EE435_A3.R

ryu_r

2021-03-01

```
#install.packages("quantmod")
#install.packages("fBasics")
#install.packages("sn")
#install.packages("PerformanceAnalytics")
#install.packages("car")
#install.packages("tseries")
#install.packages("forecast")
#install.packages("dplyr")
#install.packages("tinytex")
library(quantmod)
```

```
## Loading required package: xts
```

```
## Loading required package: zoo
```

```
##
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
##
##     as.Date, as.Date.numeric
```

```
## Loading required package: TTR
```

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

```
library(fBasics)
```

```
## Loading required package: timeDate
```

```
## Loading required package: timeSeries
```

```
##
## Attaching package: 'timeSeries'
```

```
## The following object is masked from 'package:zoo':
##
##     time<-
```

```
##
## Attaching package: 'fBasics'

## The following object is masked from 'package:TTR':
##
##     volatility
```

```
library(sn)
```

```
## Loading required package: stats4

##
## Attaching package: 'sn'

## The following object is masked from 'package:fBasics':
##
##     vech

## The following object is masked from 'package:stats':
##
##     sd
```

```
library(PerformanceAnalytics)
```

```
##
## Attaching package: 'PerformanceAnalytics'

## The following objects are masked from 'package:timeDate':
##
##     kurtosis, skewness

## The following object is masked from 'package:graphics':
##
##     legend
```

```
library(car)
```

```
## Loading required package: carData

##
## Attaching package: 'car'

## The following object is masked from 'package:fBasics':
##
##     densityPlot
```

```
library(tseries)
library(forecast)
library(Matrix)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'

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

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

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

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

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

```
library(tinytex)
#install_tinytex()
#1.A
read.table(file.choose(), header = T)
```

```
##                                    library.quantmod.
## 1                                   library(fBasics)
## 2                                        library(sn)
## 3                       library(PerformanceAnalytics)
## 4                                       library(car)
## 5                                   library(tseries)
## 6                                  library(forecast)
## 7                                    library(Matrix)
## 8                                    library(dplyr)
## 9                                  library(tinytex)
## 10                          read.table(file.choose(),
## 11                                             header
## 12                                                  =
## 13                                                 T)
## 14                      da=read.table("q-gdpmc1.txt")
## 15                                          str(da)
## 16                                  da1=da[-1,4]
## 17                                           GDP
## 18                                            <-
## 19                                  as.numeric(da1)
## 20                                 log_GDP=log(GDP)
## 21                                          log_GDP
## 22                               growth=diff(log_GDP)
## 23                                           growth
```

```
## 24                                par(mfcol=c(2,2))
## 25                              plot(growth,type='l')
## 26                                    str(growth)
## 27                  plot(growth[1:262],growth[2:263])
## 28                  plot(growth[1:261],growth[3:263])
## 29                               acf(growth,lag=12)
## 30                                par(mfcol=c(1,1))
## 31                           pacf(growth,lag.max=12)
## 32              Box.test(growth,lag=12,type='Ljung')
## 33                                t.test(growth)
## 34                    read.table(file.choose(),
## 35                                            header
## 36                                                =
## 37                                               T)
## 38                 da1=read.table("d-amzn3dx.txt")
## 39                                AMZN=da1[-1,2]
## 40                                  VW=da1[-1,3]
## 41                                  EW=da1[-1,4]
## 42                                  SP=da1[-1,5]
## 43                                          AMZN
## 44                                            <-
## 45                               as.numeric(AMZN)
## 46                                            VW
## 47                                            <-
## 48                                 as.numeric(VW)
## 49                                            EW
## 50                                            <-
## 51                                 as.numeric(EW)
## 52                                            SP
## 53                                            <-
## 54                                 as.numeric(SP)
## 55                           returnAMZN=diff(AMZN)
## 56                               returnVW=diff(VW)
## 57                               returnEW=diff(EW)
## 58                               returnSP=diff(SP)
## 59                          table.Stats(returnAMZN)
## 60                            table.Stats(returnVW)
## 61                            table.Stats(returnEW)
## 62                            table.Stats(returnSP)
## 63                                         logAMZN
## 64                                               =
## 65                                    log(1+AMZN)
## 66                                          logVW
## 67                                               =
## 68                                      log(1+VW)
## 69                                          logEW
## 70                                               =
## 71                                      log(1+EW)
## 72                                          logSP
## 73                                               =
## 74                                      log(1+SP)
## 75                            table.Stats(logAMZN)
## 76                              table.Stats(logVW)
## 77                              table.Stats(logEW)
```

```
## 78                                table.Stats(logSP)
## 79                                   t.test(logAMZN)
## 80                                 par(mfcol=c(2,1))
## 81                                     hist(logAMZN,
## 82                                            breaks
## 83                                                =
## 84                                             40)
## 85  chart.Histogram(logAMZN,method=c('add.normal'))
## 86                          read.table(file.choose(),
## 87                                            header
## 88                                                =
## 89                                             T)
## 90                   da2=read.table("m-abt3dx.txt")
## 91                                      ABT=da2[-1,2]
## 92                                      VW2=da2[-1,3]
## 93                                      EW2=da2[-1,4]
## 94                                      SP2=da2[-1,5]
## 95                                            ABT
## 96                                             <-
## 97                                   as.numeric(ABT)
## 98                                            VW2
## 99                                             <-
## 100                                  as.numeric(VW2)
## 101                                           EW2
## 102                                            <-
## 103                                  as.numeric(EW2)
## 104                                           SP2
## 105                                            <-
## 106                                  as.numeric(SP2)
## 107                                 table.Stats(ABT)
## 108                                 table.Stats(VW2)
## 109                                 table.Stats(EW2)
## 110                                 table.Stats(SP2)
## 111                                           logABT
## 112                                               =
## 113                                      log(1+ABT)
## 114                                          logVW2
## 115                                               =
## 116                                      log(1+VW2)
## 117                                          logEW2
## 118                                               =
## 119                                      log(1+EW2)
## 120                                          logSP2
## 121                                               =
## 122                                      log(1+SP2)
## 123                               table.Stats(logABT)
## 124                               table.Stats(logVW2)
## 125                               table.Stats(logEW2)
## 126                               table.Stats(logSP2)
## 127                                    t.test(logABT)
## 128                                 par(mfcol=c(2,1))
## 129                                      hist(logABT,
## 130                                            breaks
## 131                                                =
```

```
## 132                                           40)
## 133  chart.Histogram(logABT,method=c('add.normal'))
## 134                                           VW2
## 135                                    t.test(VW2)
## 136                                 T1=length(VW2)
## 137                              VW2_s3=skewness(VW2)
## 138                                         VW2_s3
## 139                            TST=VW2_s3/sqrt(6/T1)
## 140                                           TST
## 141                                PV1=2*pnorm(TST)
## 142                                           PV1
## 143                  VW2_k3=kurtosis(VW2)/sqrt(24/T)
## 144                                         VW2_k3
## 145                           PV2=2*(1-pnorm(VW2_k3))
## 146                                           PV2
## 147                                        logAMZN
## 148                               T2=length(logAMZN)
## 149                         AMZN_S3=skewness(logAMZN)
## 150                                         AMZN_S3
## 151                           TST2=AMZN_S3/sqrt(6/T2)
## 152                                          TST2
## 153                             PV3=2*(1-pnorm(TST2))
## 154                                           PV3
## 155                         AMZN_K3=kurtosis(logAMZN)
## 156                                         AMZN_K3
## 157                          TST3=AMZN_K3/sqrt(24/T2)
## 158                                          TST3
## 159                             PV4=2*(1-pnorm(TST3))
## 160                                           PV4
## 161                                 t.test(logAMZN)
## 162                               par(mfcol=c(2,1))
## 163                                    acf(logAMZN,
## 164                                         lag=12)
## 165                                  pacf(logAMZN,
## 166                                         lag=12)
## 167                         read.table(file.choose(),
## 168                                          header
## 169                                               =
## 170                                           T)
## 171                   da3=read.table("d-exuseu.txt")
## 172                                  FX=da3[-1,4]
## 173                                           FX
## 174                                           <-
## 175                                as.numeric(FX)
## 176                                 logFX=log(FX)
## 177                          logreturnFX=diff(logFX)
## 178                                    logreturnFX
## 179                          table.Stats(logreturnFX)
## 180                                 par(mfcol=c(2,1))
## 181                                 hist(logreturnFX)
## 182                       chart.Histogram(logreturnFX,
## 183                            method=c('add.normal'))
## 184                                t.test(logreturnFX)
```

```
da=read.table("q-gdpmc1.txt")
str(da)
```

```
## 'data.frame':    265 obs. of  4 variables:
##  $ V1: chr  "year" "1947" "1947" "1947" ...
##  $ V2: chr  "month" "01" "04" "07" ...
##  $ V3: chr  "day" "01" "01" "01" ...
##  $ V4: chr  "gdp" "1770691" "1767976" "1766523" ...
```

```
da1=da[-1,4]
GDP <- as.numeric(da1)
log_GDP=log(GDP)
log_GDP
```

```
##   [1] 14.38688 14.38535 14.38452 14.39957 14.41534 14.43358 14.43894 14.44048
##   [9] 14.42649 14.42283 14.43399 14.42456 14.46418 14.49416 14.53255 14.54999
##  [17] 14.56254 14.57900 14.59873 14.60042 14.61043 14.61153 14.61821 14.65071
##  [25] 14.66925 14.67679 14.67069 14.65473 14.64995 14.65120 14.66242 14.68224
##  [33] 14.71064 14.72705 14.74032 14.74589 14.74132 14.74915 14.74789 14.76410
##  [41] 14.77023 14.76781 14.77740 14.76682 14.73938 14.74550 14.76866 14.79171
##  [49] 14.81173 14.83668 14.83548 14.83898 14.86117 14.85648 14.85812 14.84521
##  [57] 14.85113 14.86967 14.88570 14.90585 14.92363 14.93461 14.94381 14.94624
##  [65] 14.95923 14.97168 14.99033 14.99791 15.02010 15.03152 15.04502 15.04779
##  [73] 15.07205 15.08553 15.10562 15.12946 15.15371 15.15703 15.16359 15.17166
##  [81] 15.18043 15.18064 15.18858 15.19618 15.21658 15.23342 15.24024 15.24456
##  [89] 15.26019 15.26309 15.26940 15.26469 15.26312 15.26493 15.27380 15.26314
##  [97] 15.29034 15.29600 15.30395 15.30672 15.32444 15.34788 15.35742 15.37376
## [105] 15.39902 15.41052 15.40517 15.41466 15.40585 15.40841 15.39847 15.39453
## [113] 15.38229 15.38991 15.40661 15.41959 15.44206 15.44956 15.45444 15.46168
## [121] 15.47322 15.49290 15.51062 15.51042 15.51383 15.55241 15.56217 15.57531
## [129] 15.57698 15.57792 15.58508 15.58783 15.59104 15.57034 15.56847 15.58680
## [137] 15.60737 15.59936 15.61143 15.59890 15.58235 15.58776 15.58389 15.58468
## [145] 15.59704 15.61927 15.63880 15.65926 15.67847 15.69559 15.70526 15.71337
## [153] 15.72276 15.73119 15.74669 15.75425 15.76381 15.76782 15.77742 15.78224
## [161] 15.78777 15.79835 15.80698 15.82395 15.82911 15.84187 15.84702 15.86028
## [169] 15.86963 15.87708 15.88498 15.88716 15.89755 15.90152 15.90151 15.89271
## [177] 15.88785 15.89458 15.89878 15.90269 15.91361 15.92418 15.93444 15.94491
## [185] 15.94675 15.95313 15.95838 15.97150 15.98118 15.99477 16.00119 16.01223
## [193] 16.01468 16.01683 16.02520 16.03215 16.03898 16.05612 16.06478 16.07563
## [201] 16.08330 16.09801 16.11049 16.11813 16.12753 16.13648 16.14959 16.16675
## [209] 16.17562 16.18341 16.19605 16.21385 16.21645 16.23577 16.23661 16.24252
## [217] 16.23923 16.24576 16.24300 16.24649 16.25500 16.26030 16.26536 16.26570
## [225] 16.26986 16.27830 16.29462 16.30363 16.31020 16.31661 16.32403 16.33218
## [233] 16.34244 16.34688 16.35479 16.35991 16.37246 16.37651 16.37664 16.38341
## [241] 16.38477 16.39372 16.40100 16.40522 16.40078 16.40406 16.39474 16.37146
## [249] 16.35798 16.35719 16.36078 16.37065 16.37642 16.38197 16.38839 16.39430
## [257] 16.39450 16.40061 16.40379 16.41382 16.41868 16.42179 16.42943 16.43038
```

```
growth=diff(log_GDP)
growth
```

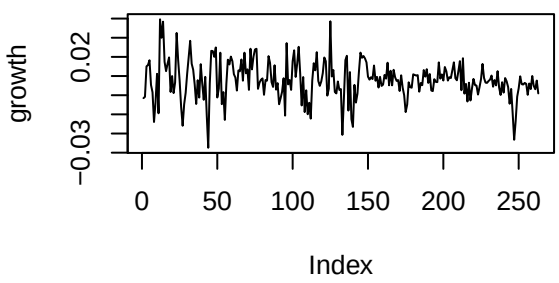
```
##   [1] -1.534476e-03 -8.221816e-04  1.504987e-02  1.576689e-02  1.824070e-02
```

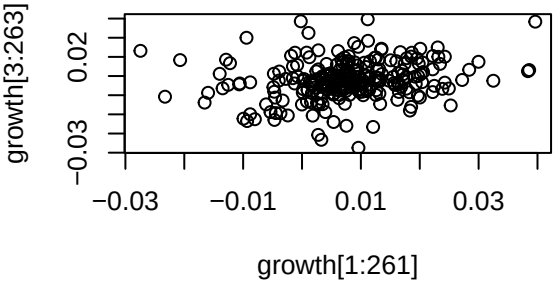
```
##   [6]  5.361958e-03  1.534216e-03 -1.398461e-02 -3.658761e-03  1.115567e-02
##  [11] -9.431750e-03  3.962427e-02  2.997947e-02  3.838396e-02  1.744117e-02
##  [16]  1.255809e-02  1.645294e-02  1.973047e-02  1.692419e-03  1.001171e-02
##  [21]  1.101789e-03  6.677677e-03  3.249907e-02  1.853724e-02  7.539189e-03
##  [26] -6.098824e-03 -1.595539e-02 -4.782939e-03  1.253814e-03  1.121199e-02
##  [31]  1.982728e-02  2.839847e-02  1.640782e-02  1.327286e-02  5.567890e-03
##  [36] -4.573696e-03  7.834040e-03 -1.257595e-03  1.620884e-02  6.127036e-03
##  [41] -2.415597e-03  9.587446e-03 -1.057610e-02 -2.744465e-02  6.118948e-03
##  [46]  2.316132e-02  2.304924e-02  2.002460e-02  2.494228e-02 -1.193250e-03
##  [51]  3.494638e-03  2.218995e-02 -4.684328e-03  1.632864e-03 -1.290639e-02
##  [56]  5.922665e-03  1.853454e-02  1.603185e-02  2.015238e-02  1.777746e-02
##  [61]  1.098070e-02  9.204125e-03  2.426829e-03  1.298540e-02  1.245270e-02
##  [66]  1.865407e-02  7.573562e-03  2.219603e-02  1.141983e-02  1.349683e-02
##  [71]  2.768460e-03  2.426470e-02  1.347712e-02  2.009019e-02  2.383953e-02
##  [76]  2.424942e-02  3.323287e-03  6.555184e-03  8.069407e-03  8.770801e-03
##  [81]  2.081310e-04  7.946463e-03  7.600767e-03  2.039906e-02  1.683646e-02
##  [86]  6.818217e-03  4.323387e-03  1.562703e-02  2.908175e-03  6.304114e-03
##  [91] -4.707864e-03 -1.569915e-03  1.811222e-03  8.864866e-03 -1.066104e-02
##  [96]  2.720221e-02  5.656829e-03  7.950879e-03  2.775053e-03  1.772328e-02
## [101]  2.343881e-02  9.537991e-03  1.633674e-02  2.525821e-02  1.150112e-02
## [106] -5.350136e-03  9.493226e-03 -8.807627e-03  2.557157e-03 -9.936583e-03
## [111] -3.943394e-03 -1.223779e-02  7.613078e-03  1.670315e-02  1.297841e-02
## [116]  2.247803e-02  7.492429e-03  4.886598e-03  7.235580e-03  1.154105e-02
## [121]  1.967826e-02  1.772609e-02 -2.069141e-04  3.408895e-03  3.858540e-02
## [126]  9.756086e-03  1.313957e-02  1.670874e-03  9.382338e-04  7.162552e-03
## [131]  2.747604e-03  3.216014e-03 -2.070782e-02 -1.860289e-03  1.832684e-02
## [136]  2.056671e-02 -8.011218e-03  1.207687e-02 -1.253576e-02 -1.654730e-02
## [141]  5.404404e-03 -3.862790e-03  7.890954e-04  1.236058e-02  2.222750e-02
## [146]  1.952753e-02  2.046017e-02  1.920996e-02  1.711792e-02  9.671426e-03
## [151]  8.108099e-03  9.392370e-03  8.431180e-03  1.550000e-02  7.561050e-03
## [156]  9.562931e-03  4.009331e-03  9.595050e-03  4.821845e-03  5.529054e-03
## [161]  1.057795e-02  8.635515e-03  1.696581e-02  5.159342e-03  1.276140e-02
## [166]  5.149771e-03  1.326435e-02  9.344879e-03  7.454509e-03  7.899689e-03
## [171]  2.180529e-03  1.039238e-02  3.966643e-03 -1.527446e-05 -8.799877e-03
## [176] -4.856017e-03  6.726719e-03  4.203486e-03  3.912428e-03  1.091666e-02
## [181]  1.056947e-02  1.026537e-02  1.046872e-02  1.836043e-03  6.377502e-03
## [186]  5.250256e-03  1.311948e-02  9.688231e-03  1.358568e-02  6.420475e-03
## [191]  1.104471e-02  2.450223e-03  2.147386e-03  8.369374e-03  6.947901e-03
## [196]  6.826798e-03  1.714016e-02  8.660736e-03  1.085672e-02  7.661820e-03
## [201]  1.471755e-02  1.247303e-02  7.642477e-03  9.402246e-03  8.952063e-03
## [206]  1.310854e-02  1.716210e-02  8.869440e-03  7.786437e-03  1.263541e-02
## [211]  1.780010e-02  2.607722e-03  1.931928e-02  8.400033e-04  5.907855e-03
## [216] -3.291248e-03  6.532798e-03 -2.763429e-03  3.493157e-03  8.504522e-03
## [221]  5.305450e-03  5.059206e-03  3.425783e-04  4.161870e-03  8.436322e-03
## [226]  1.632235e-02  9.004340e-03  6.568272e-03  6.413577e-03  7.415435e-03
## [231]  8.151655e-03  1.026150e-02  4.441660e-03  7.909241e-03  5.121298e-03
## [236]  1.254669e-02  4.049672e-03  1.330546e-04  6.772539e-03  1.355072e-03
## [241]  8.954193e-03  7.281477e-03  4.221427e-03 -4.446926e-03  3.283482e-03
## [246] -9.324910e-03 -2.327598e-02 -1.348388e-02 -7.861651e-04  3.593727e-03
## [251]  9.862621e-03  5.771219e-03  5.548023e-03  6.423993e-03  5.912885e-03
## [256]  1.950314e-04  6.116221e-03  3.180844e-03  1.002896e-02  4.852486e-03
## [261]  3.112998e-03  7.645254e-03  9.462639e-04
```

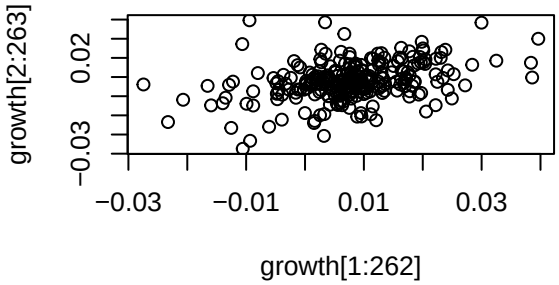
```
par(mfcol=c(2,2))
plot(growth,type='l')
str(growth)
```

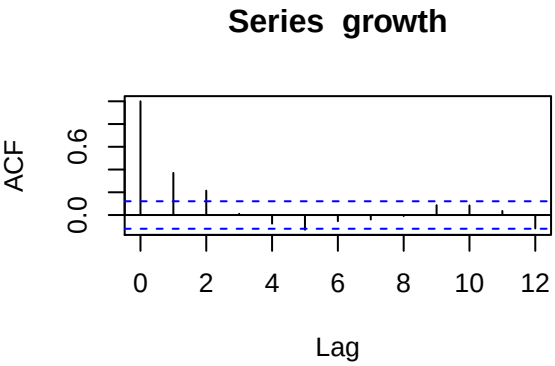
```
##  num [1:263] -0.001534 -0.000822 0.01505 0.015767 0.018241 ...
```

