [1:2675] 1 1 1 1 1 1 1 1 1 ...
##  $ predictor         : Named num [1:2675] 0.538 0.185 0.998 0.975 0.787
...
##   ..- attr(*, "names")= chr [1:2675] "1" "2" "3" "4" ...
##  $ response          : int [1:2675] 1 1 1 1 1 1 1 1 1 ...
##  $ levels            : chr [1:2] "0" "1"
##  - attr(*, "class")= chr "roc"
```

```
roc.df <- data.frame(tpp=roc.info$sensitivities*100, ## tpp = true positive
percentage
                     fpp=(1 - roc.info$specificities)*100, ## fpp = false
positive precentage
                     thresholds=roc.info$thresholds)
head(roc.df) ## head() will show us the values for the upper right-hand
corner of the ROC graph, when the threshold is so low
```

```
##   tpp       fpp thresholds
## 1 100 100.00000       -Inf
## 2 100  99.88751 0.02313112
## 3 100  99.77503 0.02622081
## 4 100  99.66254 0.02927732
```

```
## 5 100  99.55006 0.03152179
## 6 100  99.43757 0.03635800
```

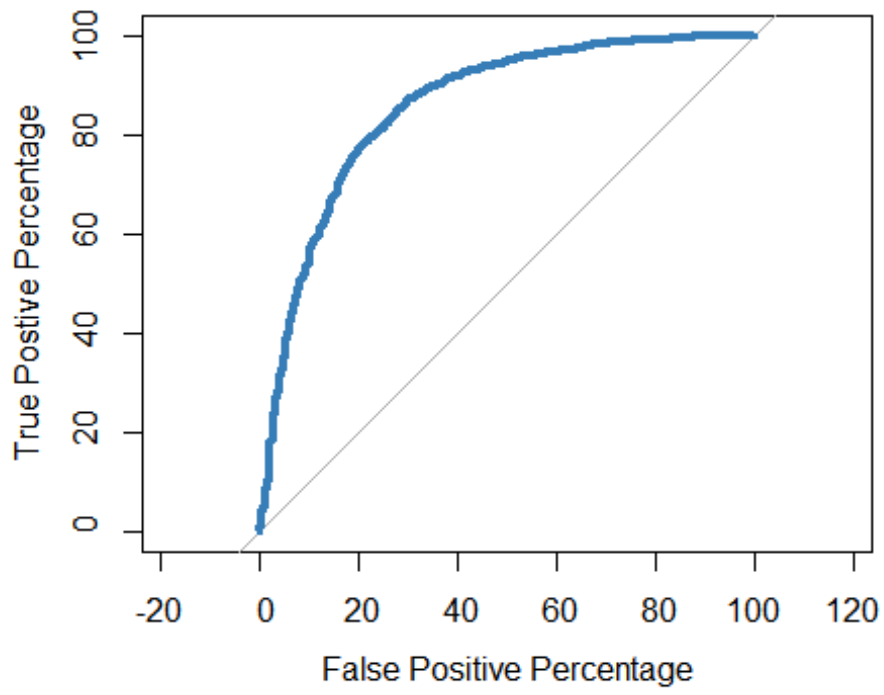
```
tail(roc.df) ## tail() will show us the values for the lower left-hand corner
```

```
##             tpp fpp thresholds
## 2671 0.27995521   0  0.9998256
## 2672 0.22396417   0  0.9998811
## 2673 0.16797312   0  0.9998903
## 2674 0.11198208   0  0.9998955
## 2675 0.05599104   0  0.9999282
## 2676 0.00000000   0        Inf
```

```
## now let's look at the thresholds between TPP 60% and 80%
#roc.df[roc.df$tpp > 60 & roc.df$tpp < 80,]
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4, percent=TRUE)
```