```
plot(growth[1:262],growth[2:263])
plot(growth[1:261],growth[3:263])
acf(growth,lag=12)
```

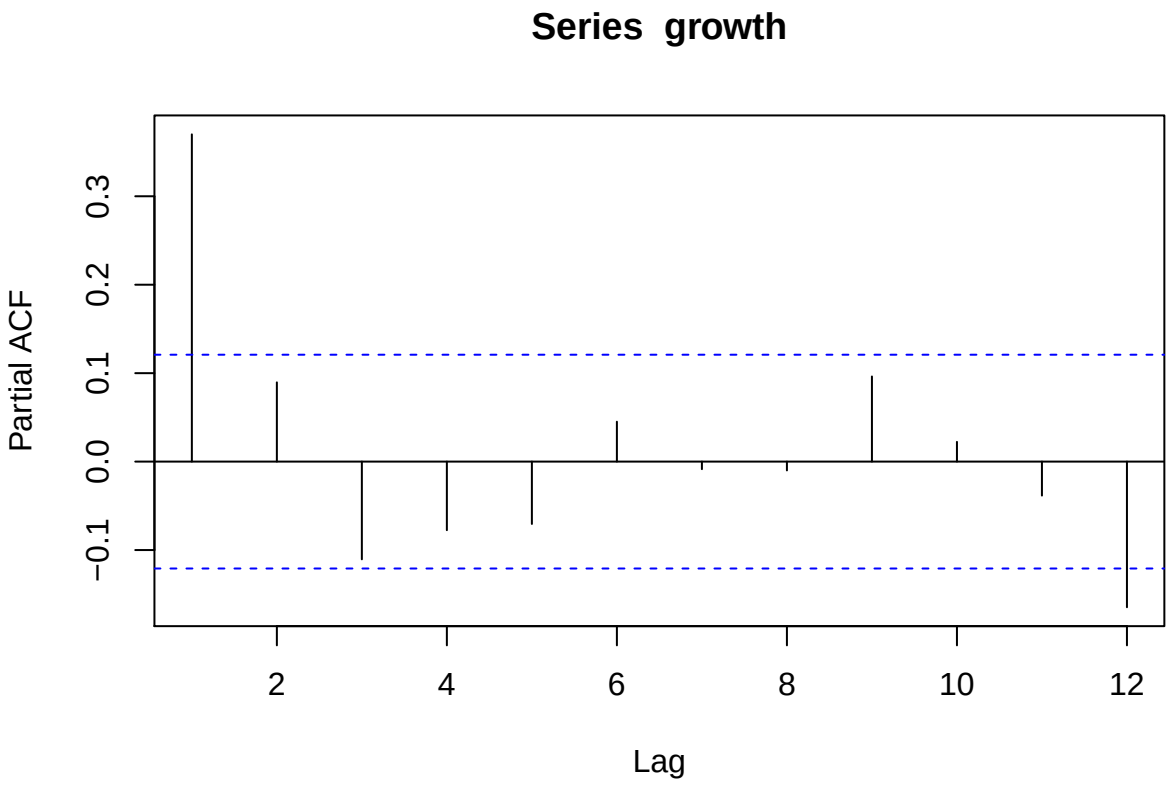









```
par(mfcol=c(1,1))
pacf(growth,lag.max=12)
```




```
#1.B
#given H0 : p1 = p2 = ... = p12 = 0 and H1 : pi != 0
Box.test(growth,lag=12,type='Ljung')
```

```
##
##  Box-Ljung test
##
## data:  growth
## X-squared = 64.259, df = 12, p-value = 3.737e-09
```

```
#1.C
t.test(growth)
```

```
##
##  One Sample t-test
##
## data:  growth
## t = 12.786, df = 262, p-value < 2.2e-16
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  0.006573382 0.008966545
## sample estimates:
##   mean of x
## 0.007769964
```

```r
#since the p-value < 2.2e-16, we can reject null hypothesis H0 : u = 0 at 95 percent confidence interva

#2.A
read.table(file.choose(), header = T)
```

```
##                                  library.quantmod.
## 1                                 library(fBasics)
## 2                                      library(sn)
## 3                    library(PerformanceAnalytics)
## 4                                     library(car)
## 5                                 library(tseries)
## 6                                library(forecast)
## 7                                  library(Matrix)
## 8                                  library(dplyr)
## 9                                 library(tinytex)
## 10                       read.table(file.choose(),
## 11                                          header
## 12                                               =
## 13                                              T)
## 14                   da=read.table("q-gdpmc1.txt")
## 15                                        str(da)
## 16                                   da1=da[-1,4]
## 17                                            GDP
## 18                                             <-
## 19                                 as.numeric(da1)
## 20                                log_GDP=log(GDP)
## 21                                        log_GDP
## 22                           growth=diff(log_GDP)
## 23                                         growth
## 24                              par(mfcol=c(2,2))
## 25                            plot(growth,type='l')
## 26                                     str(growth)
## 27                plot(growth[1:262],growth[2:263])
## 28                plot(growth[1:261],growth[3:263])
## 29                             acf(growth,lag=12)
## 30                              par(mfcol=c(1,1))
## 31                         pacf(growth,lag.max=12)
## 32             Box.test(growth,lag=12,type='Ljung')
## 33                                t.test(growth)
## 34                       read.table(file.choose(),
## 35                                          header
## 36                                               =
## 37                                              T)
## 38                  da1=read.table("d-amzn3dx.txt")
## 39                               AMZN=da1[-1,2]
## 40                                 VW=da1[-1,3]
## 41                                 EW=da1[-1,4]
## 42                                 SP=da1[-1,5]
## 43                                         AMZN
## 44                                           <-
## 45                               as.numeric(AMZN)
## 46                                           VW
## 47                                           <-
```

```
## 48                                    as.numeric(VW)
## 49                                               EW
## 50                                               <-
## 51                                    as.numeric(EW)
## 52                                               SP
## 53                                               <-
## 54                                    as.numeric(SP)
## 55                           returnAMZN=diff(AMZN)
## 56                               returnVW=diff(VW)
## 57                               returnEW=diff(EW)
## 58                               returnSP=diff(SP)
## 59                         table.Stats(returnAMZN)
## 60                           table.Stats(returnVW)
## 61                           table.Stats(returnEW)
## 62                           table.Stats(returnSP)
## 63                                         logAMZN
## 64                                               =
## 65                                     log(1+AMZN)
## 66                                           logVW
## 67                                               =
## 68                                       log(1+VW)
## 69                                           logEW
## 70                                               =
## 71                                       log(1+EW)
## 72                                           logSP
## 73                                               =
## 74                                       log(1+SP)
## 75                             table.Stats(logAMZN)
## 76                               table.Stats(logVW)
## 77                               table.Stats(logEW)
## 78                               table.Stats(logSP)
## 79                                  t.test(logAMZN)
## 80                                par(mfcol=c(2,1))
## 81                                    hist(logAMZN,
## 82                                           breaks
## 83                                               =
## 84                                             40)
## 85  chart.Histogram(logAMZN,method=c('add.normal'))
## 86                         read.table(file.choose(),
## 87                                           header
## 88                                               =
## 89                                               T)
## 90                   da2=read.table("m-abt3dx.txt")
## 91                                    ABT=da2[-1,2]
## 92                                    VW2=da2[-1,3]
## 93                                    EW2=da2[-1,4]
## 94                                    SP2=da2[-1,5]
## 95                                             ABT
## 96                                               <-
## 97                                  as.numeric(ABT)
## 98                                             VW2
## 99                                               <-
## 100                                 as.numeric(VW2)
## 101                                              EW2
```

```
## 102                                          <-
## 103                                 as.numeric(EW2)
## 104                                             SP2
## 105                                              <-
## 106                                 as.numeric(SP2)
## 107                                table.Stats(ABT)
## 108                                table.Stats(VW2)
## 109                                table.Stats(EW2)
## 110                                table.Stats(SP2)
## 111                                          logABT
## 112                                               =
## 113                                     log(1+ABT)
## 114                                          logVW2
## 115                                               =
## 116                                     log(1+VW2)
## 117                                          logEW2
## 118                                               =
## 119                                     log(1+EW2)
## 120                                          logSP2
## 121                                               =
## 122                                     log(1+SP2)
## 123                             table.Stats(logABT)
## 124                             table.Stats(logVW2)
## 125                             table.Stats(logEW2)
## 126                             table.Stats(logSP2)
## 127                                  t.test(logABT)
## 128                               par(mfcol=c(2,1))
## 129                                    hist(logABT,
## 130                                          breaks
## 131                                               =
## 132                                            40)
## 133 chart.Histogram(logABT,method=c('add.normal'))
## 134                                             VW2
## 135                                       t.test(VW2)
## 136                                    T1=length(VW2)
## 137                              VW2_s3=skewness(VW2)
## 138                                          VW2_s3
## 139                            TST=VW2_s3/sqrt(6/T1)
## 140                                             TST
## 141                                PV1=2*pnorm(TST)
## 142                                             PV1
## 143                  VW2_k3=kurtosis(VW2)/sqrt(24/T)
## 144                                          VW2_k3
## 145                           PV2=2*(1-pnorm(VW2_k3))
## 146                                             PV2
## 147                                         logAMZN
## 148                               T2=length(logAMZN)
## 149                        AMZN_S3=skewness(logAMZN)
## 150                                         AMZN_S3
## 151                           TST2=AMZN_S3/sqrt(6/T2)
## 152                                            TST2
## 153                              PV3=2*(1-pnorm(TST2))
## 154                                             PV3
## 155                        AMZN_K3=kurtosis(logAMZN)
```

```
## 156                                        AMZN_K3
## 157                          TST3=AMZN_K3/sqrt(24/T2)
## 158                                           TST3
## 159                             PV4=2*(1-pnorm(TST3))
## 160                                           PV4
## 161                                 t.test(logAMZN)
## 162                               par(mfcol=c(2,1))
## 163                                    acf(logAMZN,
## 164                                         lag=12)
## 165                                  pacf(logAMZN,
## 166                                         lag=12)
## 167                         read.table(file.choose(),
## 168                                          header
## 169                                               =
## 170                                             T)
## 171                    da3=read.table("d-exuseu.txt")
## 172                                   FX=da3[-1,4]
## 173                                           FX
## 174                                           <-
## 175                                  as.numeric(FX)
## 176                                   logFX=log(FX)
## 177                           logreturnFX=diff(logFX)
## 178                                    logreturnFX
## 179                          table.Stats(logreturnFX)
## 180                                 par(mfcol=c(2,1))
## 181                                 hist(logreturnFX)
## 182                        chart.Histogram(logreturnFX,
## 183                             method=c('add.normal'))
## 184                                 t.test(logreturnFX)
```

```
da1=read.table("d-amzn3dx.txt")
AMZN=da1[-1,2]
VW=da1[-1,3]
EW=da1[-1,4]
SP=da1[-1,5]
AMZN <- as.numeric(AMZN)
VW <- as.numeric(VW)
EW <- as.numeric(EW)
SP <- as.numeric(SP)
returnAMZN=diff(AMZN)
returnVW=diff(VW)
returnEW=diff(EW)
returnSP=diff(SP)
table.Stats(returnAMZN)
```

```
##
## Observations    1258.0000
## NAs                0.0000
## Minimum           -0.2160
## Quartile 1        -0.0227
## Median            -0.0006
## Arithmetic Mean    0.0000
## Geometric Mean    -0.0009
## Quartile 3         0.0231
```

```
## Maximum            0.2676
## SE Mean            0.0012
## LCL Mean (0.95)   -0.0023
## UCL Mean (0.95)    0.0023
## Variance           0.0017
## Stdev              0.0418
## Skewness           0.2556
## Kurtosis           5.0515
```

```
table.Stats(returnVW)
```

```
##
## Observations    1258.0000
## NAs                0.0000
## Minimum           -0.1239
## Quartile 1        -0.0116
## Median            -0.0006
## Arithmetic Mean    0.0000
## Geometric Mean    -0.0003
## Quartile 3         0.0116
## Maximum            0.1322
## SE Mean            0.0007
## LCL Mean (0.95)   -0.0013
## UCL Mean (0.95)    0.0014
## Variance           0.0006
## Stdev              0.0246
## Skewness           0.5377
## Kurtosis           6.1186
```

```
table.Stats(returnEW)
```

```
##
## Observations    1258.0000
## NAs                0.0000
## Minimum           -0.1091
## Quartile 1        -0.0104
## Median            -0.0004
## Arithmetic Mean    0.0000
## Geometric Mean    -0.0002
## Quartile 3         0.0111
## Maximum            0.1196
## SE Mean            0.0006
## LCL Mean (0.95)   -0.0012
## UCL Mean (0.95)    0.0012
## Variance           0.0005
## Stdev              0.0216
## Skewness           0.4616
## Kurtosis           5.2125
```

```
table.Stats(returnSP)
```

```
##
```

```
## Observations    1258.0000
## NAs                0.0000
## Minimum           -0.1211
## Quartile 1        -0.0114
## Median            -0.0005
## Arithmetic Mean    0.0000
## Geometric Mean    -0.0003
## Quartile 3         0.0110
## Maximum            0.1421
## SE Mean            0.0007
## LCL Mean (0.95)   -0.0013
## UCL Mean (0.95)    0.0014
## Variance           0.0006
## Stdev              0.0248
## Skewness           0.5276
## Kurtosis           6.6460
```

```
#2.B
logAMZN = log(1+AMZN)
logVW = log(1+VW)
logEW = log(1+EW)
logSP = log(1+SP)
table.Stats(logAMZN)
```

```
##
## Observations    1259.0000
## NAs                0.0000
## Minimum           -0.1368
## Quartile 1        -0.0133
## Median            -0.0005
## Arithmetic Mean    0.0008
## Geometric Mean     0.0004
## Quartile 3         0.0145
## Maximum            0.2374
## SE Mean            0.0008
## LCL Mean (0.95)   -0.0008
## UCL Mean (0.95)    0.0024
## Variance           0.0008
## Stdev              0.0287
## Skewness           0.6279
## Kurtosis           7.2656
```

```
table.Stats(logVW)
```

```
##
## Observations    1259.0000
## NAs                0.0000
## Minimum           -0.0941
## Quartile 1        -0.0063
## Median             0.0008
## Arithmetic Mean    0.0001
## Geometric Mean    -0.0001
## Quartile 3         0.0073
```

```
## Maximum            0.1088
## SE Mean            0.0005
## LCL Mean (0.95)   -0.0009
## UCL Mean (0.95)    0.0010
## Variance           0.0003
## Stdev              0.0167
## Skewness          -0.3177
## Kurtosis           6.2095
```

```
table.Stats(logEW)
```

```
##
## Observations    1259.0000
## NAs                0.0000
## Minimum           -0.0815
## Quartile 1        -0.0064
## Median             0.0012
## Arithmetic Mean    0.0004
## Geometric Mean     0.0003
## Quartile 3         0.0077
## Maximum            0.1020
## SE Mean            0.0004
## LCL Mean (0.95)   -0.0005
## UCL Mean (0.95)    0.0013
## Variance           0.0002
## Stdev              0.0154
## Skewness          -0.3338
## Kurtosis           5.2061
```

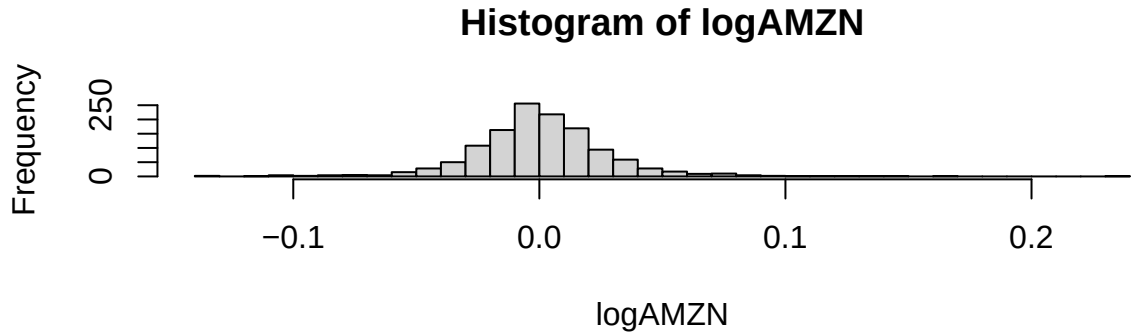
```
table.Stats(logSP)
```

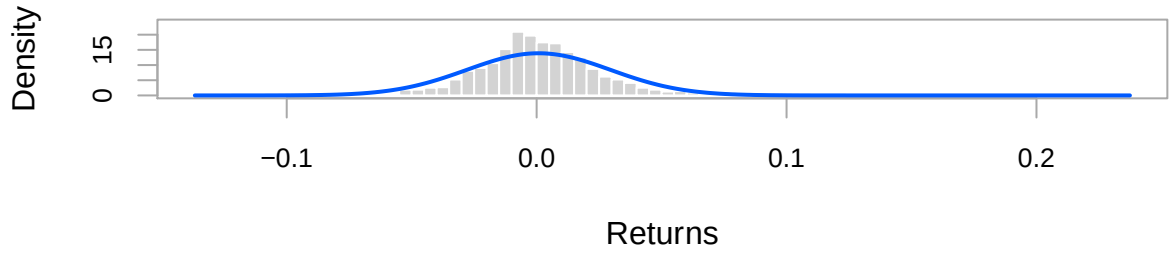
```
##
## Observations    1259.0000
## NAs                0.0000
## Minimum           -0.0947
## Quartile 1        -0.0063
## Median             0.0007
## Arithmetic Mean    0.0000
## Geometric Mean    -0.0002
## Quartile 3         0.0070
## Maximum            0.1096
## SE Mean            0.0005
## LCL Mean (0.95)   -0.0009
## UCL Mean (0.95)    0.0009
## Variance           0.0003
## Stdev              0.0166
## Skewness          -0.2424
## Kurtosis           6.9679
```

```
#2.C
t.test(logAMZN)
```

```
##
##  One Sample t-test
##
## data:  logAMZN
## t = 0.97705, df = 1258, p-value = 0.3287
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -0.0007975567  0.0023801007
## sample estimates:
##   mean of x
## 0.000791272
```

```
#since the calculated p-value = 0.9915 exceed 0.05, we cannot reject null hypothesis at 95 percent conf
#2.D
par(mfcol=c(2,1))
hist(logAMZN, breaks = 40)
chart.Histogram(logAMZN,method=c('add.normal'))
```






```
#3
read.table(file.choose(), header = T)
```

```
##                                 library.quantmod.
## 1                                library(fBasics)
## 2                                     library(sn)
## 3                   library(PerformanceAnalytics)
```

```
## 4                                    library(car)
## 5                                 library(tseries)
## 6                                library(forecast)
## 7                                  library(Matrix)
## 8                                  library(dplyr)
## 9                                 library(tinytex)
## 10                      read.table(file.choose(),
## 11                                        header
## 12                                             =
## 13                                            T)
## 14                  da=read.table("q-gdpmc1.txt")
## 15                                       str(da)
## 16                                  da1=da[-1,4]
## 17                                           GDP
## 18                                            <-
## 19                                as.numeric(da1)
## 20                               log_GDP=log(GDP)
## 21                                       log_GDP
## 22                            growth=diff(log_GDP)
## 23                                        growth
## 24                               par(mfcol=c(2,2))
## 25                            plot(growth,type='l')
## 26                                  str(growth)
## 27               plot(growth[1:262],growth[2:263])
## 28               plot(growth[1:261],growth[3:263])
## 29                           acf(growth,lag=12)
## 30                            par(mfcol=c(1,1))
## 31                      pacf(growth,lag.max=12)
## 32           Box.test(growth,lag=12,type='Ljung')
## 33                               t.test(growth)
## 34                      read.table(file.choose(),
## 35                                        header
## 36                                             =
## 37                                            T)
## 38                   da1=read.table("d-amzn3dx.txt")
## 39                               AMZN=da1[-1,2]
## 40                                 VW=da1[-1,3]
## 41                                 EW=da1[-1,4]
## 42                                 SP=da1[-1,5]
## 43                                         AMZN
## 44                                           <-
## 45                               as.numeric(AMZN)
## 46                                           VW
## 47                                           <-
## 48                                 as.numeric(VW)
## 49                                           EW
## 50                                           <-
## 51                                 as.numeric(EW)
## 52                                           SP
## 53                                           <-
## 54                                 as.numeric(SP)
## 55                           returnAMZN=diff(AMZN)
## 56                               returnVW=diff(VW)
## 57                               returnEW=diff(EW)
```

```
## 58                                 returnSP=diff(SP)
## 59                             table.Stats(returnAMZN)
## 60                               table.Stats(returnVW)
## 61                               table.Stats(returnEW)
## 62                               table.Stats(returnSP)
## 63                                           logAMZN
## 64                                                 =
## 65                                       log(1+AMZN)
## 66                                             logVW
## 67                                                 =
## 68                                         log(1+VW)
## 69                                             logEW
## 70                                                 =
## 71                                         log(1+EW)
## 72                                             logSP
## 73                                                 =
## 74                                         log(1+SP)
## 75                               table.Stats(logAMZN)
## 76                                 table.Stats(logVW)
## 77                                 table.Stats(logEW)
## 78                                 table.Stats(logSP)
## 79                                    t.test(logAMZN)
## 80                                  par(mfcol=c(2,1))
## 81                                      hist(logAMZN,
## 82                                             breaks
## 83                                                 =
## 84                                               40)
## 85  chart.Histogram(logAMZN,method=c('add.normal'))
## 86                           read.table(file.choose(),
## 87                                             header
## 88                                                 =
## 89                                              T)
## 90                   da2=read.table("m-abt3dx.txt")
## 91                                        ABT=da2[-1,2]
## 92                                        VW2=da2[-1,3]
## 93                                        EW2=da2[-1,4]
## 94                                        SP2=da2[-1,5]
## 95                                                 ABT
## 96                                                  <-
## 97                                    as.numeric(ABT)
## 98                                                 VW2
## 99                                                  <-
## 100                                   as.numeric(VW2)
## 101                                                EW2
## 102                                                 <-
## 103                                   as.numeric(EW2)
## 104                                                SP2
## 105                                                 <-
## 106                                   as.numeric(SP2)
## 107                                 table.Stats(ABT)
## 108                                 table.Stats(VW2)
## 109                                 table.Stats(EW2)
## 110                                 table.Stats(SP2)
## 111                                           logABT
```

```
## 112                                                =
## 113                                       log(1+ABT)
## 114                                           logVW2
## 115                                                =
## 116                                       log(1+VW2)
## 117                                           logEW2
## 118                                                =
## 119                                       log(1+EW2)
## 120                                           logSP2
## 121                                                =
## 122                                       log(1+SP2)
## 123                                table.Stats(logABT)
## 124                                table.Stats(logVW2)
## 125                                table.Stats(logEW2)
## 126                                table.Stats(logSP2)
## 127                                     t.test(logABT)
## 128                                  par(mfcol=c(2,1))
## 129                                       hist(logABT,
## 130                                             breaks
## 131                                                  =
## 132                                               40)
## 133  chart.Histogram(logABT,method=c('add.normal'))
## 134                                               VW2
## 135                                        t.test(VW2)
## 136                                     T1=length(VW2)
## 137                                VW2_s3=skewness(VW2)
## 138                                             VW2_s3
## 139                               TST=VW2_s3/sqrt(6/T1)
## 140                                               TST
## 141                                   PV1=2*pnorm(TST)
## 142                                               PV1
## 143                  VW2_k3=kurtosis(VW2)/sqrt(24/T)
## 144                                             VW2_k3
## 145                           PV2=2*(1-pnorm(VW2_k3))
## 146                                               PV2
## 147                                            logAMZN
## 148                                 T2=length(logAMZN)
## 149                         AMZN_S3=skewness(logAMZN)
## 150                                           AMZN_S3
## 151                           TST2=AMZN_S3/sqrt(6/T2)
## 152                                              TST2
## 153                              PV3=2*(1-pnorm(TST2))
## 154                                               PV3
## 155                         AMZN_K3=kurtosis(logAMZN)
## 156                                           AMZN_K3
## 157                          TST3=AMZN_K3/sqrt(24/T2)
## 158                                              TST3
## 159                              PV4=2*(1-pnorm(TST3))
## 160                                               PV4
## 161                                  t.test(logAMZN)
## 162                                par(mfcol=c(2,1))
## 163                                     acf(logAMZN,
## 164                                           lag=12)
## 165                                   pacf(logAMZN,
```

```
## 166                                        lag=12)
## 167                       read.table(file.choose(),
## 168                                         header
## 169                                              =
## 170                                             T)
## 171                    da3=read.table("d-exuseu.txt")
## 172                                      FX=da3[-1,4]
## 173                                             FX
## 174                                             <-
## 175                                  as.numeric(FX)
## 176                                   logFX=log(FX)
## 177                          logreturnFX=diff(logFX)
## 178                                    logreturnFX
## 179                          table.Stats(logreturnFX)
## 180                                 par(mfcol=c(2,1))
## 181                                 hist(logreturnFX)
## 182                       chart.Histogram(logreturnFX,
## 183                            method=c('add.normal'))
## 184                                t.test(logreturnFX)
```

```
da2=read.table("m-abt3dx.txt")
ABT=da2[-1,2]
VW2=da2[-1,3]
EW2=da2[-1,4]
SP2=da2[-1,5]
ABT <- as.numeric(ABT)
VW2 <- as.numeric(VW2)
EW2 <- as.numeric(EW2)
SP2 <- as.numeric(SP2)
table.Stats(ABT)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2341
## Quartile 1       -0.0242
## Median            0.0141
## Arithmetic Mean   0.0141
## Geometric Mean    0.0120
## Quartile 3        0.0558
## Maximum           0.3823
## SE Mean           0.0029
## LCL Mean (0.95)   0.0083
## UCL Mean (0.95)   0.0198
## Variance          0.0042
## Stdev             0.0648
## Skewness          0.0974
## Kurtosis          2.4923
```

```
table.Stats(VW2)
```

```
##
## Observations    492.0000
```

```
## NAs               0.0000
## Minimum          -0.2254
## Quartile 1       -0.0172
## Median            0.0126
## Arithmetic Mean   0.0090
## Geometric Mean    0.0079
## Quartile 3        0.0395
## Maximum           0.1656
## SE Mean           0.0021
## LCL Mean (0.95)   0.0049
## UCL Mean (0.95)   0.0131
## Variance          0.0021
## Stdev             0.0463
## Skewness         -0.5570
## Kurtosis          2.0943
```

```
table.Stats(EW2)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2722
## Quartile 1       -0.0207
## Median            0.0144
## Arithmetic Mean   0.0116
## Geometric Mean    0.0099
## Quartile 3        0.0445
## Maximum           0.2993
## SE Mean           0.0026
## LCL Mean (0.95)   0.0065
## UCL Mean (0.95)   0.0167
## Variance          0.0033
## Stdev             0.0573
## Skewness         -0.2006
## Kurtosis          3.3137
```

```
table.Stats(SP2)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2176
## Quartile 1       -0.0189
## Median            0.0091
## Arithmetic Mean   0.0064
## Geometric Mean    0.0054
## Quartile 3        0.0353
## Maximum           0.1630
## SE Mean           0.0020
## LCL Mean (0.95)   0.0024
## UCL Mean (0.95)   0.0104
## Variance          0.0020
## Stdev             0.0448
```

```
## Skewness         -0.4457
## Kurtosis          1.9097
```

```
logABT = log(1+ABT)
logVW2 = log(1+VW2)
logEW2 = log(1+EW2)
logSP2 = log(1+SP2)
table.Stats(logABT)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2668
## Quartile 1       -0.0245
## Median            0.0140
## Arithmetic Mean   0.0119
## Geometric Mean    0.0098
## Quartile 3        0.0543
## Maximum           0.3238
## SE Mean           0.0029
## LCL Mean (0.95)   0.0062
## UCL Mean (0.95)   0.0176
## Variance          0.0041
## Stdev             0.0643
## Skewness         -0.2980
## Kurtosis          2.0258
```

```
table.Stats(logVW2)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2554
## Quartile 1       -0.0173
## Median            0.0125
## Arithmetic Mean   0.0079
## Geometric Mean    0.0068
## Quartile 3        0.0387
## Maximum           0.1532
## SE Mean           0.0021
## LCL Mean (0.95)   0.0038
## UCL Mean (0.95)   0.0120
## Variance          0.0022
## Stdev             0.0467
## Skewness         -0.8421
## Kurtosis          3.0278
```

```
table.Stats(logEW2)
```

```
##
## Observations    492.0000
## NAs               0.0000
```

```
## Minimum          -0.3178
## Quartile 1       -0.0209
## Median            0.0143
## Arithmetic Mean   0.0099
## Geometric Mean    0.0082
## Quartile 3        0.0435
## Maximum           0.2618
## SE Mean           0.0026
## LCL Mean (0.95)   0.0048
## UCL Mean (0.95)   0.0150
## Variance          0.0033
## Stdev             0.0575
## Skewness         -0.6643
## Kurtosis          4.0045
```

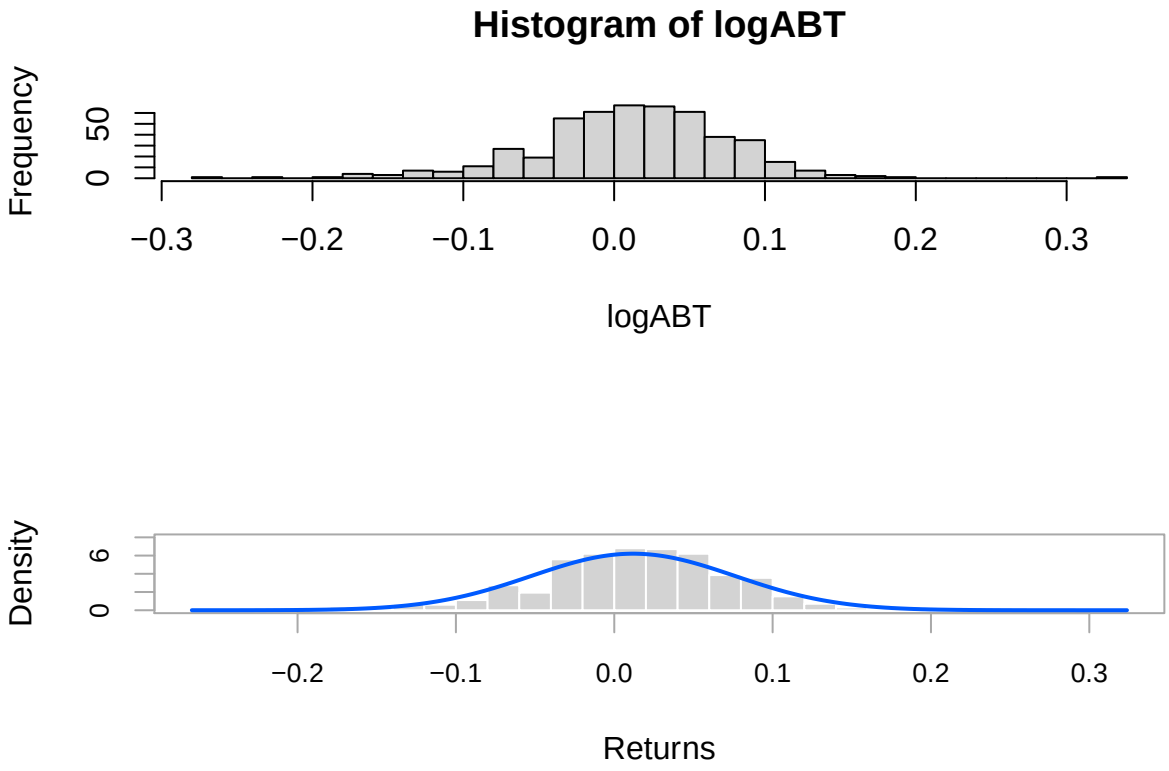
```
table.Stats(logSP2)
```

```
##
## Observations    492.0000
## NAs               0.0000
## Minimum          -0.2454
## Quartile 1       -0.0191
## Median            0.0090
## Arithmetic Mean   0.0054
## Geometric Mean    0.0043
## Quartile 3        0.0347
## Maximum           0.1510
## SE Mean           0.0020
## LCL Mean (0.95)   0.0014
## UCL Mean (0.95)   0.0094
## Variance          0.0020
## Stdev             0.0451
## Skewness         -0.7134
## Kurtosis          2.6821
```

```
t.test(logABT)
```

```
##
##  One Sample t-test
##
## data:  logABT
## t = 4.1143, df = 491, p-value = 4.555e-05
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  0.006229721 0.017618849
## sample estimates:
##  mean of x
## 0.01192429
```

```
#since the calculated p-value = 4.555e-05 less than 0.05, we can reject null hypothesis H0:u = 0 at 95 p
par(mfcol=c(2,1))
hist(logABT, breaks = 40)
chart.Histogram(logABT,method=c('add.normal'))
```




```
#4.A
VW2
```

```
##   [1]  0.028383  0.031349  0.008722  0.005505  0.016375 -0.020896 -0.004254
##   [8]  0.035966 -0.007671  0.008676  0.049764  0.011243 -0.027455 -0.044368
##  [15] -0.007851 -0.051759 -0.024503 -0.008647  0.056954 -0.029648  0.053937
##  [22] -0.000427 -0.120703  0.011425  0.004408  0.002352 -0.023365 -0.045957
##  [29] -0.041982 -0.022942 -0.070879 -0.087756 -0.109718  0.165585 -0.041047
##  [36] -0.027005  0.141600  0.058411  0.030191  0.046497  0.055140  0.051473
##  [43] -0.060385 -0.023557 -0.038010  0.055857  0.031223 -0.010998  0.126011
##  [50]  0.007314  0.026799 -0.010389 -0.009369  0.044487 -0.006157 -0.001435
##  [57]  0.024484 -0.020373  0.005364  0.061591 -0.036337 -0.015760 -0.009246
##  [64]  0.004952 -0.010785  0.051367 -0.012810 -0.013352  0.001574 -0.039280
##  [71]  0.045432  0.008218 -0.055202 -0.009275  0.034013  0.082841  0.023238
##  [78] -0.010751  0.056749  0.042352 -0.006891 -0.110997  0.033792  0.017710
##  [85]  0.049489 -0.026766  0.065618  0.008522 -0.013576  0.046850  0.014991
##  [92]  0.064728  0.001428 -0.072660  0.063603  0.028212  0.065607  0.001015
##  [99] -0.120224  0.052288  0.060090  0.037714  0.069438  0.023553  0.029498
## [106]  0.020093  0.104951 -0.034409 -0.040085  0.015521  0.046184 -0.011268
## [113]  0.013551 -0.010242 -0.003080 -0.056279 -0.063772  0.060162  0.045849
## [120] -0.028096 -0.026209 -0.051126 -0.010099  0.043267 -0.028212 -0.023912
## [127] -0.020526  0.119013  0.016761  0.118636  0.051935  0.014516  0.041850
## [134]  0.030218  0.034673  0.074188  0.013224  0.037837 -0.031567  0.003464
## [141]  0.016059 -0.028049  0.029556 -0.010464 -0.013023 -0.039073  0.013389
## [148]  0.002534 -0.052342  0.023385 -0.020621  0.112689  0.000404 -0.000074
## [155] -0.010685  0.023656  0.085718  0.016896 -0.001747 -0.002186  0.055775
```

```
## [162]  0.017091 -0.000251 -0.004795 -0.039825  0.044441  0.069228  0.043061
## [169]  0.009829  0.072500  0.053885 -0.007900  0.050844  0.014246 -0.059700
## [176]  0.066181 -0.079021  0.049303  0.015093 -0.026388  0.128496  0.047918
## [183]  0.023664 -0.017001  0.005125  0.043662  0.044248  0.037146 -0.020774
## [190] -0.225363 -0.072273  0.070327  0.044880  0.051695 -0.016598  0.010991
## [197]  0.000448  0.051460 -0.007272 -0.028006  0.037202  0.017637 -0.016412
## [204]  0.021075  0.066103 -0.016446  0.021465  0.048204  0.039338 -0.004866
## [211]  0.077131  0.022127 -0.001474 -0.029281  0.017815  0.018295 -0.070115
## [218]  0.014901  0.024140 -0.028286  0.088936 -0.004196 -0.009405 -0.091896
## [225] -0.053843 -0.012504  0.065744  0.029513  0.049078  0.075847  0.028923
## [232]  0.003322  0.040732 -0.044029  0.046795  0.026819 -0.010975  0.017789
## [239] -0.037275  0.106778 -0.001182  0.013354 -0.023700  0.013419  0.006439
## [246] -0.019287  0.039900 -0.020820  0.012447  0.010986  0.040193  0.017768
## [253]  0.012643  0.005402  0.025116 -0.025400  0.029598  0.005440 -0.000795
## [260]  0.039479  0.000641  0.018064 -0.017606  0.019513  0.031466 -0.024224
## [267] -0.045795  0.009478  0.009360 -0.027909  0.030633  0.042597 -0.018363
## [274]  0.014520 -0.037219  0.012609  0.020399  0.039615  0.027041  0.025048
## [281]  0.034007  0.031173  0.040783  0.009305  0.036362 -0.011317  0.042708
## [288]  0.015191  0.028144  0.016310  0.010927  0.025511  0.026800 -0.008298
## [295] -0.053819  0.032463  0.053019  0.013739  0.065569 -0.011388  0.053473
## [302] -0.001122 -0.044868  0.042373  0.071624  0.044095  0.076514 -0.036290
## [309]  0.058499 -0.034436  0.030404  0.017817  0.004502  0.073303  0.051301
## [316]  0.010903 -0.025748  0.031939 -0.023368 -0.157840  0.063828  0.074393
## [323]  0.062024  0.063051  0.038456 -0.038085  0.037932  0.049105 -0.020709
## [330]  0.050820 -0.030716 -0.009987 -0.022846  0.062147  0.036823  0.083758
## [337] -0.039612  0.031820  0.053526 -0.059529 -0.038967  0.051591 -0.017106
## [344]  0.075910 -0.051054 -0.024597 -0.102492  0.020402  0.039499 -0.099263
## [351] -0.070260  0.083832  0.010576 -0.017464 -0.018297 -0.058980 -0.091526
## [358]  0.027835  0.078774  0.017859 -0.015984 -0.021699  0.044685 -0.049632
## [365] -0.010524 -0.070249 -0.081135  0.007965 -0.099965  0.074925  0.061275
## [372] -0.053316 -0.023392 -0.015390  0.010325  0.082762  0.063471  0.016335
## [379]  0.023112  0.024966 -0.009112  0.060318  0.016594  0.045528  0.023049
## [386]  0.015459 -0.010694 -0.024231  0.014125  0.021582 -0.037667  0.002713
## [393]  0.020546  0.017805  0.048210  0.035179 -0.026556  0.022672 -0.016935
## [400] -0.025186  0.037955  0.011534  0.043327 -0.005946  0.010565 -0.020801
## [407]  0.040385  0.003455  0.040033 -0.001640  0.019055  0.012962 -0.031046
## [414] -0.000406 -0.001902  0.025062  0.019424  0.037125  0.023705  0.010833
## [421]  0.019428 -0.013957  0.012949  0.039821  0.038932 -0.014756 -0.031756
## [428]  0.011660  0.040860  0.025835 -0.049222 -0.004419 -0.062151 -0.021653
## [435] -0.010420  0.051105  0.023843 -0.078434 -0.013330  0.010564 -0.098005
## [442] -0.184603 -0.084614  0.022149 -0.077332 -0.100184  0.086693  0.109359
## [449]  0.067789 -0.003098  0.081718  0.031459  0.045235 -0.027998  0.057099
## [456]  0.028419 -0.037098  0.034775  0.063605  0.020011 -0.079141 -0.050721
## [463]  0.070293 -0.042818  0.091518  0.038533  0.005165  0.067152  0.019159
## [470]  0.038164  0.003374  0.028688 -0.014933 -0.018395 -0.022470 -0.057472
## [477] -0.084873  0.113984 -0.006226  0.003702  0.054077  0.041186  0.023993
## [484] -0.006801 -0.065530  0.038156  0.010266  0.026265  0.026539 -0.014100
## [491]  0.006191  0.012534
```

```
t.test(VW2)
```

```
##
##  One Sample t-test
##
```

```
## data:  VW2
## t = 4.3172, df = 491, p-value = 1.912e-05
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  0.004914667 0.013124406
## sample estimates:
##   mean of x
## 0.009019537
```

```
#since the calculated p-value = 1.912e-05 less than 0.05, we can reject null hypothesis H0 : u = 0 at 9
#4.B
T1=length(VW2)
VW2_s3=skewness(VW2)
VW2_s3
```

```
## [1] -0.5570388
```

```
TST=VW2_s3/sqrt(6/T1)
TST
```

```
## [1] -5.044201
```

```
PV1=2*pnorm(TST)
PV1
```

```
## [1] 4.55421e-07
```

```
#4.C
VW2_k3=kurtosis(VW2)/sqrt(24/T)
VW2_k3
```

```
## [1] 0.4275063
```

```
PV2=2*(1-pnorm(VW2_k3))
PV2
```

```
## [1] 0.6690106
```

```
#5.A
logAMZN
```

```
##    [1]  3.822791e-02 -1.086380e-02 -6.981106e-02  3.379429e-04 -1.063940e-02
##    [6] -3.073657e-02 -1.132893e-02 -3.847059e-02  2.183683e-02 -3.225153e-02
##   [11]  1.370061e-03 -2.866103e-03 -4.503124e-03 -1.617816e-02 -5.918435e-02
##   [16]  4.880921e-02 -9.014061e-04 -2.320517e-02 -2.497325e-02  3.509833e-03
##   [21]  4.595663e-02 -4.031275e-02 -9.153768e-03 -2.547372e-02 -5.122803e-02
##   [26]  3.472408e-02  3.587377e-02  2.273264e-02 -9.890753e-03  4.311409e-02
##   [31] -2.514346e-02 -3.818693e-02 -1.213432e-02  2.141212e-02 -5.212311e-02
##   [36]  3.071057e-02  1.637421e-02 -2.179990e-02 -1.150392e-02 -4.354758e-02
##   [41] -5.109963e-02 -3.215446e-02  4.555828e-02 -5.369389e-03 -3.523554e-02
```