```
## Setting levels: control = 0, case = 1
```

```
## Setting direction: controls < cases
```

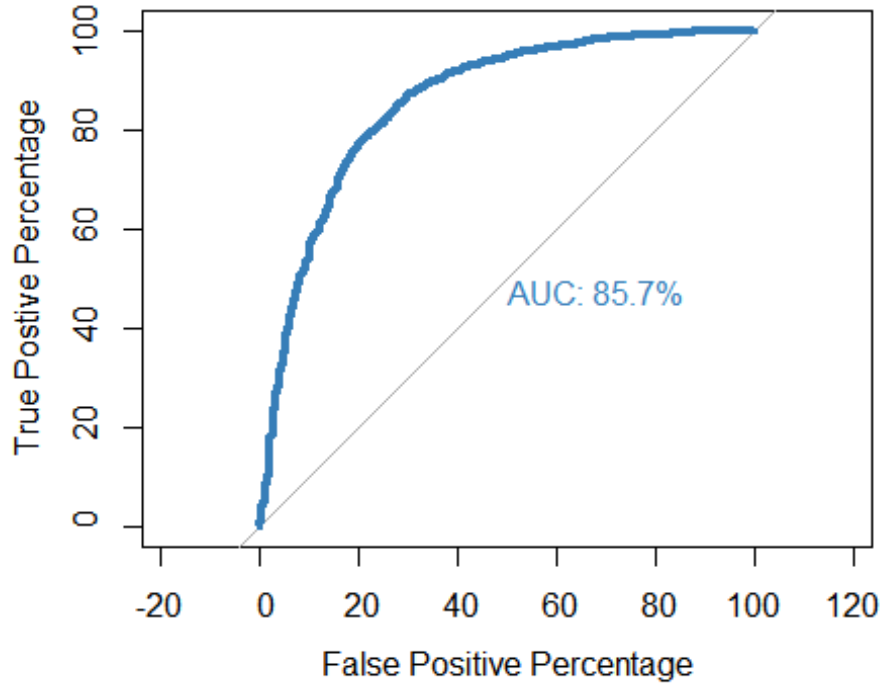



```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
percent = TRUE, plot = TRUE, legacy.axes = TRUE, xlab = "False Positive
Percentage",     ylab = "True Postive Percentage", col = "#377eb8", lwd = 4)
```

```
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 85.65%
```

```
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4, percent=TRUE, print.auc=TRUE)
```

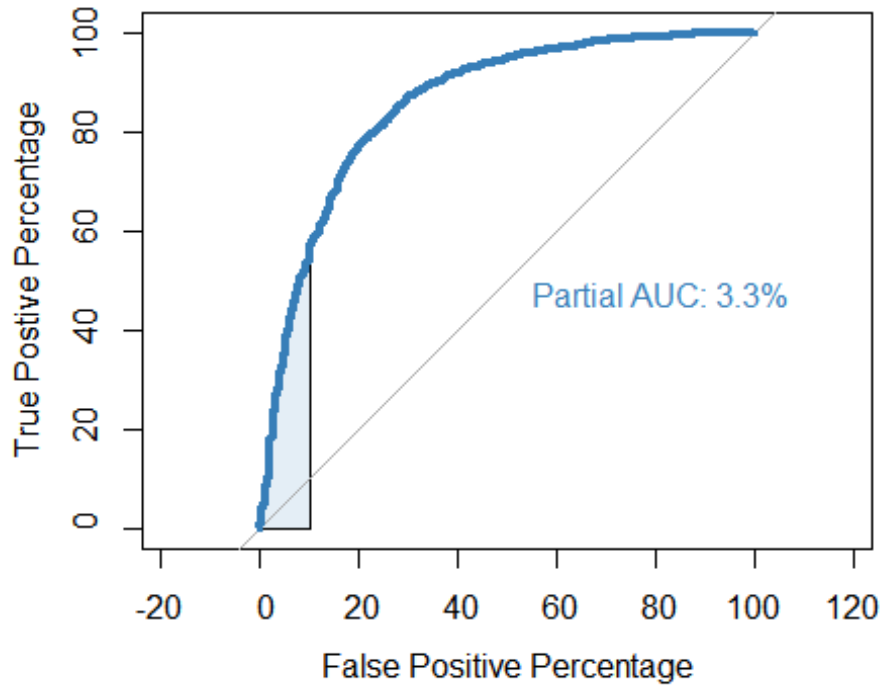
```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```




```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
percent = TRUE, plot = TRUE, legacy.axes = TRUE, xlab = "False Positive
Percentage",     ylab = "True Postive Percentage", col = "#377eb8", lwd = 4,
print.auc = TRUE)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Area under the curve: 85.65%
```