```
##   [46]  2.128878e-02 -9.721097e-03  5.636143e-02 -9.576711e-03  2.685028e-02
##   [51] -1.465073e-03 -2.508501e-02  7.483749e-02 -2.156997e-02  4.213761e-02
##   [56]  3.701636e-02 -1.032310e-02 -1.839312e-02 -4.149931e-02 -1.479795e-02
##   [61]  2.183585e-02  7.300508e-02  8.697071e-03 -3.191181e-02  2.542795e-02
##   [66]  3.899240e-04  5.188516e-03 -3.837291e-02  5.897575e-03 -3.869197e-02
##   [71]  8.575128e-03 -1.516149e-03  2.842029e-02 -7.401322e-03  7.867069e-02
##   [76]  9.985013e-04 -7.260292e-03  1.743512e-02 -4.172240e-02  3.999253e-02
##   [81]  1.363364e-02 -1.511973e-02 -2.648053e-02  9.241169e-03 -2.617151e-02
##   [86] -1.814360e-02 -2.769832e-03 -3.398811e-02 -5.343250e-03 -5.233672e-03
##   [91]  2.885759e-02  4.029188e-04 -4.839692e-03  2.554688e-02  4.457053e-03
##   [96]  7.348185e-02 -1.926335e-02 -3.043859e-02  1.218644e-02 -1.154742e-02
##  [101]  2.856122e-02 -6.720532e-03  3.366328e-03  1.568239e-02 -1.717668e-02
##  [106] -1.497120e-03  1.720219e-02  3.626732e-02 -4.699937e-02 -1.499486e-02
##  [111]  2.389144e-03 -2.983054e-02 -1.472996e-02  3.889277e-02  3.145700e-02
##  [116]  1.542541e-02 -5.438763e-03  2.086677e-02 -3.822433e-02 -5.192458e-03
##  [121] -1.297380e-02  1.086476e-02 -5.370884e-02 -2.172836e-02 -1.797458e-02
##  [126]  3.947200e-03 -3.005929e-02  7.808435e-03  6.782944e-03  3.457243e-02
##  [131] -6.084933e-02  2.829600e-04 -3.003765e-02 -3.352886e-02  1.125245e-02
##  [136]  6.930122e-02  3.750956e-03 -4.234816e-02 -9.302131e-03 -7.474867e-03
##  [141]  3.711369e-02  1.097177e-01 -5.221609e-03 -3.020460e-02  2.892754e-02
##  [146]  0.000000e+00 -2.420048e-02 -7.759024e-03 -5.281394e-04  4.392884e-02
##  [151] -1.297684e-02 -1.470661e-02  4.522572e-02  8.997781e-02 -9.581759e-03
##  [156] -6.438684e-03  1.533876e-02 -1.868957e-02 -3.882295e-02 -2.214234e-02
##  [161]  1.027998e-02  1.366520e-02  2.373703e-02 -2.867420e-02 -1.324331e-02
##  [166] -3.670674e-04  2.046711e-02 -3.178689e-02  7.397570e-03 -7.893068e-03
##  [171] -3.451174e-02  1.475658e-02  2.457261e-02 -2.646821e-02 -2.953077e-02
##  [176]  3.545980e-02 -1.533498e-02 -1.233679e-02  1.781340e-02 -9.576778e-02
##  [181]  6.703415e-02  5.715886e-02 -7.789452e-02 -4.322697e-02 -2.540397e-02
##  [186]  2.985293e-02 -1.933064e-02 -1.097702e-01  1.384916e-01 -4.468884e-02
##  [191] -3.242609e-02 -5.358330e-03 -2.677323e-02 -1.085512e-01  4.183268e-02
##  [196] -8.584987e-02  4.454066e-03  9.765107e-02 -1.046086e-01 -1.367595e-01
##  [201]  3.171667e-02  7.132503e-03  4.478692e-02 -5.311284e-02 -4.789451e-03
##  [206]  6.579309e-03 -2.739895e-02  1.258349e-02  1.224778e-01  1.505412e-02
##  [211] -3.169016e-03  9.302596e-03 -2.601651e-02  4.693607e-02 -1.173128e-01
##  [216] -9.604185e-02  4.127917e-02 -1.535834e-02 -4.559692e-02 -1.080040e-01
##  [221]  7.796794e-02 -7.340653e-02 -5.059985e-02 -3.200060e-02 -7.003413e-02
##  [226] -2.285929e-02  7.795407e-02  1.153445e-01 -7.320731e-03  4.109684e-02
##  [231] -2.908078e-02 -5.363815e-02  1.763459e-02  9.312324e-02  4.561465e-02
##  [236]  1.967027e-02  6.322923e-02 -3.116852e-03 -3.071079e-02 -2.960905e-02
##  [241]  6.031963e-02 -4.796096e-02  7.453217e-02  1.039578e-02 -2.090091e-02
##  [246] -1.003518e-02 -3.392810e-02  2.457553e-02  7.023279e-03  6.588250e-03
##  [251] -4.705387e-02  2.715786e-02  1.019189e-02  5.832740e-02 -5.534286e-03
##  [256]  5.925239e-02 -2.043028e-02  1.693774e-02 -2.929082e-02 -6.685908e-02
##  [261] -9.093218e-03 -5.925331e-02  5.905822e-02  2.911757e-03 -6.300157e-02
##  [266]  4.243957e-02 -1.194303e-02  1.372242e-02 -1.994866e-02 -2.426913e-02
##  [271]  3.887161e-02 -7.174677e-03  1.624589e-01  3.884757e-02  3.912648e-02
##  [276] -4.059910e-02  3.413086e-02  5.196607e-02  2.401115e-03 -5.231171e-02
##  [281]  1.635552e-02 -6.140816e-03 -1.100433e-02 -2.545525e-02  1.096566e-02
##  [286] -6.435665e-03  3.036527e-02 -3.424678e-02  6.112991e-02 -2.923418e-02
##  [291] -2.173858e-02  3.854837e-02 -4.417866e-02 -4.688976e-03  4.917580e-02
##  [296] -6.171904e-04 -4.872082e-02 -1.964368e-02  8.277282e-02  4.216637e-02
##  [301]  1.506003e-02 -1.374706e-02 -2.433573e-02  6.320294e-02 -1.402984e-03
##  [306] -1.627167e-02 -1.998997e-03  7.726840e-02 -3.733849e-02 -5.646914e-03
##  [311]  1.766112e-02 -4.397070e-02  1.296163e-02  2.761128e-02  8.166664e-04
```

```
##  [316]  3.791120e-02  2.368918e-02 -2.305656e-03 -3.231557e-02  1.928092e-02
##  [321]  3.560167e-02 -1.045951e-02 -2.202989e-02 -3.304502e-02  3.343284e-02
##  [326]  1.030274e-02 -6.168989e-03  1.497038e-02  5.825002e-03  1.764638e-02
##  [331]  4.665551e-02 -1.599220e-02 -8.699733e-03 -3.218750e-02  9.107401e-03
##  [336] -1.956414e-02  1.020574e-02  2.635172e-02  1.098397e-03 -3.361159e-02
##  [341] -1.691831e-02  8.431356e-03 -8.687628e-03 -4.918184e-02  1.232474e-02
##  [346] -2.030884e-02  3.142987e-02  2.496575e-02  1.283176e-03 -2.611710e-02
##  [351] -4.221900e-03  3.571071e-02 -1.659290e-02  7.108673e-03  4.369440e-03
##  [356]  6.286212e-02  2.238459e-02  8.792235e-03 -1.868745e-03  2.357394e-02
##  [361] -1.379978e-02  8.302439e-03 -5.642891e-03 -1.044839e-02 -1.896776e-02
##  [366] -1.076170e-02 -1.246031e-02  6.067555e-03 -1.284717e-02  1.659061e-02
##  [371] -4.701404e-02 -1.874663e-02  2.026233e-02  3.629528e-02  2.023195e-02
##  [376] -1.018570e-02  7.559356e-03 -2.493224e-02 -2.833878e-02 -1.550051e-02
##  [381] -3.213690e-02  2.261729e-02  9.520536e-03 -6.036181e-03  4.828051e-02
##  [386]  5.874710e-03  3.123410e-02  1.828285e-02 -3.023566e-03  2.734568e-02
##  [391]  8.802147e-03 -2.475060e-03  5.563715e-02 -8.188165e-02 -2.635938e-02
##  [396]  8.745645e-03 -7.559501e-03  2.053667e-02 -3.840365e-03  1.940059e-02
##  [401] -1.893412e-02 -1.775570e-02  2.132724e-03  1.001271e-02 -1.036756e-02
##  [406] -1.047669e-02  2.831726e-02 -1.594749e-02 -1.213028e-02 -3.061489e-02
##  [411]  1.299223e-02  1.065899e-02  1.304652e-02  1.076386e-02 -5.899367e-03
##  [416] -3.675747e-03 -2.259551e-03  3.683209e-03 -1.855509e-02 -1.915326e-02
##  [421] -2.532088e-02 -1.296873e-02  4.086638e-03  5.212392e-03  2.541333e-02
##  [426]  1.642831e-02  1.938784e-02  8.195326e-03 -8.076528e-03 -3.703851e-03
##  [431]  8.211164e-02 -2.871118e-03 -1.770567e-03  3.096202e-03  3.461879e-02
##  [436] -1.472082e-02 -2.927280e-03 -1.741273e-02  1.849785e-02 -5.328170e-03
##  [441]  1.772203e-02 -2.516397e-02 -1.315718e-02 -1.322000e-02  2.494819e-02
##  [446]  3.310590e-02  1.321431e-02  5.132805e-03 -2.229264e-02  1.305541e-02
##  [451]  2.735638e-02 -1.498979e-02 -7.212951e-03 -6.736640e-03  3.163989e-03
##  [456] -1.656139e-02  3.209485e-04  2.374022e-01  5.059995e-02 -2.083454e-02
##  [461] -3.529220e-03  7.673483e-03 -3.121413e-02  2.519683e-04 -3.962842e-03
##  [466] -1.078697e-02  2.953356e-02  4.530601e-02  3.717083e-03  2.710239e-02
##  [471] -1.845702e-03  4.760650e-03  1.852043e-02 -1.043223e-02 -2.587344e-03
##  [476]  3.049535e-04 -1.767326e-02  5.180558e-03  2.543380e-02 -4.511017e-04
##  [481]  8.165571e-03 -1.723365e-02  3.116237e-02  1.887769e-02  2.671593e-02
##  [486] -7.620966e-03 -2.575893e-02 -2.479999e-02 -7.452777e-04 -2.109903e-02
##  [491]  3.052436e-02 -9.127529e-03 -2.086415e-02 -8.791533e-03 -1.446309e-02
##  [496] -1.136028e-02  1.229510e-02  3.299561e-02  7.203989e-03  3.807005e-02
##  [501] -3.388735e-03  6.047676e-03  7.177424e-04 -2.116746e-02 -1.453817e-02
##  [506] -4.619654e-03  5.882663e-03 -1.828210e-02 -1.715938e-02  2.671690e-02
##  [511] -2.435007e-02 -2.296161e-02  1.372537e-02 -1.372577e-02 -1.650361e-03
##  [516]  3.690183e-03 -1.444483e-02  6.655801e-03 -4.185273e-02 -9.265795e-03
##  [521] -6.922908e-03  2.700117e-02  2.637023e-02 -4.931138e-03 -5.355796e-02
##  [526] -6.328986e-03  8.262769e-03 -2.689033e-02  1.242845e-02 -4.781413e-03
##  [531]  1.021861e-02 -5.693175e-03  2.299556e-02 -3.587427e-03 -1.796033e-02
##  [536] -1.043425e-02  1.510337e-02 -4.754284e-03  4.161330e-03 -6.546381e-03
##  [541]  2.093238e-02 -1.277728e-02  1.690570e-03  5.055812e-02  7.917573e-03
##  [546]  2.863895e-03  2.075414e-02  2.952637e-03  9.265938e-03 -9.964481e-03
##  [551]  1.303369e-02  2.325060e-02 -1.326357e-02 -5.247745e-03  5.020377e-03
##  [556] -3.420844e-03  1.075397e-02 -1.831979e-02  9.205761e-04 -9.317271e-03
##  [561] -9.482820e-03  5.092978e-02  2.446006e-03  4.439015e-04  1.074012e-02
##  [566] -5.940611e-03 -2.960081e-02 -2.430952e-03  3.048362e-02 -5.102998e-03
##  [571]  4.416520e-02 -6.405471e-03  8.106057e-03 -7.392256e-03  2.897125e-02
##  [576]  1.061744e-02 -2.534242e-02  1.820342e-03  1.235042e-02  1.534664e-02
##  [581]  2.468773e-02 -4.399473e-02  2.394013e-02 -3.521276e-02 -1.897897e-02
```

```
##  [586]  1.693479e-02 -3.321351e-02  2.840961e-03 -5.732513e-02  8.437306e-03
##  [591] -1.710140e-02 -2.940821e-02  4.925482e-02 -6.342068e-03  2.580224e-02
##  [596] -1.809065e-02 -2.259332e-02  2.928707e-03 -2.061300e-02 -1.347336e-02
##  [601] -3.995570e-02  2.483309e-02 -4.900990e-03  2.218899e-02 -1.330310e-02
##  [606]  2.793224e-02 -9.835207e-03 -1.785343e-02  2.460578e-02  1.921128e-02
##  [611] -4.763788e-02 -6.209237e-03 -2.636656e-02 -7.814453e-03  4.396808e-02
##  [616] -1.462068e-03  6.481947e-03  2.401629e-02  4.728882e-04 -7.990842e-03
##  [621] -4.771138e-04 -2.641277e-02 -1.984969e-03 -7.031664e-03 -2.602575e-02
##  [626]  2.231320e-02 -2.680199e-02 -8.122524e-02  5.967161e-03  1.543920e-02
##  [631] -1.653800e-02  8.394666e-03  3.016056e-02  2.429936e-02  8.909195e-03
##  [636]  1.900623e-02  3.405451e-02 -2.835015e-03 -1.010791e-02 -2.968425e-02
##  [641]  1.216273e-02  1.333111e-03 -2.248183e-02  2.223203e-02 -1.004428e-02
##  [646] -3.961838e-03 -1.078394e-02  0.000000e+00 -2.307661e-03  8.775383e-03
##  [651]  1.832310e-02  1.938293e-02  4.128589e-02  1.958082e-03  3.825673e-03
##  [656]  3.966125e-03  9.041007e-03 -3.212554e-02  5.307888e-03 -1.488625e-02
##  [661]  1.100621e-02  2.188966e-02  6.112282e-03 -1.617308e-02  1.487893e-03
##  [666] -9.121474e-03 -1.648615e-02  1.845859e-02 -1.581236e-02  1.415534e-02
##  [671] -2.276210e-02  8.365908e-03  5.955393e-02  2.032210e-02  2.613255e-02
##  [676] -1.137647e-02  1.389502e-02  8.872523e-03  1.456738e-02  1.829561e-02
##  [681]  4.676050e-03 -2.060121e-03  1.825830e-02  1.315135e-03  1.989086e-02
##  [686] -3.806235e-03  7.271498e-03  6.695535e-03  5.026907e-02 -8.496997e-03
##  [691]  2.068858e-03 -4.455913e-03 -1.221328e-02 -2.155975e-02  1.087070e-02
##  [696]  3.465840e-02 -3.459455e-02  5.583384e-03 -4.617645e-03 -1.633367e-02
##  [701]  2.229462e-02 -8.407242e-03  2.317313e-03  5.692272e-02 -6.581611e-03
##  [706] -3.035303e-02  0.000000e+00  3.893702e-02  2.490430e-02 -7.692958e-04
##  [711]  5.605261e-03 -1.446106e-02 -4.008021e-03 -9.696863e-03 -1.616800e-02
##  [716]  1.240869e-02  2.317830e-02  2.726280e-03  1.083311e-02  7.118603e-03
##  [721] -1.005135e-02  1.781143e-02 -1.722449e-02 -2.791400e-02 -4.178287e-02
##  [726] -7.072954e-03  3.606489e-03  3.609468e-02  3.951184e-03  3.323553e-02
##  [731] -1.293631e-02  5.240742e-02  1.409007e-03  1.114862e-02 -2.305064e-02
##  [736]  6.534603e-03 -1.130064e-04 -4.826629e-03  1.339982e-02 -7.214965e-03
##  [741] -2.718692e-03 -8.201541e-03  4.394331e-03 -7.831587e-03 -1.780584e-03
##  [746]  9.327365e-03  1.396996e-02 -2.587344e-03  3.164788e-02  7.934439e-03
##  [751]  5.399854e-05 -1.181452e-02 -2.468043e-03 -5.781682e-03  1.251140e-02
##  [756] -3.386728e-03 -1.516237e-02  2.317341e-02  4.278833e-03  1.294189e-02
##  [761] -8.358838e-03 -1.992985e-03 -4.376563e-03 -1.842697e-03 -1.410995e-03
##  [766]  7.846138e-03  1.720710e-02  1.315805e-02 -2.316832e-02 -2.662636e-02
##  [771] -2.526755e-02 -3.218173e-03 -8.483598e-04 -7.441620e-03  5.036606e-02
##  [776] -7.489597e-02 -8.803639e-03  1.445502e-02  8.217147e-03  1.036463e-03
##  [781]  1.269902e-02  2.837969e-03  3.689011e-02  1.216175e-02  4.898980e-03
##  [786]  1.619416e-02  6.162970e-03 -7.326775e-03 -1.283097e-02  6.090416e-03
##  [791] -6.733620e-03 -3.314425e-02 -2.094686e-02  6.037736e-03 -2.873123e-03
##  [796] -2.253809e-02 -2.246751e-02  1.511223e-02  4.466013e-03 -6.503099e-03
##  [801] -1.520197e-02 -1.303661e-02  1.285996e-02 -1.736388e-02  1.155004e-02
##  [806] -8.004954e-03 -9.945291e-03 -2.304654e-03 -2.290738e-02  5.267104e-03
##  [811]  1.657783e-02 -1.176898e-02  1.658963e-02  3.436471e-02 -7.012458e-04
##  [816] -9.578730e-03  3.064462e-02  2.711699e-02  3.949192e-03  0.000000e+00
##  [821]  1.547957e-02  1.276419e-02 -1.374807e-02  1.169534e-02 -1.082586e-03
##  [826] -3.633594e-03 -1.953354e-02  9.979043e-03 -2.581329e-03 -1.000488e-02
##  [831] -9.320299e-03  2.688383e-03  2.784958e-02  1.092609e-02 -2.531201e-03
##  [836] -1.697018e-02  7.567039e-02 -7.965642e-03  3.785825e-03  2.710531e-02
##  [841] -1.371259e-02  7.629819e-03 -1.440526e-02  2.482915e-03  1.606428e-02
##  [846]  1.551600e-02  2.155675e-03  8.234999e-03 -1.717973e-02 -5.088811e-02
##  [851]  1.187620e-02  1.163604e-02  8.664356e-03 -7.803044e-04 -1.230844e-02
```

```
##  [856] -1.514816e-02 -5.239703e-03  1.415140e-02 -4.471984e-03  1.310081e-02
##  [861] -2.207793e-02  6.501817e-03 -2.790988e-02 -1.406444e-02  9.967162e-03
##  [866]  2.662453e-03  8.630649e-03 -1.674644e-02 -1.287829e-03  1.950945e-02
##  [871] -2.117461e-02 -1.260714e-02  1.470239e-02  7.217888e-03  3.409123e-02
##  [876] -1.347640e-02  1.311660e-02 -8.326570e-03  4.419199e-02  5.451116e-03
##  [881]  9.003348e-03  1.516849e-03  2.415686e-02  1.750784e-02  4.680032e-03
##  [886]  1.183469e-02  7.079878e-03 -2.660171e-02 -6.229362e-03  1.068966e-02
##  [891] -1.472184e-02  1.176650e-02 -6.314897e-03  3.040311e-02 -1.157776e-02
##  [896] -1.091536e-02  1.540572e-02 -1.409284e-02  3.226788e-03  3.819134e-02
##  [901]  6.191791e-03 -6.182070e-03 -5.407595e-03 -4.443999e-02 -8.252962e-03
##  [906] -4.122728e-02  6.036742e-03 -4.541691e-02  5.713808e-02 -5.492092e-02
##  [911]  2.155599e-02  1.966830e-02  3.207849e-03 -2.631010e-02 -8.892421e-03
##  [916] -7.089790e-02 -1.986501e-02 -7.798328e-03  8.634007e-02  9.295678e-04
##  [921] -8.813727e-03  3.700865e-02  3.578501e-02  2.103324e-02  2.022803e-02
##  [926] -1.257676e-02 -1.202299e-02  2.900428e-02  1.706162e-02 -1.207764e-02
##  [931] -2.738970e-02  2.416272e-02  1.362081e-02  1.375299e-02  1.873834e-02
##  [936]  5.373790e-02  9.937459e-03 -3.554532e-02 -5.933569e-03 -3.797397e-02
##  [941]  1.700553e-03  2.752372e-02 -2.484407e-02  2.423495e-02 -3.216065e-02
##  [946] -2.831512e-02 -1.985073e-02  2.449996e-03  3.240136e-02  9.124247e-03
##  [951]  1.447671e-02  2.885759e-02  1.782420e-02  5.632110e-03 -2.790891e-03
##  [956]  4.374604e-02 -1.791349e-02  6.375632e-03 -5.196721e-02  8.943884e-03
##  [961]  4.995502e-03  1.198193e-02 -4.502038e-02 -1.353250e-01  4.137032e-02
##  [966]  4.971545e-02 -1.768751e-02 -6.601744e-03  1.643618e-02  1.230696e-02
##  [971] -8.326570e-03  2.399120e-03  4.551626e-03 -3.154846e-02 -2.038075e-03
##  [976]  3.083081e-02  7.059026e-03 -5.036663e-03 -2.717594e-02 -3.587384e-02
##  [981] -3.675216e-02 -4.084491e-02  1.619613e-02 -1.757046e-02 -3.549765e-02
##  [986]  6.243475e-02 -3.011700e-02  2.049063e-02  2.485845e-02 -5.595626e-03
##  [991]  1.070427e-03 -2.189495e-02  1.719629e-02 -2.509219e-02  1.329819e-02
##  [996] -1.835136e-02 -4.870822e-02 -1.663383e-03  5.809094e-03  0.000000e+00
## [1001] -1.070510e-02  1.763164e-02 -4.579475e-02  2.648905e-02 -9.823089e-03
## [1006] -5.713290e-03 -1.359398e-02 -1.730150e-04 -4.380581e-03  3.368426e-02
## [1011] -8.526245e-03  5.628416e-04  2.776302e-02 -2.242763e-02  4.358488e-03
## [1016] -2.456014e-03 -1.674034e-02  1.405378e-02  1.799609e-02  4.193529e-02
## [1021]  2.610235e-02 -1.826785e-02 -2.567685e-02  4.878083e-03  4.268875e-03
## [1026]  2.894891e-02  1.056895e-02 -1.661934e-02  1.184754e-02 -8.017155e-02
## [1031]  1.251437e-02  3.227162e-02 -2.448738e-02  5.716629e-03  6.979586e-03
## [1036] -2.699641e-03  3.022428e-03  3.208764e-02 -1.515147e-03 -3.635594e-02
## [1041] -2.491891e-02  1.418196e-02 -1.315865e-03 -9.260749e-03 -9.403071e-03
## [1046]  1.341100e-03 -3.355624e-03  2.909170e-02 -2.261480e-02  1.946105e-03
## [1051] -4.118469e-03  5.339718e-03  4.593434e-03  1.469056e-02  2.084032e-02
## [1056] -1.785139e-02 -5.058774e-03  6.521687e-03 -1.270335e-02  1.183568e-02
## [1061]  3.356361e-03  2.536780e-03  3.605031e-02 -3.124877e-03  3.487910e-03
## [1066]  1.362772e-02  3.936109e-02  1.258843e-02 -2.105307e-02  1.700558e-02
## [1071] -1.031603e-02 -2.227015e-02  8.096138e-03 -2.880902e-02  2.059877e-03
## [1076] -1.304877e-02 -2.581639e-02  5.281031e-03  1.436631e-02 -1.176291e-02
## [1081] -1.583065e-02  1.545988e-02  1.412576e-02  1.569877e-04 -5.878243e-03
## [1086] -9.201202e-03  1.104181e-02  2.126137e-02  8.042572e-03  1.462254e-01
## [1091]  2.201684e-02 -8.053341e-03  9.125835e-04 -3.480048e-03 -2.408370e-02
## [1096]  5.209407e-03 -5.611716e-03 -4.117465e-03  1.650110e-02  4.357492e-03
## [1101] -2.108371e-02  6.527648e-03 -1.472083e-03 -2.576919e-02 -2.087028e-02
## [1106]  1.972419e-02 -1.282793e-02  9.015240e-03 -9.433355e-03 -1.097804e-02
## [1111]  8.699053e-03 -2.604012e-02  1.743512e-02 -2.227424e-02  3.004121e-02
## [1116] -6.358170e-03  2.056508e-02  5.315846e-03 -1.464071e-03 -9.104319e-03
## [1121] -3.700685e-04 -7.839650e-03 -1.304851e-03  1.802261e-02  1.954671e-02
```

```
## [1126]  6.134148e-03 -4.518192e-03 -1.102354e-02  7.160304e-03 -9.452535e-03
## [1131]  2.486235e-02  4.399903e-05 -1.928782e-02  3.131551e-02  4.239003e-03
## [1136]  9.155807e-04 -1.081932e-02 -8.891412e-03  0.000000e+00 -2.497018e-02
## [1141] -5.161297e-03 -1.387988e-02  1.397095e-02 -1.095782e-02  4.249956e-03
## [1146]  2.485908e-03  3.922648e-02  9.329346e-03 -1.003720e-02 -1.322811e-02
## [1151] -2.722321e-02  1.354485e-02  7.573622e-02 -5.196478e-03 -1.188738e-02
## [1156] -5.199494e-03 -5.530264e-03  1.786251e-02 -4.179723e-03  1.092312e-02
## [1161] -9.257721e-03 -1.365932e-03 -5.612722e-03 -1.332888e-03  3.221804e-03
## [1166]  1.797743e-02  1.724544e-02 -1.574238e-03 -3.405793e-03 -3.752030e-03
## [1171]  1.512799e-02 -7.854768e-03  1.865589e-02 -7.433561e-03  8.937937e-03
## [1176]  4.095602e-03 -3.648648e-03  8.291530e-03 -1.572235e-03 -6.719526e-03
## [1181]  2.074042e-02  3.040311e-02 -7.942458e-03 -5.538308e-03 -1.560122e-04
## [1186]  1.787332e-02  3.950188e-03 -1.259498e-02  2.902783e-03  1.126036e-02
## [1191] -3.330540e-03 -1.288870e-02 -1.040494e-02 -9.245609e-03 -1.111252e-02
## [1196]  2.733984e-02 -8.886367e-03 -9.124502e-03 -5.610711e-03  2.100680e-02
## [1201]  1.762280e-02 -7.553456e-03  2.125739e-03 -3.176625e-02 -2.407653e-02
## [1206] -3.147950e-03 -7.645150e-03  7.480948e-03 -9.834835e-04  1.444812e-02
## [1211] -1.072430e-02 -2.000681e-02 -2.625876e-02  2.264434e-03 -2.515269e-02
## [1216] -2.467904e-02  6.646541e-02 -2.269868e-02 -3.239241e-03  1.215261e-03
## [1221]  8.174498e-03  1.368986e-02 -2.342115e-02 -2.050888e-02 -4.584493e-03
## [1226]  7.067502e-04  5.738353e-04 -1.623914e-02 -1.060099e-02  2.077568e-02
## [1231]  1.969576e-02  1.756287e-02  1.801574e-02  7.741954e-03  1.547071e-02
## [1236] -8.964016e-04  1.512011e-02  1.669486e-02  3.099193e-03 -6.851417e-03
## [1241]  8.588017e-03  5.813071e-03 -2.325702e-03 -4.020808e-04 -2.194811e-02
## [1246]  1.171610e-02  4.258918e-03 -2.028055e-03 -8.232797e-03  1.856755e-02
## [1251]  2.543575e-02 -9.298094e-03  1.351328e-02 -1.766918e-02  6.595204e-03
## [1256] -3.938865e-02 -1.293837e-03 -1.268512e-02  2.294181e-02
```

```
T2=length(logAMZN)
AMZN_S3=skewness(logAMZN)
AMZN_S3
```

```
## [1] 0.6278955
```

```
TST2=AMZN_S3/sqrt(6/T2)
TST2
```

```
## [1] 9.095459
```

```
PV3=2*(1-pnorm(TST2))
PV3
```

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

```
AMZN_K3=kurtosis(logAMZN)
AMZN_K3
```

```
## [1] 7.26559
```

```r
TST3=AMZN_K3/sqrt(24/T2)
TST3
```

```
## [1] 52.62331
```

```r
PV4=2*(1-pnorm(TST3))
PV4
```

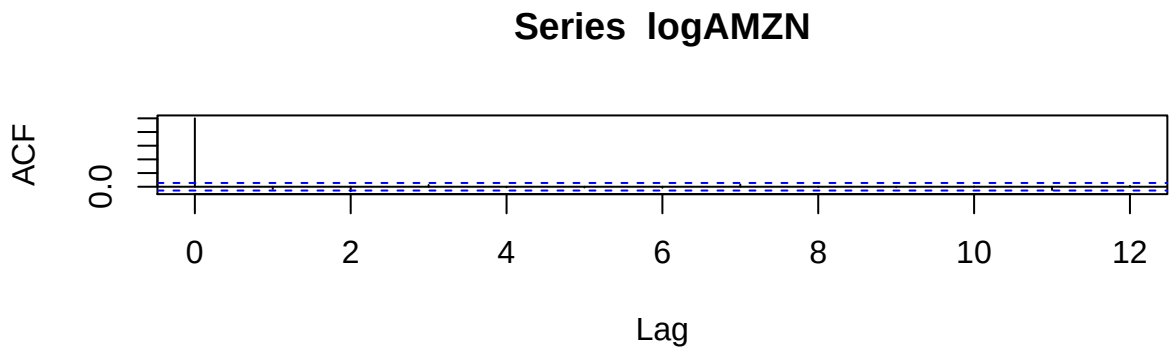
```
## [1] 0
```

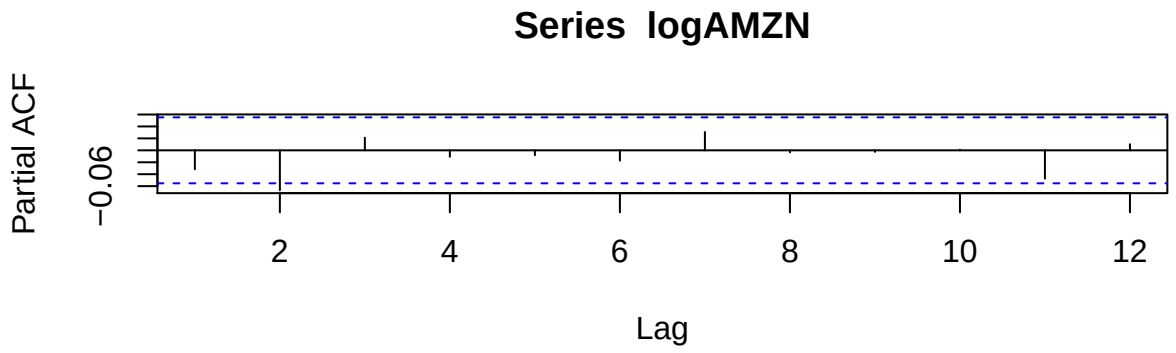
```r
t.test(logAMZN)
```

```
##
##  One Sample t-test
##
## data:  logAMZN
## t = 0.97705, df = 1258, p-value = 0.3287
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -0.0007975567  0.0023801007
## sample estimates:
##   mean of x
## 0.000791272
```

```r
#since the calculated p-value = 0.3287

#5.B
par(mfcol=c(2,1))
acf(logAMZN, lag=12)
pacf(logAMZN, lag=12)
```






```
#6.A
read.table(file.choose(), header = T)
```

```
##                                  library.quantmod.
## 1                                 library(fBasics)
## 2                                      library(sn)
## 3                  library(PerformanceAnalytics)
## 4                                     library(car)
## 5                                 library(tseries)
## 6                                library(forecast)
## 7                                  library(Matrix)
## 8                                  library(dplyr)
## 9                                 library(tinytex)
## 10                    read.table(file.choose(),
## 11                                        header
## 12                                             =
## 13                                            T)
## 14                 da=read.table("q-gdpmc1.txt")
## 15                                       str(da)
## 16                              da1=da[-1,4]
## 17                                         GDP
## 18                                          <-
## 19                              as.numeric(da1)
## 20                             log_GDP=log(GDP)
## 21                                       log_GDP
## 22                          growth=diff(log_GDP)
```

```
## 23                                        growth
## 24                              par(mfcol=c(2,2))
## 25                            plot(growth,type='l')
## 26                                   str(growth)
## 27               plot(growth[1:262],growth[2:263])
## 28               plot(growth[1:261],growth[3:263])
## 29                           acf(growth,lag=12)
## 30                            par(mfcol=c(1,1))
## 31                        pacf(growth,lag.max=12)
## 32           Box.test(growth,lag=12,type='Ljung')
## 33                               t.test(growth)
## 34                    read.table(file.choose(),
## 35                                        header
## 36                                             =
## 37                                            T)
## 38         da1=read.table("d-amzn3dx.txt")
## 39                               AMZN=da1[-1,2]
## 40                                 VW=da1[-1,3]
## 41                                 EW=da1[-1,4]
## 42                                 SP=da1[-1,5]
## 43                                         AMZN
## 44                                           <-
## 45                               as.numeric(AMZN)
## 46                                           VW
## 47                                           <-
## 48                                 as.numeric(VW)
## 49                                           EW
## 50                                           <-
## 51                                 as.numeric(EW)
## 52                                           SP
## 53                                           <-
## 54                                 as.numeric(SP)
## 55                           returnAMZN=diff(AMZN)
## 56                               returnVW=diff(VW)
## 57                               returnEW=diff(EW)
## 58                               returnSP=diff(SP)
## 59                         table.Stats(returnAMZN)
## 60                           table.Stats(returnVW)
## 61                           table.Stats(returnEW)
## 62                           table.Stats(returnSP)
## 63                                       logAMZN
## 64                                             =
## 65                                  log(1+AMZN)
## 66                                        logVW
## 67                                             =
## 68                                    log(1+VW)
## 69                                        logEW
## 70                                             =
## 71                                    log(1+EW)
## 72                                        logSP
## 73                                             =
## 74                                    log(1+SP)
## 75                             table.Stats(logAMZN)
## 76                               table.Stats(logVW)
```

```
## 77                                table.Stats(logEW)
## 78                                table.Stats(logSP)
## 79                                   t.test(logAMZN)
## 80                                 par(mfcol=c(2,1))
## 81                                     hist(logAMZN,
## 82                                            breaks
## 83                                                =
## 84                                             40)
## 85  chart.Histogram(logAMZN,method=c('add.normal'))
## 86                          read.table(file.choose(),
## 87                                            header
## 88                                                =
## 89                                              T)
## 90                   da2=read.table("m-abt3dx.txt")
## 91                                   ABT=da2[-1,2]
## 92                                   VW2=da2[-1,3]
## 93                                   EW2=da2[-1,4]
## 94                                   SP2=da2[-1,5]
## 95                                             ABT
## 96                                              <-
## 97                                  as.numeric(ABT)
## 98                                             VW2
## 99                                              <-
## 100                                 as.numeric(VW2)
## 101                                            EW2
## 102                                             <-
## 103                                 as.numeric(EW2)
## 104                                            SP2
## 105                                             <-
## 106                                 as.numeric(SP2)
## 107                                table.Stats(ABT)
## 108                                table.Stats(VW2)
## 109                                table.Stats(EW2)
## 110                                table.Stats(SP2)
## 111                                          logABT
## 112                                               =
## 113                                     log(1+ABT)
## 114                                         logVW2
## 115                                               =
## 116                                     log(1+VW2)
## 117                                         logEW2
## 118                                               =
## 119                                     log(1+EW2)
## 120                                         logSP2
## 121                                               =
## 122                                     log(1+SP2)
## 123                              table.Stats(logABT)
## 124                              table.Stats(logVW2)
## 125                              table.Stats(logEW2)
## 126                              table.Stats(logSP2)
## 127                                   t.test(logABT)
## 128                                 par(mfcol=c(2,1))
## 129                                      hist(logABT,
## 130                                            breaks
```

```
## 131                                                =
## 132                                               40)
## 133  chart.Histogram(logABT,method=c('add.normal'))
## 134                                               VW2
## 135                                     t.test(VW2)
## 136                                   T1=length(VW2)
## 137                             VW2_s3=skewness(VW2)
## 138                                           VW2_s3
## 139                           TST=VW2_s3/sqrt(6/T1)
## 140                                               TST
## 141                                PV1=2*pnorm(TST)
## 142                                               PV1
## 143                 VW2_k3=kurtosis(VW2)/sqrt(24/T)
## 144                                           VW2_k3
## 145                         PV2=2*(1-pnorm(VW2_k3))
## 146                                               PV2
## 147                                          logAMZN
## 148                               T2=length(logAMZN)
## 149                       AMZN_S3=skewness(logAMZN)
## 150                                           AMZN_S3
## 151                         TST2=AMZN_S3/sqrt(6/T2)
## 152                                              TST2
## 153                           PV3=2*(1-pnorm(TST2))
## 154                                               PV3
## 155                       AMZN_K3=kurtosis(logAMZN)
## 156                                           AMZN_K3
## 157                        TST3=AMZN_K3/sqrt(24/T2)
## 158                                              TST3
## 159                           PV4=2*(1-pnorm(TST3))
## 160                                               PV4
## 161                                t.test(logAMZN)
## 162                              par(mfcol=c(2,1))
## 163                                   acf(logAMZN,
## 164                                        lag=12)
## 165                                  pacf(logAMZN,
## 166                                        lag=12)
## 167                         read.table(file.choose(),
## 168                                         header
## 169                                              =
## 170                                               T)
## 171                  da3=read.table("d-exuseu.txt")
## 172                                    FX=da3[-1,4]
## 173                                              FX
## 174                                              <-
## 175                                  as.numeric(FX)
## 176                                   logFX=log(FX)
## 177                           logreturnFX=diff(logFX)
## 178                                     logreturnFX
## 179                         table.Stats(logreturnFX)
## 180                                par(mfcol=c(2,1))
## 181                                hist(logreturnFX)
## 182                     chart.Histogram(logreturnFX,
## 183                          method=c('add.normal'))
## 184                              t.test(logreturnFX)
```

```
da3=read.table("d-exuseu.txt")
FX=da3[-1,4]
FX <- as.numeric(FX)
logFX=log(FX)
logreturnFX=diff(logFX)
logreturnFX
```

```
##    [1] -4.412021e-03 -1.060020e-02  3.089071e-03 -1.016111e-02 -1.732502e-03
##    [6]  1.213067e-03  1.290563e-02 -7.696584e-04 -8.419294e-03  1.637861e-03
##   [11] -3.019196e-03  1.727713e-04  4.317976e-04 -1.382409e-03  9.506115e-04
##   [16] -8.326876e-03 -7.518832e-03 -2.108408e-03 -5.998077e-03  2.209360e-03
##   [21]  9.705740e-04 -2.914553e-03 -2.036390e-03  1.151513e-03  3.540450e-04
##   [26]  2.739607e-03 -2.474155e-03 -1.859642e-03 -8.277382e-03  3.657616e-03
##   [31] -6.235247e-04 -1.327493e-02 -3.437051e-03 -3.994558e-03 -1.912134e-03
##   [36]  8.711489e-03 -6.617438e-03 -9.503864e-03  3.666029e-03 -3.941524e-03
##   [41] -5.895374e-03  1.753820e-03  5.151331e-03 -2.388390e-03  8.060866e-03
##   [46] -2.649250e-03  3.658314e-04 -5.487972e-04 -1.373312e-03  9.119990e-03
##   [51] -2.272212e-03 -6.115111e-03 -7.326679e-04  2.748134e-04  2.747379e-04
##   [56] -4.588848e-03 -1.184431e-02 -2.516428e-03  1.491981e-03  7.056668e-03
##   [61] -2.408524e-03  0.000000e+00 -7.073745e-03  1.225415e-02 -4.994923e-03
##   [66]  4.718081e-03 -4.532638e-03  5.178484e-03 -5.734915e-03 -9.276868e-05
##   [71] -5.768531e-03 -2.709649e-03 -7.513183e-03  2.071759e-03 -1.694756e-03
##   [76] -1.320132e-03  3.391111e-03 -4.146255e-03  5.555831e-03 -3.103694e-03
##   [81] -2.357713e-03 -2.552589e-03  6.624084e-04  2.079003e-03  1.229081e-02
##   [86]  5.115576e-03  1.855288e-04  5.563798e-04 -6.230550e-03 -5.050043e-03
##   [91] -3.757284e-03  2.256064e-03  2.063597e-03  0.000000e+00 -2.909025e-03
##   [96] -1.034272e-03 -4.998360e-03  1.511573e-03 -5.665723e-04 -1.101730e-02
##  [101] -3.060739e-03 -1.629836e-03  2.587324e-03 -8.843660e-03 -1.931248e-04
##  [106] -2.707670e-03 -3.006354e-03  1.369752e-02  1.148985e-03  2.580400e-03
##  [111]  3.715528e-03 -9.554821e-03  3.839509e-04 -1.177733e-02  3.005771e-03
##  [116]  3.768667e-03 -4.349724e-03  0.000000e+00 -6.783275e-04  5.413780e-03
##  [121]  7.300705e-03 -7.204296e-03 -3.476585e-03 -2.615394e-03 -7.203380e-03
##  [126]  7.812500e-04  4.879715e-04 -2.442242e-03 -2.546275e-03 -1.177394e-03
##  [131] -4.624854e-03  3.642633e-03  3.825222e-03  4.893565e-04 -1.664790e-03
##  [136]  0.000000e+00  2.104524e-02  1.012135e-02 -1.616354e-03 -1.142531e-03
##  [141]  1.456428e-02 -2.255852e-03  1.598421e-03  7.021515e-03 -2.335031e-03
##  [146] -3.090614e-03  1.780611e-03  8.020187e-03  2.504756e-03 -2.133285e-03
##  [151] -7.081655e-03  5.408947e-03 -8.593365e-03 -2.253945e-03 -6.413906e-03
##  [156] -1.041420e-03 -3.035767e-03 -1.902045e-03  1.305106e-02  1.033009e-03
##  [161] -9.525229e-03 -4.463657e-03 -4.292466e-03 -1.913693e-03  1.818095e-03
##  [166] -1.435064e-03  1.293654e-02  9.450456e-05  1.006073e-02 -7.889587e-03
##  [171] -2.265648e-03  8.502197e-04 -4.448027e-03 -1.346404e-02 -1.922892e-04
##  [176]  7.689351e-04 -2.212284e-03  3.172622e-03 -1.825432e-03  8.650935e-04
##  [181]  4.983717e-03  3.816799e-03 -8.128182e-03  4.884833e-03 -3.349766e-03
##  [186]  7.449891e-03  9.847632e-03  2.822734e-03  7.022172e-03 -1.400495e-03
##  [191] -9.347542e-04  1.028182e-03  1.586931e-03 -8.524243e-03  1.001553e-02
##  [196]  1.953943e-03  3.803873e-03  8.115880e-03 -2.206897e-03 -2.765488e-03
##  [201] -6.296900e-03  3.986470e-03 -1.210105e-02 -1.124438e-03 -8.284740e-03
##  [206] -4.358131e-03 -1.235096e-03 -9.507059e-05 -2.284410e-03  1.142857e-03
##  [211] -2.000858e-03 -4.301082e-03 -3.838776e-03 -3.564036e-03  3.660185e-03
##  [216]  3.359412e-03 -1.166222e-02  0.000000e+00 -2.908809e-04  8.785960e-03
##  [221] -1.024164e-02  1.552645e-03  1.356589e-03 -6.411524e-03 -8.318294e-03
##  [226] -3.839910e-03 -3.656673e-03 -2.279825e-03 -1.787843e-03 -3.585304e-03
```