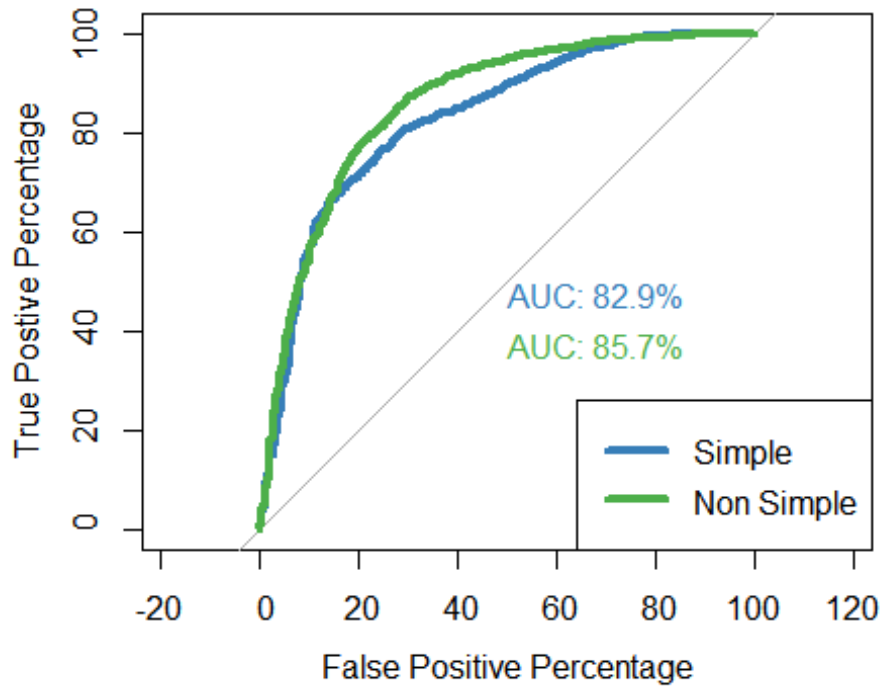
```
roc(bank$deposit,logistic$fitted.values,plot=TRUE, legacy.axes=TRUE,
xlab="False Positive Percentage", ylab="True Postive Percentage",
col="#377eb8", lwd=4, percent=TRUE, print.auc=TRUE, partial.auc=c(100, 90),
auc.polygon = TRUE, auc.polygon.col = "#377eb822", print.auc.x=45)
```

```
## Setting levels: control = 0, case = 1
## Setting direction: controls < cases
```




```
##
## Call:
## roc.default(response = bank$deposit, predictor = logistic$fitted.values,
percent = TRUE, plot = TRUE, legacy.axes = TRUE, xlab = "False Positive
Percentage",     ylab = "True Postive Percentage", col = "#377eb8", lwd = 4,
print.auc = TRUE, partial.auc = c(100, 90), auc.polygon = TRUE,
auc.polygon.col = "#377eb822", print.auc.x = 45)
##
## Data: logistic$fitted.values in 889 controls (bank$deposit 0) < 1786 cases
(bank$deposit 1).
## Partial area under the curve (specificity 100%-90%): 3.253%

# Lets do two roc plots to understand which model is better
roc(bank$deposit, logistic_simple$fitted.values, plot=TRUE, legacy.axes=TRUE,
percent=TRUE, xlab="False Positive Percentage", ylab="True Postive
Percentage", col="#377eb8", lwd=4, print.auc=TRUE)

## Setting levels: control = 0, case = 1

## Setting direction: controls < cases

##
## Call:
## roc.default(response = bank$deposit, predictor =
logistic_simple$fitted.values,     percent = TRUE, plot = TRUE, legacy.axes =
```

```
TRUE, xlab = "False Positive Percentage",     ylab = "True Postive
Percentage", col = "#377eb8", lwd = 4,     print.auc = TRUE)
##
## Data: logistic_simple$fitted.values in 889 controls (bank$deposit 0) <
1786 cases (bank$deposit 1).
## Area under the curve: 82.86%

# Lets add the other graph
plot.roc(bank$deposit, logistic$fitted.values, percent=TRUE, col="#4daf4a",
lwd=4, print.auc=TRUE, add=TRUE, print.auc.y=40)

## Setting levels: control = 0, case = 1
## Setting direction: controls < cases

legend("bottomright", legend=c("Simple", "Non Simple"), col=c("#377eb8",
"#4daf4a"), lwd=4) # Make it user friendly
```



#Logistic Regression gave us 85% accuracy both on train and test data

In summary, we learned how to use logistic regression to predict if a user will subscribe for the next bank marketing campaign or not.