```
##  [231] -6.986377e-04  2.328899e-02 -2.930548e-03  4.002934e-03 -9.988332e-03
##  [236] -2.952901e-04 -3.747909e-03 -5.250916e-03 -9.933939e-05  1.018047e-02
##  [241] -7.997278e-03 -2.183190e-03  2.678706e-03 -1.288852e-03  8.102011e-03
##  [246] -3.351408e-03  7.895776e-04 -6.731366e-03 -2.287079e-03 -2.092781e-03
##  [251]  4.578489e-03  8.405488e-03  1.505111e-02  2.518893e-03 -1.064911e-03
##  [256] -2.910081e-03 -4.088393e-03  6.804731e-03 -3.980008e-03 -1.070508e-03
##  [261] -1.392316e-02 -6.913922e-04 -5.930026e-04  1.777954e-03 -3.262001e-03
##  [266] -8.052134e-03  2.193421e-03 -2.992222e-03 -1.216034e-02 -1.271958e-02
##  [271] -8.195882e-04 -2.668310e-03  3.795071e-03  1.210903e-02 -1.292836e-02
##  [276]  2.353785e-03  8.042802e-03  5.258912e-03 -4.954760e-03 -1.826299e-03
##  [281] -6.520655e-03  5.199584e-03  8.131735e-04  2.131440e-03 -1.318927e-03
##  [286]  2.109571e-02 -4.283515e-03 -8.622472e-03 -1.706145e-02 -9.674839e-03
##  [291] -2.692628e-03  5.893622e-03 -8.385576e-03 -1.039663e-04 -1.560793e-03
##  [296] -4.487823e-03  1.672241e-03  1.121507e-02 -2.584916e-03 -1.139483e-03
##  [301] -4.146797e-04  5.377469e-03  1.442853e-03 -1.649145e-03  1.649145e-03
##  [306] -7.211663e-04 -9.839031e-03  8.601535e-03  3.399437e-03 -8.157410e-03
##  [311] -3.219277e-03 -9.405441e-03  7.322974e-03 -2.086812e-03 -1.463364e-03
##  [316]  2.924590e-03  6.134670e-03 -6.969394e-03  1.043297e-03 -2.085723e-04
##  [321]  3.128422e-04 -4.179298e-03 -2.830932e-03  4.191121e-03 -1.464895e-03
##  [326] -7.673344e-03 -1.146144e-02  7.468659e-04  3.199147e-04  1.810919e-03
##  [331] -1.404021e-02 -5.194255e-03 -1.464507e-02  6.603566e-04  3.404913e-03
##  [336] -5.718071e-03 -1.971220e-02  1.797955e-03  5.151187e-03 -3.351394e-04
##  [341]  8.123341e-03  8.167816e-03 -8.389496e-03  6.519000e-03  6.367351e-03
##  [346] -9.345349e-03 -1.468815e-02  3.468923e-03 -6.704660e-04  1.001009e-02
##  [351] -4.427718e-04  7.060930e-03 -2.642009e-03  2.589634e-02  4.295533e-04
##  [356]  1.501985e-03 -2.253824e-03  1.334136e-02  4.126335e-03  1.039871e-02
##  [361]  3.129893e-03 -5.431390e-03 -2.306806e-03  1.887782e-03  7.827624e-03
##  [366] -3.019420e-03 -6.276171e-03  1.230592e-02 -2.698497e-03 -6.778273e-03
##  [371] -1.073017e-02 -6.046801e-03 -4.265308e-03  2.561367e-03  6.586659e-03
##  [376]  0.000000e+00  7.489882e-03  3.147956e-03 -1.992555e-03  2.306806e-03
##  [381] -2.201836e-03 -4.523705e-03  3.893717e-03 -2.523926e-03 -1.015989e-02
##  [386] -6.616886e-03  3.740719e-03 -2.456610e-03 -3.106092e-03 -9.160040e-03
##  [391]  5.936657e-03  5.473585e-03 -3.108755e-03  8.233139e-03  2.339929e-03
##  [396] -8.749522e-03 -9.151165e-03  2.160761e-03 -4.109447e-03 -9.910236e-03
##  [401] -1.045172e-02  3.642991e-03  3.300333e-03 -9.490250e-03 -3.109386e-03
##  [406]  9.519665e-03 -3.421070e-03 -9.954101e-04  1.078593e-02  8.753694e-04
##  [411]  9.838755e-04 -9.220702e-03 -4.531646e-03 -6.891979e-03  2.230649e-04
##  [416]  6.779687e-03 -4.431642e-04 -2.440920e-03 -4.007129e-03 -4.695369e-03
##  [421] -5.167970e-03  1.287019e-02 -1.309549e-02 -1.979812e-02  4.357305e-03
##  [426] -8.733680e-03 -4.627496e-03 -3.252035e-03  5.105604e-03 -2.665587e-03
##  [431] -5.235919e-03 -5.732686e-03 -1.056524e-03 -6.126315e-03  1.128097e-02
##  [436]  2.708943e-02 -6.274620e-03  8.773485e-03 -1.135074e-03  2.382169e-03
##  [441]  1.245542e-03 -3.514145e-03 -7.408708e-03 -1.717525e-03 -4.709675e-03
##  [446] -5.758710e-04  2.303882e-04  3.793762e-03 -8.180240e-03 -8.831105e-03
##  [451] -9.263125e-03  2.118146e-03 -1.372965e-02  1.786034e-03 -7.140307e-04
##  [456] -4.294924e-03  0.000000e+00 -1.130227e-02  1.209117e-04  1.619032e-02
##  [461]  3.088255e-03  6.383755e-03  1.148226e-02  1.164280e-03  2.324501e-03
##  [466] -3.488781e-03 -1.165026e-04 -2.800142e-03  1.751007e-03  5.930595e-03
##  [471] -2.089137e-03 -3.958096e-03 -3.499971e-04 -4.443932e-03 -1.877054e-03
##  [476] -3.529000e-03 -3.305008e-03 -4.146680e-03 -4.879510e-03  1.397961e-02
##  [481]  5.514181e-03  3.503858e-03  1.354893e-02  8.133386e-03  1.247182e-02
##  [486] -8.032172e-03  8.257498e-03  1.575867e-03 -5.978922e-03 -7.609782e-03
##  [491]  4.559444e-04 -2.281804e-03  1.169604e-02  1.379023e-02 -5.806828e-03
##  [496] -3.028436e-03  1.737237e-02  5.943881e-03  1.286682e-02  6.694766e-03
```

```
##  [501]  1.290600e-03 -5.064393e-03  1.405226e-02  8.168507e-03  8.448622e-04
##  [506] -2.642568e-03  9.166160e-03 -5.152212e-03 -9.426538e-03 -1.064736e-03
##  [511]  1.406910e-02 -3.577821e-03 -1.187713e-02 -7.280546e-03  1.493202e-02
##  [516] -8.825620e-03  1.174148e-03  1.598892e-03 -1.405075e-02 -4.221471e-03
##  [521] -6.510417e-04 -3.479399e-03  8.999790e-03  4.738325e-03  8.131866e-03
##  [526] -2.881385e-03  4.052907e-03 -9.733218e-03  2.897775e-03 -1.587935e-02
##  [531]  8.996863e-03  2.155870e-03 -8.977401e-03 -7.608283e-04 -1.533940e-02
##  [536]  1.152656e-02 -7.229739e-03 -2.091015e-03 -8.817371e-04  2.862808e-03
##  [541] -2.199252e-04  3.841726e-03  9.160369e-03  8.539208e-03  5.260063e-03
##  [546] -5.475348e-03  2.580369e-03 -4.196488e-03  7.545136e-04  3.656704e-03
##  [551] -1.611604e-03 -1.647912e-02 -1.641048e-03 -9.571557e-03 -1.301826e-02
##  [556]  6.252114e-03  7.650129e-03 -9.320973e-03 -9.971513e-03  5.054203e-03
##  [561]  3.243669e-03 -5.037794e-03 -3.147485e-03 -8.479897e-03 -1.477189e-03
##  [566]  3.405611e-03  1.194111e-02  9.251585e-03 -4.113631e-03  2.892426e-03
##  [571]  1.332149e-03 -1.452702e-02 -3.156711e-03  7.424941e-03 -3.818084e-03
##  [576] -2.929580e-03 -5.431106e-03  2.268860e-04  1.049375e-02  1.371183e-02
##  [581] -8.003600e-03 -1.563722e-03  2.902112e-03  4.337437e-03 -9.701777e-03
##  [586] -5.618624e-03  7.074309e-03 -1.343635e-03 -3.816799e-03  4.824694e-03
##  [591] -2.016807e-03 -7.655971e-03 -3.391172e-04 -6.010111e-03 -3.760474e-03
##  [596] -1.256640e-03  4.562052e-03  6.125941e-03 -1.584607e-03 -6.135686e-03
##  [601] -1.368613e-03 -1.205595e-02 -6.838624e-03 -3.261885e-03  8.164694e-04
##  [606] -3.503858e-03  3.387260e-03 -1.420962e-02 -3.548826e-04 -3.550086e-04
##  [611]  6.488550e-03 -6.133541e-03  6.368697e-03 -1.175710e-04 -9.450750e-03
##  [616]  6.389042e-03  6.699996e-03  7.237104e-03  3.483110e-03 -2.088410e-03
##  [621] -6.057800e-03 -6.094721e-03  4.457485e-03  3.038450e-03  4.772723e-03
##  [626]  1.392596e-03 -2.319647e-04 -1.767058e-02  4.721435e-04 -2.244670e-03
##  [631]  2.598631e-03 -1.270273e-02  1.128613e-02  1.062637e-03  9.747009e-03
##  [636]  6.639125e-03 -9.799425e-03 -3.517617e-04  2.576717e-03  0.000000e+00
##  [641]  1.762364e-02 -1.265022e-03  2.643224e-03 -4.255570e-03  8.721653e-03
##  [646]  5.128509e-03 -3.644236e-03 -1.827110e-03  1.142922e-04  2.285453e-04
##  [651]  4.673705e-03  2.271954e-03  3.398281e-03 -4.647217e-03 -3.072199e-03
##  [656]  3.418219e-04  1.222841e-02  6.058585e-03  4.798313e-03  4.664602e-03
##  [661]  9.813189e-03  2.629850e-03  2.950338e-03 -4.154828e-03 -1.315645e-03
##  [666]  8.629689e-03 -3.050111e-03 -5.469875e-03 -1.976502e-03  4.395604e-04
##  [671] -5.494808e-04  6.246253e-03 -7.016034e-03 -2.472562e-02  3.264850e-03
##  [676]  5.156962e-03  1.123045e-02 -6.211200e-03  8.971650e-03  2.202887e-03
##  [681]  1.202989e-02 -1.087134e-04  3.797954e-03  8.305068e-03 -5.925145e-03
##  [686] -1.699943e-02  3.948672e-03  9.478744e-03  9.754512e-04 -5.431254e-03
##  [691] -8.971614e-03  6.572485e-03 -1.092419e-03  3.491547e-03 -4.366342e-03
##  [696]  2.949371e-03 -1.965281e-03 -3.503397e-03 -1.213741e-02  7.740833e-03
##  [701] -1.101625e-04  1.871114e-03 -3.194011e-03 -4.422340e-03 -4.219416e-03
##  [706] -9.053882e-03 -1.460756e-03  3.591877e-03  4.471779e-03 -4.920059e-03
##  [711]  1.291921e-02  2.541859e-03 -7.422623e-03  5.655057e-03 -7.742935e-04
##  [716] -8.222269e-03  1.337942e-03  2.670526e-03 -9.939219e-03  2.801907e-03
##  [721] -1.397521e-02  2.040817e-03 -1.813854e-03  4.076554e-03 -7.714162e-03
##  [726]  5.791193e-03 -5.791193e-03 -1.253490e-03  4.664135e-03  1.134881e-04
##  [731]  5.770879e-03  1.803630e-03  8.858050e-03 -6.832847e-03  1.123911e-04
##  [736] -4.731337e-03  6.752220e-03 -1.234499e-03 -2.361011e-03  2.248708e-03
##  [741]  4.594103e-03  3.459632e-03  7.547206e-03 -4.423800e-04 -2.325711e-03
##  [746] -2.442275e-03 -2.782572e-03 -1.211049e-02 -1.031931e-02  5.697681e-04
##  [751]  7.377594e-03 -2.377584e-03  8.915028e-03  1.449947e-02 -4.327810e-03
##  [756] -5.128788e-03 -1.678134e-03 -6.720430e-04 -4.829571e-03  4.829571e-03
##  [761] -2.243411e-03  3.363232e-03 -2.465263e-03 -8.902972e-03 -3.856192e-03
##  [766]  4.987542e-03 -6.786563e-04 -2.263212e-04 -6.130113e-03 -1.456698e-02
```

```
##  [771] -5.793759e-03  4.406315e-03  5.783356e-04 -6.263795e-03  2.208404e-03
##  [776]  8.324710e-03 -1.497955e-03  2.418659e-03 -3.451648e-04  4.248729e-03
##  [781]  5.826923e-03 -1.139861e-03 -4.343360e-03 -1.949207e-03  1.949207e-03
##  [786]  3.887052e-03 -6.754849e-03  8.038124e-04  5.151995e-03 -5.037217e-03
##  [791] -3.564246e-03 -4.617879e-03  1.849712e-03 -6.932409e-04  6.107065e-03
##  [796] -6.894967e-04  8.356754e-03  2.618548e-03 -4.901133e-03  1.826485e-03
##  [801] -1.026987e-03  1.255063e-03  5.231446e-03  7.936958e-04  3.399626e-04
##  [806] -2.382169e-03  3.514544e-03  0.000000e+00 -5.105815e-03 -2.619741e-03
##  [811] -1.140576e-04 -4.687598e-03 -1.720480e-03  6.885472e-04  1.015817e-02
##  [816] -2.729135e-03  2.501992e-03 -2.843658e-03  2.957236e-03 -6.266042e-03
##  [821]  4.902250e-03  1.137204e-04  3.972087e-03 -4.199541e-03  1.136751e-03
##  [826]  3.176046e-03  6.209447e-03  1.462071e-03 -5.620820e-04 -1.800788e-03
##  [831]  2.250479e-03  2.021110e-03  7.041889e-03  2.227420e-04  5.330977e-03
##  [836] -2.884084e-03  6.643071e-03 -3.316019e-03  1.112040e-02  3.606758e-03
##  [841] -1.965710e-03 -1.187610e-02  5.295688e-03  3.076249e-03 -9.877628e-04
##  [846] -9.377310e-03  5.747142e-03  3.410532e-03  1.103173e-02  7.600847e-04
##  [851] -2.390786e-03  8.019115e-03 -3.459837e-03 -1.408985e-03  7.025157e-03
##  [856]  3.011079e-03  6.421942e-03 -3.634036e-03  5.446113e-03  3.614334e-03
##  [861] -3.507843e-03  7.003424e-03 -8.462922e-04 -3.175443e-04 -1.058705e-04
##  [866]  2.960146e-03 -3.489667e-03  8.470987e-04 -6.352568e-04  4.332900e-03
##  [871]  6.411963e-03  1.063064e-02  6.097895e-03  8.311576e-03 -9.651990e-03
##  [876]  1.362935e-02  6.088299e-03 -2.938050e-03  3.747030e-03 -5.371725e-03
##  [881] -2.442004e-03 -8.799811e-03  1.418463e-02  6.967262e-03 -4.841648e-03
##  [886]  3.734172e-03 -2.319602e-03  1.682058e-02  1.488169e-03 -8.926358e-04
##  [891] -1.092083e-03  8.801916e-03 -5.727279e-03 -1.647484e-02  1.207365e-03
##  [896]  5.215136e-03 -1.157013e-02 -1.047769e-02  1.017406e-02 -8.437153e-03
##  [901]  4.786404e-03  3.954378e-03 -3.649639e-03 -2.114417e-02  1.011465e-02
##  [906] -8.767010e-03  6.299396e-03  6.566820e-03  9.200103e-04  8.140881e-03
##  [911] -5.182148e-03  2.035417e-03 -6.221018e-03  4.091235e-04  1.736910e-03
##  [916] -1.015758e-02  2.986153e-03  5.139539e-04  8.493272e-03  6.111847e-04
##  [921]  9.160772e-04 -2.342756e-03  1.548222e-02 -3.621370e-03 -1.210044e-03
##  [926] -6.884709e-03 -2.644966e-03 -6.643185e-03 -2.875336e-03  3.797798e-03
##  [931] -1.845776e-03 -2.054866e-03 -3.915916e-03  1.068101e-02  2.856270e-03
##  [936]  2.238503e-03 -1.729312e-03 -7.129399e-04 -1.835611e-03 -4.296242e-03
##  [941]  1.741179e-03  1.089014e-02 -2.026548e-03 -1.725801e-03  2.942223e-03
##  [946] -5.078215e-03 -5.092428e-04 -2.039568e-03  7.323060e-03 -7.096153e-04
##  [951] -7.101192e-04 -4.475191e-03  1.426098e-03 -1.084854e-02 -1.029548e-03
##  [956]  2.469137e-03  5.124537e-03 -1.022809e-03 -3.074718e-03  2.562921e-03
##  [961]  7.751186e-03  8.124302e-04 -1.625521e-03  4.666269e-03  9.067159e-03
##  [966] -1.806867e-03  4.110900e-03 -2.003206e-03  1.176132e-02  4.646343e-03
##  [971] -3.359023e-03 -4.463186e-03 -2.587839e-03  4.772330e-03  9.918175e-05
##  [976]  2.377416e-03 -8.246035e-03 -3.998406e-03 -1.804512e-03 -2.914136e-03
##  [981] -2.418137e-03 -1.817448e-03  3.732289e-03 -5.035500e-04  4.121644e-03
##  [986]  3.105126e-03 -1.000600e-03  9.167977e-03  6.941346e-04 -1.488022e-03
##  [991]  9.922605e-04  1.045787e-02  3.624790e-03 -1.565864e-03  5.567236e-03
##  [996] -1.266995e-03 -3.614874e-03  4.979263e-03 -4.979263e-03  8.576215e-03
## [1001]  5.129954e-03  5.103771e-03  4.695519e-03  2.387206e-03 -1.189691e-02
## [1006]  5.486322e-03  4.883430e-03 -4.787447e-03  2.683793e-03  1.912595e-03
## [1011]  6.475596e-03  0.000000e+00  3.411356e-03  4.728803e-04 -6.620951e-04
## [1016]  8.573231e-03  1.593476e-03  4.858460e-03  3.535545e-03  5.372373e-03
## [1021]  1.200203e-03 -4.614462e-04  2.581360e-03 -7.856952e-03 -3.439464e-03
## [1026]  2.046512e-03  1.053809e-02 -3.039096e-03 -1.292109e-03 -2.496649e-03
## [1031] -5.663633e-03  6.515568e-04 -2.888694e-03  1.095139e-02 -3.235800e-03
## [1036] -8.462412e-03  3.356334e-03  7.141231e-03 -3.146985e-03 -3.708855e-04
```

```
## [1041] -9.274287e-05  1.390241e-03 -3.153991e-03  1.485471e-03  5.181838e-03
## [1046]  4.420304e-03  7.688825e-03  2.731745e-03  1.544683e-03  4.348621e-03
## [1051] -3.078318e-03 -4.534942e-04 -1.397730e-02 -1.342924e-02 -1.115759e-02
## [1056]  1.695714e-03 -3.205433e-03  2.169505e-03 -6.427851e-03  9.344539e-03
## [1061]  2.720835e-03  3.747073e-04  2.899230e-03  5.030285e-03  1.274138e-02
## [1066]  3.669052e-04 -1.282956e-02 -2.697551e-03 -2.331329e-03 -8.438077e-03
## [1071]  5.914122e-03  3.550410e-03  7.526168e-03 -4.825100e-03  2.044230e-03
## [1076]  2.595719e-03  6.551954e-03  3.214108e-03 -2.294737e-03 -2.300015e-03
## [1081]  9.989544e-03 -1.551449e-03  8.186329e-03  9.058381e-05 -3.720681e-03
## [1086]  9.995912e-04  1.532252e-02  5.174425e-03 -3.387114e-03  6.319277e-03
## [1091]  7.337049e-03 -1.233806e-03  9.915406e-03  3.921403e-03  5.118207e-03
## [1096] -5.031239e-03 -8.696787e-05 -3.572210e-03  7.391659e-03  1.239899e-02
## [1101] -8.557614e-05  1.880986e-03 -5.981117e-04  7.323545e-03  5.668614e-03
## [1106] -9.408842e-03  7.889085e-03 -5.847227e-03 -1.871545e-03 -3.582705e-03
## [1111]  5.126015e-04  1.374184e-02 -1.485281e-02  4.095918e-03 -4.865774e-03
## [1116]  6.652477e-03  2.549828e-04  5.339675e-03  1.098298e-03 -2.621012e-03
## [1121] -8.672786e-03 -2.736448e-03 -5.323272e-03 -5.871196e-03 -4.339155e-03
## [1126]  8.142098e-03 -1.416122e-02 -5.251182e-04  6.892067e-03  6.758539e-03
## [1131] -4.847655e-03 -1.823946e-03 -1.418339e-02 -6.723904e-03  4.075130e-03
## [1136]  6.960074e-03 -7.579132e-03 -5.309265e-04 -5.769844e-03 -2.138848e-03
## [1141] -4.022711e-03  6.695557e-03  9.475386e-03 -1.852588e-03  1.394209e-02
## [1146] -3.751368e-03  6.273437e-03 -1.390700e-03 -2.699997e-03 -8.671714e-03
## [1151] -1.203661e-02  1.868079e-03  7.525822e-03  1.057921e-03  7.046596e-04
## [1156]  2.901484e-03 -6.076369e-03  2.470226e-03 -3.972989e-03  1.149375e-03
## [1161] -6.026784e-03  5.332385e-04 -1.044979e-02 -1.887217e-03 -1.170064e-03
## [1166] -1.159433e-02 -9.612378e-03  1.929882e-03  9.180629e-05  1.192715e-03
## [1171] -9.173471e-04  8.225986e-03 -1.043106e-02 -2.486533e-03  4.966898e-03
## [1176]  1.583867e-02  4.595224e-03  5.915586e-03  4.467277e-04 -8.042537e-04
## [1181]  1.075901e-02 -2.653576e-04 -1.228320e-02  6.516426e-03  8.897193e-05
## [1186]  9.386414e-03  1.069529e-02  1.655413e-03 -1.306677e-03  1.045478e-03
## [1191] -1.741705e-04  8.326154e-03  6.199434e-03  4.966189e-03  7.684099e-04
## [1196] -1.038057e-02  9.441320e-03  6.641148e-03  1.780491e-03 -9.361771e-03
## [1201]  9.954564e-03 -7.477941e-03 -6.160184e-03  1.115066e-03 -3.004939e-03
## [1206]  3.519166e-03  4.283206e-04  1.098772e-02 -8.474577e-04  3.216526e-03
## [1211] -6.018242e-03 -6.225767e-03 -1.369746e-03  1.797407e-03 -7.295230e-03
## [1216] -1.344165e-02  3.747118e-03 -2.089683e-03 -4.892976e-03  7.678251e-03
## [1221]  8.688098e-04  1.139810e-02  5.479935e-03  2.728747e-03  8.515349e-05
## [1226]  1.260752e-02  1.344425e-03 -1.176273e-03  1.512097e-03 -1.224626e-02
## [1231]  1.443553e-03  1.122233e-02  6.440034e-03 -3.256652e-03  1.064902e-02
## [1236]  7.445093e-04 -1.323956e-03  6.602318e-03  4.923289e-03  9.817558e-04
## [1241] -1.145475e-03 -4.183935e-03  9.816833e-03  4.883210e-04  3.087174e-03
## [1246]  4.289941e-03 -4.039262e-04  3.231540e-04  2.823152e-03 -7.251924e-04
## [1251]  4.664263e-03 -1.847019e-03  3.530454e-03  2.879311e-03  6.051456e-03
## [1256] -3.969987e-04  6.885390e-03  7.386487e-03 -8.491285e-03  8.412991e-03
## [1261]  6.321972e-03 -3.975838e-03 -5.247300e-03 -7.069636e-04 -1.090317e-02
## [1266] -1.545081e-02  1.513300e-02  2.618945e-03  7.894570e-03 -8.449531e-03
## [1271] -4.610135e-03  7.223687e-03 -1.820845e-03 -1.847387e-02  5.072270e-03
## [1276] -2.090201e-03  1.080572e-02 -7.167603e-04  4.292876e-03  6.956550e-03
## [1281] -1.734606e-03  4.330886e-03  6.890639e-03 -6.244634e-04 -4.382197e-03
## [1286]  7.578457e-03 -2.805925e-03 -9.962039e-03 -9.664207e-03  4.774789e-04
## [1291]  9.738409e-03 -1.500326e-02 -4.730036e-03 -2.411091e-04 -8.041171e-04
## [1296] -1.777428e-02 -1.020585e-02  1.126981e-02  1.429408e-02 -2.422091e-03
## [1301]  4.596968e-03 -1.638716e-02  3.429415e-03 -6.296272e-03  4.256371e-03
## [1306]  2.202914e-03 -5.967239e-03  1.586108e-02 -9.975347e-03  8.036736e-03
```

```
## [1311] -4.619320e-03 -7.992213e-03 -3.527051e-03 -6.429830e-03  4.044078e-03
## [1316]  5.011718e-03  7.348772e-03  5.354982e-03 -2.035465e-02 -8.375883e-03
## [1321]  6.722854e-03  6.760125e-03 -6.842848e-03  1.157503e-03 -2.813407e-03
## [1326] -1.208801e-02  1.424800e-03 -2.179929e-03  9.273637e-03 -4.990850e-04
## [1331] -9.110348e-03 -4.797383e-03  6.747069e-04 -4.986698e-03  4.143244e-03
## [1336]  6.392485e-03 -8.166060e-03  9.674103e-03  2.508363e-03 -3.178323e-03
## [1341]  1.157719e-02  7.342964e-03 -6.184312e-03 -1.710156e-02 -4.300357e-03
## [1346] -1.352951e-03  7.838550e-03 -9.278069e-03  6.166862e-03  1.130523e-02
## [1351] -3.169310e-03  3.668811e-03 -7.434978e-03  6.935478e-03 -2.584735e-03
## [1356]  1.071216e-02 -4.130695e-04  1.411248e-02 -4.654780e-03 -5.731363e-04
## [1361]  3.270649e-03 -3.680233e-03  4.333081e-03  5.045173e-03 -3.822230e-03
## [1366] -1.444424e-02  1.074070e-03 -8.208661e-03  5.148658e-03  5.451856e-03
## [1371] -1.101689e-02  2.827915e-03  6.457511e-03 -6.603930e-04 -1.487481e-03
## [1376] -1.654123e-04  6.595242e-03 -2.056345e-03  3.944454e-03 -5.675057e-03
## [1381]  4.526198e-03 -1.725768e-03  1.218082e-02 -1.382283e-03  7.619393e-03
## [1386]  4.843788e-04 -1.614335e-04  1.693754e-03 -8.660165e-03  6.724212e-03
## [1391] -9.693837e-04  5.159221e-03 -4.825479e-04 -4.353441e-03 -1.243868e-02
## [1396]  4.000495e-03 -1.237974e-02  1.071856e-03 -6.531378e-03 -8.298067e-04
## [1401]  1.990380e-03 -3.153268e-03  1.662096e-04  1.411667e-03  4.977601e-04
## [1406] -5.807442e-04  1.825558e-02 -8.967514e-04  3.663455e-03 -6.849342e-03
## [1411]  1.636260e-04  1.057866e-02 -1.701301e-03 -3.243857e-04 -2.436253e-03
## [1416]  5.594534e-03 -3.563911e-03 -1.044055e-02 -7.985225e-03 -7.441399e-04
## [1421] -4.964011e-04 -4.894448e-03  1.993853e-03  1.105987e-02 -3.283803e-04
## [1426] -1.232387e-03 -9.250149e-03  3.396152e-03  5.853997e-03  2.053136e-03
## [1431]  7.600870e-03 -2.527210e-03  1.386680e-03 -1.015903e-02  8.231131e-04
## [1436]  1.644196e-03 -1.642980e-04  7.529910e-03 -2.446483e-04  3.013154e-03
## [1441] -3.421035e-03  4.152593e-03 -8.125787e-05  1.625091e-04  8.817044e-03
## [1446] -1.370029e-03 -1.021327e-02  3.416026e-03 -1.462583e-03 -9.762448e-04
## [1451]  1.068663e-02 -7.923075e-03 -3.985203e-03  9.893042e-03  6.835297e-03
## [1456]  3.360272e-03 -3.994408e-04  8.909454e-03 -3.960553e-04  1.345949e-03
## [1461]  1.132889e-02 -1.957637e-03 -2.589963e-03  2.668343e-03 -1.019408e-03
## [1466] -3.923569e-04 -2.986954e-03  6.590844e-03  7.479583e-03  4.260105e-03
## [1471] -1.545953e-04 -4.639295e-04 -3.867724e-04  3.706854e-03 -2.237914e-03
## [1476]  2.700306e-03  3.998467e-03 -3.767352e-03  5.913769e-03 -8.426859e-04
## [1481]  3.213715e-03  5.485310e-03  9.527482e-03 -1.505231e-04 -2.034282e-03
## [1486]  3.688791e-03 -3.010237e-03  9.153039e-03  3.057308e-03  4.466280e-04
## [1491] -1.386361e-02  1.658750e-03 -3.773874e-03  6.407138e-03 -2.181354e-03
## [1496]  1.115740e-02 -1.063043e-02  6.019111e-04  7.568130e-03 -1.419341e-03
## [1501]  9.713454e-04  7.514637e-03  3.330006e-03  6.553538e-03 -2.936211e-04
## [1506] -3.898640e-03  4.045462e-03 -6.258995e-03 -4.590221e-03 -1.352230e-02
## [1511] -2.256742e-04 -7.930855e-03 -9.524244e-03  3.591766e-03  3.958894e-03
## [1516]  9.076532e-03 -5.587450e-03 -7.676851e-03 -4.818549e-03 -5.368304e-04
## [1521] -5.924234e-03  6.920975e-03 -6.132618e-04 -6.693620e-03  9.756175e-03
## [1526] -3.752924e-03  7.673125e-05  1.226900e-03 -2.455307e-03 -1.536570e-04
## [1531] -4.312011e-03 -2.472380e-03 -1.198458e-02  7.825951e-04  1.094605e-03
## [1536]  6.620220e-03 -1.398276e-03  9.054037e-03  3.851042e-04  6.158584e-04
## [1541]  6.825965e-03 -6.116676e-04  1.178497e-02 -1.664272e-03 -2.271609e-04
## [1546] -7.575758e-04  5.969265e-03 -6.424086e-03 -4.711971e-03  2.285105e-04
## [1551]  8.644931e-03 -3.100543e-03  1.047288e-02  3.143009e-03  1.866160e-03
## [1556]  4.167603e-03 -8.877012e-03 -2.325495e-03  8.078434e-03 -3.731905e-03
## [1561] -4.646988e-03 -1.102897e-02  3.412326e-03 -1.564022e-02 -3.697716e-03
## [1566] -2.315619e-04 -5.961846e-03  2.791782e-03  2.397804e-03  1.929534e-03
## [1571] -5.644709e-03 -4.507663e-03  3.115265e-04  2.022560e-03  2.948710e-03
## [1576]  4.647920e-04  4.636077e-03 -7.661094e-03  3.489593e-03 -7.693242e-03
```

```
## [1581]  8.467056e-03  8.395967e-03 -2.301408e-04  3.523018e-03  9.933902e-04
## [1586] -1.911243e-03 -6.448664e-03 -1.541545e-03 -2.007568e-03 -1.701865e-03
## [1591]  2.322431e-04 -4.810686e-03  2.485824e-03  3.639888e-03  0.000000e+00
## [1596] -8.072071e-03  5.453625e-04  2.955361e-03 -5.763256e-03 -7.605196e-03
## [1601] -4.812443e-03 -1.186944e-03  1.107858e-03  1.264622e-03 -2.530846e-03
## [1606] -5.956890e-03  1.751035e-03  1.033263e-03  1.111552e-03 -6.767811e-03
## [1611]  4.066181e-03 -1.757881e-02 -9.519620e-03  2.775739e-03 -3.184586e-03
## [1616]  3.347625e-03  7.333469e-04  3.496365e-03 -8.477390e-03 -7.312196e-03
## [1621] -7.615300e-03  2.492419e-04  5.632884e-03 -1.405249e-03  1.241333e-02
## [1626] -8.203491e-03 -4.943561e-04 -3.297066e-04 -6.285168e-03  2.816670e-03
## [1631]  5.280540e-03 -6.108149e-03  1.902478e-03 -2.479441e-04 -1.172327e-02
## [1636] -3.350929e-03  8.391022e-05  8.387151e-04  5.028916e-04  1.100011e-02
## [1641]  1.104437e-02 -9.057287e-03 -8.271641e-05 -4.310709e-03  3.317578e-03
## [1646] -6.312838e-03  3.742675e-03  5.546601e-03 -2.810848e-03 -2.071853e-03
## [1651] -3.906742e-03  3.408858e-03  6.040814e-03  6.597938e-04  5.426752e-03
## [1656]  1.147353e-03  1.042949e-02  3.721687e-03 -4.532586e-03  2.754376e-03
## [1661] -1.133236e-03 -1.619958e-04  7.183533e-03 -4.826643e-04 -5.324740e-03
## [1666] -1.619171e-03 -4.222156e-03 -9.154878e-03 -2.548819e-03  7.218471e-03
## [1671] -1.799739e-03  2.126616e-03  5.865597e-03  1.055409e-03 -6.185922e-03
## [1676] -3.598892e-03  1.027155e-02  9.444313e-03  7.284403e-03 -4.396314e-03
## [1681] -3.531020e-03 -3.140226e-03  2.657755e-03 -1.173105e-02 -2.036578e-03
## [1686]  1.548177e-03 -5.388208e-03 -1.637331e-04 -5.006782e-03  1.972874e-03
## [1691]  2.542548e-03 -4.515422e-03 -6.273236e-03 -3.400659e-03 -2.079262e-03
## [1696]  4.161984e-04  3.328341e-04  3.156411e-03 -1.201416e-02  3.356831e-04
## [1701]  5.522564e-03  1.235659e-02 -1.484659e-03 -8.288485e-03  2.078571e-03
## [1706] -8.507850e-03  1.124496e-02 -2.737114e-03 -8.424088e-03  4.095797e-03
## [1711] -5.006258e-04 -2.005013e-03  3.339459e-03  8.382835e-03 -1.406063e-03
## [1716]  5.447805e-03 -4.868599e-03 -7.806052e-03  2.500729e-04  5.734485e-03
## [1721] -7.987396e-03 -1.201746e-02 -2.793889e-03 -1.866939e-03 -2.125761e-03
## [1726] -6.811989e-04 -6.237471e-03  2.397056e-03 -1.968589e-03  2.908720e-03
## [1731]  2.985459e-03 -5.963791e-04  2.556346e-04  5.268537e-03 -6.376759e-03
## [1736]  6.800434e-03 -1.526071e-03  3.393281e-04 -7.491947e-03 -2.563993e-04
## [1741]  7.493861e-03 -2.545501e-04 -5.275261e-03  9.171260e-03 -5.073138e-04
## [1746]  1.218861e-02 -3.599083e-03  9.596602e-03 -6.331772e-03  3.920429e-03
## [1751] -1.332889e-03 -1.241418e-02 -2.704532e-03  5.654262e-03 -2.190397e-03
## [1756] -8.434192e-05  1.601281e-03 -2.445092e-03 -3.377237e-04  1.158606e-02
## [1761]  9.222782e-03  8.267196e-04  3.876453e-03 -6.938736e-03 -8.289468e-05
## [1766]  5.950923e-03 -8.274768e-03  5.634285e-03 -2.481801e-03  8.279517e-04
## [1771]  2.232052e-03 -7.434637e-04  1.435804e-02  8.956561e-04 -2.852604e-03
## [1776] -1.879009e-03 -8.128457e-03 -3.220349e-03  5.526015e-03 -5.443312e-03
## [1781]  6.613757e-04 -6.550332e-03 -4.168062e-03  2.505742e-04 -3.262373e-03
## [1786]  2.343293e-03 -3.600892e-03 -1.259182e-03 -8.403362e-04 -9.251862e-04
## [1791] -1.683077e-04  2.017825e-03  5.038207e-04 -5.878154e-04  1.510828e-03
## [1796] -3.444658e-03 -1.853256e-03  5.465643e-03 -2.182674e-03  8.702256e-03
## [1801]  2.080647e-03 -2.163963e-03 -9.543815e-03  2.184691e-03  5.034824e-04
## [1806] -2.856425e-03  4.700361e-03  6.926218e-03  1.661820e-03  8.761835e-03
## [1811]  3.778549e-03 -2.380465e-03 -7.341147e-03  1.323736e-03 -9.219717e-03
## [1816]  4.163550e-03 -1.580108e-03  5.229747e-03 -3.982086e-03  8.443060e-03
## [1821]  5.768201e-04 -1.236451e-03  1.099183e-02  1.141460e-03 -4.573677e-03
## [1826] -8.797590e-03 -1.487604e-03  2.808063e-03 -1.485639e-03  0.000000e+00
## [1831] -8.260026e-05  1.321153e-02  5.704739e-04  5.767919e-03 -1.540270e-03
## [1836]  1.135166e-03  2.670661e-03  3.147067e-03  4.180743e-03  4.882158e-03
## [1841]  7.873117e-03 -1.347549e-03  2.930579e-03 -3.955227e-04  3.554085e-03
## [1846]  3.855692e-03 -1.021491e-03  2.120392e-03  4.071093e-03  4.365798e-03
```

```
## [1851]  2.563805e-03 -4.822285e-03 -7.019460e-04 -7.439636e-03  5.721691e-03
## [1856] -3.523198e-03  7.812540e-03 -4.670351e-04 -7.580826e-03  2.350730e-03
## [1861] -2.978525e-03  1.007546e-02 -2.723631e-03 -7.015630e-04  6.838696e-03
## [1866]  3.170310e-03 -9.697140e-03 -2.263239e-03 -1.186794e-02 -9.492170e-04
## [1871] -3.885348e-03 -1.033345e-03  4.522920e-03 -1.188260e-03  5.546971e-04
## [1876] -3.650798e-03 -7.158481e-04  7.688383e-03 -6.575062e-03 -4.780124e-03
## [1881]  2.552243e-03  2.784077e-03 -4.538044e-03  1.595787e-04  1.935825e-02
## [1886]  1.094948e-03 -5.251002e-03  2.432996e-03  5.082305e-03 -5.552746e-03
## [1891]  2.352480e-04 -3.770625e-03 -2.600577e-03 -2.528247e-03 -8.899542e-03
## [1896] -2.317313e-03  4.788517e-03  6.270111e-03  3.554085e-03 -4.266420e-03
## [1901] -4.284701e-03  4.126335e-03  8.201939e-03  1.255887e-03  1.254312e-03
## [1906]  1.096234e-03  1.563967e-03 -1.485710e-03  8.958888e-03 -2.096193e-03
## [1911] -2.178481e-03  3.809232e-03 -9.589595e-03 -6.269101e-04 -1.726032e-03
## [1916]  4.153123e-03  5.925481e-03  4.663092e-04 -4.672906e-03  8.085878e-03
## [1921] -8.554372e-03 -7.813111e-04 -2.661033e-03  5.484389e-04  1.330672e-03
## [1926] -1.252348e-03  4.454350e-03 -2.498245e-03  3.121832e-03 -1.793862e-03
## [1931] -1.797086e-03 -2.348889e-03 -6.606394e-03  2.049504e-03 -4.725898e-04
## [1936]  1.181056e-03  2.200913e-03 -6.933529e-03  1.816818e-03  9.465963e-04
## [1941]  1.418216e-03  2.280682e-03  5.171210e-03 -3.836672e-03 -4.718103e-03
## [1946]  9.454030e-04 -1.575051e-04 -7.878979e-04  4.482725e-03 -1.334852e-03
## [1951] -3.147874e-03  0.000000e+00 -6.881033e-03 -4.693537e-03  4.783163e-04
## [1956] -7.973210e-04 -2.795641e-03  1.278977e-03  3.667973e-03 -3.827756e-03
## [1961]  6.212684e-03  1.507518e-03 -5.485564e-03  1.672707e-03  2.067102e-03
## [1966]  6.175792e-03  4.410498e-03 -6.288814e-04  4.393887e-03 -1.565925e-04
## [1971]  7.044734e-04 -5.885832e-03  7.867821e-04  7.131412e-03 -2.423675e-03
## [1976]  4.685678e-03  2.023662e-03 -3.973360e-03  1.561158e-04 -3.122561e-04
## [1981]  0.000000e+00  1.170458e-03 -1.014318e-03  1.092299e-03  8.077086e-03
## [1986]  1.176529e-02  2.976988e-03  3.196107e-03 -1.216360e-03  8.709867e-03
## [1991]  4.138923e-03  8.257329e-04  0.000000e+00 -1.501840e-03 -8.269744e-04
## [1996] -6.110690e-03  6.051895e-04  7.559722e-04 -1.361162e-03 -3.107358e-03
## [2001] -6.014712e-03 -1.681443e-03  9.213146e-03 -8.340600e-04 -6.070263e-04
## [2006] -3.345248e-03  7.615276e-05 -5.331912e-04  2.511130e-03  2.959592e-03
## [2011]  6.721318e-03 -8.845267e-03 -5.711473e-03 -6.820211e-03  1.383126e-03
## [2016] -2.152357e-03 -4.241379e-03 -2.785948e-03  1.703446e-03 -6.190992e-04
## [2021]  2.319648e-03 -4.634994e-04  2.006948e-03 -8.486018e-04  5.234405e-03
## [2026] -4.694302e-03  1.233426e-03 -5.484969e-03  3.016594e-03  4.632847e-04
## [2031]  3.390879e-03  1.767939e-03 -4.695748e-03 -2.085506e-03  2.779710e-03
## [2036]  3.924742e-03  1.074691e-03 -2.227429e-03 -3.311899e-03  4.771809e-03
## [2041]  7.801187e-03  1.066017e-03 -2.283366e-04 -2.283887e-04 -6.092917e-04
## [2046]  6.092917e-04  2.281543e-03 -3.798959e-04  6.589685e-03 -1.208642e-03
## [2051] -4.317698e-03  6.829824e-04 -6.698153e-03  1.068621e-03  3.046925e-03
## [2056] -1.446132e-03 -8.381911e-04  5.170328e-03  9.854085e-04  2.119126e-03
## [2061]  1.661883e-03  4.368135e-03 -6.013681e-04 -6.017300e-04  1.052790e-03
## [2066]  4.050411e-03 -4.275915e-03  2.552746e-03  1.573447e-03 -1.948442e-03
## [2071]  3.749953e-04  2.845378e-03  0.000000e+00 -8.228298e-04  7.483070e-05
## [2076]  4.628601e-03 -3.432071e-03 -9.720717e-04  5.148689e-03  0.000000e+00
## [2081]  3.566126e-03  2.518333e-03  2.364417e-03  1.401232e-03  3.684191e-04
## [2086]  2.281174e-03 -2.940528e-04 -1.545197e-03  3.088011e-03  1.833584e-03
## [2091] -4.185489e-03  2.572112e-03  2.565514e-03 -4.402061e-03 -1.470696e-04
## [2096] -2.356061e-03  1.546791e-03  2.132119e-03 -6.188321e-03  1.255493e-03
## [2101] -2.734564e-03  5.179239e-04  1.847541e-03  4.346712e-03 -5.972368e-03
## [2106] -2.072846e-03  1.259026e-03 -4.004752e-03  5.200401e-04  1.336006e-03
## [2111] -3.938915e-03  1.711246e-03  2.301839e-03 -4.758020e-03  2.530516e-03
## [2116] -9.667944e-04  3.565066e-03  2.813358e-03 -2.516842e-03 -2.671814e-03
```

```
## [2121] -7.234788e-03  0.000000e+00 -2.548345e-03 -2.253945e-03  1.202736e-03
## [2126]  4.048589e-03  2.689981e-03  1.118693e-03  7.451010e-04 -2.013048e-03
## [2131]  2.906437e-03  8.925915e-04  1.337395e-03 -2.602135e-03  2.453624e-03
## [2136]  4.002080e-03  7.883048e-03 -8.809926e-04 -1.690742e-03  2.498348e-03
## [2141] -2.201916e-04  6.657668e-03  3.130577e-03  1.380162e-03  8.707010e-04
## [2146] -2.176042e-04 -2.176515e-04  1.884741e-03  2.172418e-04  1.447074e-03
## [2151] -1.012732e-03  5.064940e-04 -8.207782e-03  1.384789e-03 -6.063503e-03
## [2156]  2.488292e-03  2.190421e-03 -2.117330e-03  8.036530e-04  6.696291e-03
## [2161]  2.901284e-04 -3.050554e-03  4.427516e-03 -7.779311e-03 -1.095410e-03
## [2166] -4.540469e-03 -3.161186e-03 -7.538838e-03 -5.728969e-03  6.692968e-03
## [2171] -1.780416e-03  1.113131e-03  3.849290e-03  1.845359e-03  6.248872e-03
## [2176]  0.000000e+00 -1.393422e-03  3.589616e-03 -1.976358e-03 -5.130272e-04
## [2181]  0.000000e+00 -2.569092e-03  4.619623e-03  2.046336e-03  5.460715e-03
## [2186]  1.596170e-03  3.112449e-03  4.830405e-03 -1.367448e-03 -2.668303e-03
## [2191]  8.661759e-04  6.491399e-04  5.823375e-03  1.012775e-02 -1.136041e-03
## [2196]  7.101769e-04  2.977248e-03 -1.415729e-04  8.491368e-04  5.712891e-03
## [2201]  7.030371e-04 -4.649205e-03 -1.978939e-03 -4.953473e-04  1.838626e-03
## [2206]  0.000000e+00 -4.390009e-03  4.601941e-03  5.002653e-03 -4.225954e-03
## [2211]  3.382190e-03 -3.593958e-03  3.031053e-03  5.824782e-03 -1.961197e-03
## [2216] -8.802564e-03  7.750338e-03 -7.723364e-04  4.345395e-03  6.343916e-03
## [2221]  1.041848e-03  1.318117e-03  3.045828e-03 -2.283501e-03  3.181632e-03
## [2226] -8.290156e-04  5.926147e-03  7.665495e-03  1.634989e-03 -1.771359e-03
## [2231] -4.579169e-03  4.920059e-03 -2.115392e-03  8.876447e-04  4.094166e-04
## [2236]  8.762155e-03  2.836307e-03  0.000000e+00 -2.697781e-04  2.492675e-03
## [2241] -3.032450e-03 -4.532087e-03  1.084158e-03 -5.296407e-03 -2.112797e-03
## [2246]  6.935029e-03 -6.321177e-03 -1.911002e-03  1.774623e-03  3.403911e-03
## [2251] -8.158826e-04  0.000000e+00 -7.578639e-03 -1.088765e-02 -4.444143e-03
## [2256]  1.599388e-03 -3.340760e-03  6.272433e-04  5.572195e-04  3.336812e-03
## [2261]  6.295638e-03  6.941370e-03  7.981215e-03 -7.844247e-03  9.202205e-03
## [2266] -1.357128e-04  3.387308e-03 -6.922322e-03  2.244823e-03 -3.675974e-03
## [2271]  5.237573e-03  3.183530e-03  6.067980e-03 -2.355397e-03 -1.349859e-02
## [2276]  3.204585e-03 -5.050171e-03 -4.790419e-04 -2.398658e-03  1.112222e-02
## [2281] -4.352268e-03  7.874591e-03 -1.488700e-03  1.015263e-03  3.983397e-03
## [2286]  6.735821e-04 -1.280194e-03 -1.316612e-02  6.146492e-04 -1.043177e-02
## [2291]  6.896552e-04  6.893937e-05  5.911076e-03 -1.577450e-03  4.519936e-03
## [2296]  2.661300e-03  4.623342e-03 -5.373249e-03  1.017786e-02  8.097713e-04
## [2301] -2.023814e-04  4.510122e-03  1.618902e-02  2.639917e-03  9.881749e-04
## [2306]  5.266276e-04  9.866799e-04  4.722559e-03  4.830612e-03 -1.498909e-03
## [2311]  2.345125e-03 -2.606034e-03  1.077093e-02  5.727356e-03  1.282545e-03
## [2316]  1.026500e-02  1.204476e-03 -9.037165e-03 -1.448881e-02  1.944013e-03
## [2321] -3.436987e-03  1.297253e-02  1.058818e-02  2.344816e-03 -2.471719e-03
## [2326]  2.914715e-03 -1.209435e-02  1.921045e-04  3.132494e-03  4.330941e-03
## [2331] -1.399135e-03 -5.092622e-04  6.283940e-03 -3.803732e-03  3.297403e-03
## [2336]  1.960599e-03 -1.644113e-03  1.113955e-02 -3.385371e-03 -1.149511e-02
## [2341]  8.791126e-03  8.090101e-03 -7.020212e-03 -1.457290e-02 -2.172386e-03
## [2346]  8.950835e-04 -2.815822e-03 -2.309766e-03 -7.090857e-03 -1.748196e-03
## [2351]  3.880737e-03  3.672803e-03 -1.151446e-02  2.534197e-03  2.463055e-03
## [2356]  5.745102e-03 -1.739411e-03 -2.711779e-03  1.615040e-03  6.370063e-03
## [2361] -4.822075e-03  9.684840e-03  6.679627e-03 -4.384439e-03  5.144992e-03
## [2366] -3.363481e-03 -6.569111e-03 -6.483733e-03  2.123075e-03 -6.428801e-04
## [2371] -6.192769e-03 -6.471026e-05  6.900359e-03  1.092977e-02 -8.267354e-04
## [2376] -1.570998e-02  5.735476e-03 -9.296387e-03 -3.248233e-03  6.744513e-03
## [2381]  3.033141e-03 -1.096032e-03  0.000000e+00  7.967146e-03 -8.612432e-03
## [2386]  6.370063e-03 -1.347839e-03  1.073218e-02  6.987011e-04 -6.349811e-05
```

```
## [2391]  1.903192e-03  5.750956e-03 -1.019738e-02 -3.954843e-03  4.472986e-04
## [2396]  5.796748e-03  1.713470e-03  8.020505e-03  1.005910e-03  5.653799e-04
## [2401] -4.784397e-03  8.830580e-04 -3.783579e-04  1.386613e-03 -4.165621e-03
## [2406] -6.535764e-03 -3.252035e-03  1.914243e-03  3.817527e-03 -1.014848e-02
## [2411] -1.862138e-03  1.926288e-03 -1.412248e-03  1.284687e-04 -6.508384e-03
## [2416] -3.821619e-03 -4.422771e-03 -1.935035e-02 -5.932362e-03 -3.549547e-03
## [2421] -6.711410e-04 -2.621762e-03 -1.089652e-02  2.378931e-03  1.085629e-03
## [2426] -3.056341e-03  1.176643e-02 -5.054771e-03  2.026822e-04 -9.707166e-03
## [2431]  1.635769e-03  6.809902e-05 -1.090141e-03 -1.007168e-02 -2.275000e-03
## [2436] -8.943177e-03 -6.076923e-03 -1.035257e-02  3.321675e-03 -1.085386e-02
## [2441] -5.794215e-03  1.657752e-02  2.116626e-04 -1.411931e-03  4.229827e-03
## [2446]  1.167968e-02  1.390530e-04  2.152691e-02  2.717947e-03 -5.579764e-03
## [2451] -8.191686e-04 -3.214887e-03 -1.483963e-02 -2.108152e-02 -1.634742e-03
## [2456] -1.461763e-02 -2.746659e-03 -2.254524e-02  1.038416e-02  2.268653e-03
## [2461] -2.488474e-03 -1.290721e-02  1.378620e-02 -6.685057e-03 -1.119235e-02
## [2466]  3.422877e-03 -1.105479e-02 -1.605122e-02 -2.058908e-02  3.344615e-03
## [2471] -1.873316e-02 -1.538799e-02  2.407513e-03  2.961483e-02 -7.781798e-05
## [2476] -1.316015e-02  2.913273e-03  2.346650e-02  1.381428e-03 -2.194312e-02
## [2481]  1.644930e-03 -1.331402e-03 -1.595737e-02 -2.551429e-03  1.623348e-02
## [2486] -3.928193e-04 -2.832863e-03 -7.514372e-03 -5.573263e-03  4.789272e-04
## [2491]  2.824624e-02  1.080257e-02 -1.562411e-02 -1.050084e-02 -4.737848e-03
## [2496]  7.098381e-03 -4.331909e-03  1.340723e-02 -1.459193e-02  2.250447e-02
## [2501] -3.864137e-04  6.702386e-03  2.051900e-02  4.128670e-03  2.332316e-02
## [2506]  1.062833e-02  3.891431e-02 -4.187611e-03 -3.003101e-02  5.534208e-03
## [2511]  1.002937e-03 -1.432152e-04  6.993535e-03  1.201683e-02 -1.038255e-02
## [2516] -1.185559e-02  1.937916e-03 -2.688920e-02 -9.696238e-03  2.010155e-02
## [2521] -2.916302e-04 -1.609796e-02 -1.102761e-02 -1.122634e-02 -1.820113e-03
## [2526] -6.091080e-03  1.139051e-02 -2.275776e-02 -5.887839e-03  6.582792e-03
## [2531] -8.215827e-03  2.110043e-02  2.739519e-03  6.438685e-03 -1.951877e-02
## [2536] -1.426823e-02  3.123536e-04  1.564832e-02 -1.182988e-02 -1.478887e-03
## [2541]  2.800251e-03  1.465058e-02 -7.529809e-03 -5.646018e-03 -5.522083e-03
## [2546]  4.435632e-03 -2.420550e-02 -1.910981e-03  1.014996e-02  1.182732e-03
## [2551]  4.481668e-03 -3.923261e-04 -8.636596e-04  2.588744e-03 -8.023326e-03
## [2556] -6.497131e-03 -2.467270e-03  4.611234e-03 -3.337044e-03  8.637480e-03
## [2561] -3.002768e-03  9.138239e-03  1.723733e-03  1.955188e-03  7.162351e-03
## [2566]  8.189168e-03 -1.925373e-03  1.058211e-02  4.620792e-02 -1.201656e-02
## [2571]  2.211166e-04 -3.321894e-03  1.108525e-03  1.549873e-03 -1.890922e-02
## [2576] -1.209753e-02  8.709867e-03 -2.869659e-03  1.761599e-02 -8.176919e-04
## [2581] -6.266339e-03 -6.079959e-03  4.516372e-04 -1.051566e-02 -4.564126e-04
## [2586]  1.592667e-02 -5.782751e-03 -7.180952e-03  1.137268e-03 -1.273514e-02
## [2591] -9.794549e-03  5.795774e-03  2.616392e-03  2.762857e-03  1.739835e-02
## [2596] -1.067666e-02 -5.725862e-03  1.993623e-02 -6.022301e-03  1.735129e-03
## [2601]  7.359601e-03  7.479432e-04 -4.646291e-03  7.334264e-03  6.169876e-03
## [2606]  9.294159e-03  1.320713e-03 -1.908257e-03 -2.939015e-04 -5.083446e-03
## [2611] -2.662527e-03  7.745972e-03  1.147128e-02  2.829267e-03  1.445600e-02
## [2616] -9.286710e-04 -4.871768e-03  1.722159e-03  1.268094e-02  4.661355e-03
## [2621]  5.481006e-03 -5.340091e-03 -4.932878e-04 -1.398326e-02 -7.605691e-03
## [2626]  9.319732e-03 -2.214524e-03  7.835914e-03 -3.767822e-03 -1.840190e-02
## [2631]  6.796353e-03 -2.019620e-03  9.199432e-03  1.429797e-03 -1.091808e-02
## [2636]  1.355783e-02 -1.426025e-03 -4.433646e-03  7.354812e-03  1.422779e-04
## [2641] -2.706747e-03  1.177068e-02 -1.191334e-02 -1.927952e-03 -3.795343e-03
## [2646]  1.935276e-03 -8.124573e-03  1.248312e-02 -7.155154e-03  3.369300e-03
## [2651] -1.431434e-04  1.032515e-02 -7.084411e-05  3.541704e-04  6.424081e-03
## [2656] -1.056078e-03  1.689190e-03  3.229659e-03 -3.722045e-03 -7.036060e-05
```

```
## [2661]  2.110669e-04 -1.288605e-02  2.348839e-03  1.502939e-02  9.548774e-03
## [2666] -1.110494e-03 -6.251954e-04 -2.365383e-03 -1.240511e-02 -2.612719e-03
## [2671] -1.414227e-04  5.219366e-03  4.772274e-03 -4.701928e-03 -9.044720e-03
## [2676] -9.231972e-04  1.319848e-02 -1.894937e-03  4.905406e-03  1.048035e-03
## [2681]  2.092781e-03 -8.397530e-03  2.947164e-03  6.007702e-03 -2.786291e-04
## [2686] -8.324928e-03  7.724448e-04  2.243726e-03  0.000000e+00  1.522184e-02
## [2691]  5.228770e-03 -3.431591e-04  1.234822e-03  1.849379e-03  2.736914e-04
## [2696]  5.526195e-03  2.514186e-03 -2.106051e-03 -8.164377e-04  6.986158e-03
## [2701] -2.910619e-03 -3.803319e-03 -9.530942e-04 -2.181918e-03 -6.643178e-03
## [2706]  5.277057e-03 -6.721101e-03  3.983248e-03  3.899174e-03  6.600684e-03
## [2711] -4.690855e-03  6.926552e-03 -4.204536e-03  8.391468e-03  4.035247e-03
## [2716]  3.082699e-03 -3.754110e-03  3.887926e-03 -2.813884e-03  6.953294e-03
## [2721] -3.998401e-04  1.731487e-03 -5.872556e-03 -8.064018e-03 -3.921043e-03
## [2726]  3.786091e-03 -4.328133e-03  4.935277e-03 -1.153102e-02  1.207040e-02
## [2731]  1.414475e-03 -1.481881e-03  1.099428e-02 -2.603560e-03 -6.370516e-03
## [2736]  1.411717e-03  6.094517e-03 -9.863535e-03  1.073116e-02 -5.686585e-03
## [2741] -2.350967e-03  6.568828e-03 -2.073233e-03  9.859516e-03 -8.120385e-03
## [2746]  2.069634e-03  7.044623e-03 -2.718925e-03  1.459854e-03 -1.308168e-02
## [2751] -4.376375e-03 -5.344893e-03 -1.085998e-03 -6.113923e-04 -7.845318e-03
## [2756]  3.008961e-03 -8.985279e-03  4.331243e-03 -1.799730e-02 -2.517660e-03
## [2761]  2.657344e-03 -5.321769e-03  6.857010e-03  1.811342e-03  1.738587e-03
## [2766] -2.504523e-03 -2.790180e-03  1.117007e-03  6.051982e-03 -1.179695e-03
## [2771]  1.388600e-04 -6.267866e-03  2.999549e-03  1.239070e-02 -8.947315e-04
## [2776] -2.136827e-03 -9.665172e-04 -7.070106e-03 -7.470798e-03 -1.234018e-02
## [2781]  8.510639e-04  3.397031e-03 -5.653710e-04 -5.884664e-03 -7.113388e-04
## [2786] -4.278692e-03 -8.828970e-03  2.448334e-03  3.661298e-03 -3.445556e-03
## [2791] -1.069916e-02 -1.103530e-02  6.664982e-03  6.983370e-03 -5.305823e-03
## [2796] -5.993732e-03 -1.100312e-03  8.550496e-03 -8.697296e-03 -4.414044e-03
## [2801] -1.844951e-03  3.833682e-03 -3.907551e-03  2.876851e-03 -7.393202e-03
## [2806]  1.356153e-02 -1.059769e-02  3.545055e-03  1.223683e-02 -1.172089e-02
## [2811]  2.722692e-03  3.673634e-04 -1.985368e-03  5.285580e-03  1.170789e-03
## [2816]  5.760763e-03 -7.370951e-03  7.734442e-03 -1.381969e-03 -9.948147e-03
## [2821] -5.380914e-03  7.390710e-05  2.955738e-04 -1.398728e-02 -2.247949e-04
## [2826]  4.038596e-03  4.988284e-03 -4.167603e-03  8.687636e-03  3.174020e-03
## [2831] -6.061521e-03 -7.414822e-05 -8.040544e-03 -1.047042e-03 -2.993564e-04
## [2836]  8.051333e-03  8.796952e-03  3.679311e-04  5.429612e-03 -9.262729e-03
## [2841] -3.922009e-03 -2.152534e-03 -8.920607e-04 -4.696419e-03 -6.371597e-03
## [2846]  4.651520e-03 -1.798023e-03 -7.980167e-03 -7.587290e-03  8.569423e-03
## [2851]  4.445289e-03 -8.986279e-03 -1.113665e-02 -1.133965e-02 -1.571634e-02
## [2856]  2.518695e-03  1.094531e-02 -1.141708e-02 -5.757795e-03 -5.870703e-03
## [2861] -1.426421e-02 -7.371737e-03  4.785668e-03 -3.323205e-03  4.293764e-03
## [2866]  1.643653e-02 -1.353049e-02 -1.028974e-02 -4.489254e-03  1.187295e-02
## [2871] -8.084401e-05 -8.362135e-03 -4.903573e-03 -1.065618e-03 -1.612205e-02
## [2876] -3.255836e-03  3.005763e-03  4.159740e-03  5.464494e-03 -2.811313e-03
## [2881]  1.642478e-02  4.064385e-03 -3.245436e-04  3.402466e-03 -4.044489e-04
## [2886]  2.020611e-03 -6.642928e-03  5.688051e-04 -1.788764e-03  3.574334e-03
## [2891] -1.298280e-03 -1.052942e-02  8.497477e-03  1.397720e-02  9.025260e-03
## [2896]  5.471211e-03 -4.120450e-03  7.042004e-03 -3.475242e-03 -5.235614e-03
## [2901]  1.154528e-02  2.826413e-03  1.076118e-02  2.014568e-03  3.400050e-03
## [2906] -4.484312e-03 -6.764400e-03  6.609409e-03 -2.250069e-03  8.431036e-03
## [2911]  0.000000e+00  1.154690e-03  5.064856e-03  3.826579e-04  8.002177e-03
## [2916]  4.921829e-03 -6.137080e-03 -7.600228e-05  9.455799e-03 -3.091659e-03
## [2921] -1.108760e-02 -1.508069e-02 -2.561616e-03 -7.724456e-03  5.545806e-03
## [2926]  4.042294e-03 -1.397407e-03 -2.722784e-03 -1.175378e-02 -1.893492e-03
```

```
## [2931]  9.471940e-04 -1.816244e-03  5.124376e-03  3.767370e-03 -6.208027e-03
## [2936]  1.417881e-03  8.543376e-03  8.581348e-04  4.745429e-03 -1.265246e-02
## [2941]  3.143418e-04 -1.494005e-03  1.808248e-03  1.241185e-02  9.573884e-03
## [2946] -4.611483e-04  5.443338e-03 -2.526317e-03  2.143952e-03  4.731028e-03
## [2951]  1.877812e-02 -3.067831e-03  9.843480e-03 -7.420875e-05  7.982894e-03
## [2956]  4.041003e-03 -2.716695e-03  1.118637e-02 -4.810154e-03  1.060979e-02
## [2961]  6.484640e-03 -2.154785e-04  1.436575e-04 -5.545767e-03  8.486207e-03
## [2966]  7.277949e-03 -4.846076e-03 -1.429797e-03 -1.086146e-02  8.784619e-03
## [2971]  1.719075e-03 -4.950328e-03  5.880261e-03 -8.112324e-03 -6.145856e-03
## [2976]  1.017435e-02 -2.515905e-03 -4.319344e-04  9.887592e-03 -8.559202e-04
## [2981]  1.487385e-02 -1.351898e-02 -7.582297e-03 -4.461723e-03 -9.930136e-03
## [2986] -2.041710e-03 -6.223707e-03 -7.223974e-03  2.807330e-03  4.636964e-03
## [2991]  2.640072e-03 -3.080762e-03 -1.659297e-02 -2.842399e-03 -8.047274e-03
## [2996] -1.146775e-02 -4.286596e-03  8.630949e-03  5.990085e-03  1.045319e-02
## [3001] -6.906416e-03  3.609298e-03 -6.098268e-03 -2.722325e-03  2.722325e-03
## [3006]  1.103988e-02  4.480287e-04 -6.666442e-03 -7.543790e-03 -3.869357e-03
## [3011] -2.359299e-03  5.332318e-04 -3.203664e-03  9.163804e-04  3.428967e-03
## [3016] -1.827319e-03  4.637910e-03  6.502367e-03  7.657695e-03 -4.873121e-03
## [3021] -1.019762e-02 -1.099332e-02 -6.391766e-03  7.725289e-05  2.546003e-03
## [3026]  6.757820e-03  2.255109e-02 -2.697439e-03  5.312992e-03  7.139169e-03
## [3031] -3.860722e-03  1.021323e-02  5.287521e-03 -6.594131e-04  3.219672e-03
## [3036]  0.000000e+00 -5.935170e-03  7.905758e-03  5.671093e-03 -1.015523e-03
## [3041] -9.113175e-03 -5.139889e-03 -1.989610e-03  9.543458e-03  7.305936e-05
## [3046] -3.732850e-03 -8.616616e-03 -3.408168e-03  1.483240e-03  3.919978e-03
## [3051]  4.786636e-03  4.471329e-03 -8.780274e-04  7.075415e-03  2.613242e-03
## [3056] -2.685930e-03  2.613432e-03  1.448961e-03  4.045956e-03  5.608298e-03
## [3061]  2.577875e-03 -5.007332e-04 -4.589796e-03 -4.313754e-04 -5.986530e-03
## [3066]  2.961681e-03  7.974467e-03 -5.010199e-04 -3.298676e-03  7.085883e-03
## [3071]  8.522174e-03  3.036189e-03  1.972109e-03 -6.211200e-03  5.366487e-03
## [3076] -3.951459e-03 -2.832061e-03 -9.931192e-04  3.547987e-04  6.223940e-03
## [3081]  2.253681e-03  4.220003e-04  6.326667e-04  7.212159e-03 -3.214538e-03
## [3086]  1.044432e-02  1.176837e-03  6.918261e-05  1.520808e-03 -8.983795e-04
## [3091] -1.452936e-03 -1.619356e-02  7.571014e-03  1.345747e-02  4.948804e-03
## [3096] -2.746311e-03  2.129049e-03  3.356053e-03  2.322088e-03  8.558672e-03
## [3101]  2.431941e-03  3.300666e-03  3.361910e-04 -1.076209e-03 -1.874928e-02
## [3106] -6.052704e-03 -1.347430e-02  3.977813e-03 -6.217926e-03 -2.807216e-03
## [3111] -6.203756e-03  5.500719e-03 -4.511180e-03  8.091513e-03 -1.121862e-03
## [3116] -5.769382e-03 -1.114000e-02  6.542943e-03 -3.544968e-04 -9.932601e-04
## [3121]  1.402666e-02  6.210117e-03  3.818521e-03 -3.465364e-04  1.226333e-02
## [3126]  1.094991e-03  3.754911e-03 -6.014645e-03 -3.639989e-03 -1.169604e-02
## [3131]  2.088191e-04  7.281333e-03 -1.756510e-02 -4.651827e-03  1.200815e-02
## [3136] -4.189067e-04  5.501598e-03  2.777585e-04 -1.659179e-02  1.622289e-03
## [3141]  6.532987e-03  6.003508e-03  4.167251e-03  6.562837e-03 -1.033378e-03
## [3146] -2.622681e-03 -9.792085e-03  1.394798e-03 -6.853174e-03 -1.534412e-02
## [3151] -1.426127e-03  1.085849e-02  1.058238e-03 -1.834992e-03 -8.085724e-03
## [3156]  8.085724e-03  2.257974e-03  1.288533e-02 -4.175656e-04 -6.266755e-04
## [3161]  9.566134e-03 -8.452316e-03 -4.882141e-03  5.925220e-03 -1.301173e-02
## [3166]  2.110151e-03  6.164211e-03 -1.137733e-02  0.000000e+00  5.845293e-03
## [3171]  7.021732e-05 -3.446460e-03  2.603527e-03  6.322667e-04  1.484813e-02
## [3176] -2.147336e-03  1.039609e-03 -8.067925e-03  6.126446e-03 -1.667130e-03
## [3181]  3.262193e-03 -2.011585e-03 -1.528734e-03  5.755312e-03  3.244403e-03
## [3186] -5.182254e-03 -2.011027e-03 -8.574768e-03 -5.616809e-03 -1.446731e-02
## [3191]  4.205730e-03 -7.927197e-03 -2.035344e-02 -2.270980e-03  3.294896e-03
## [3196]  2.190581e-03  1.073719e-02 -5.426734e-03 -1.072259e-02  4.463476e-03
```

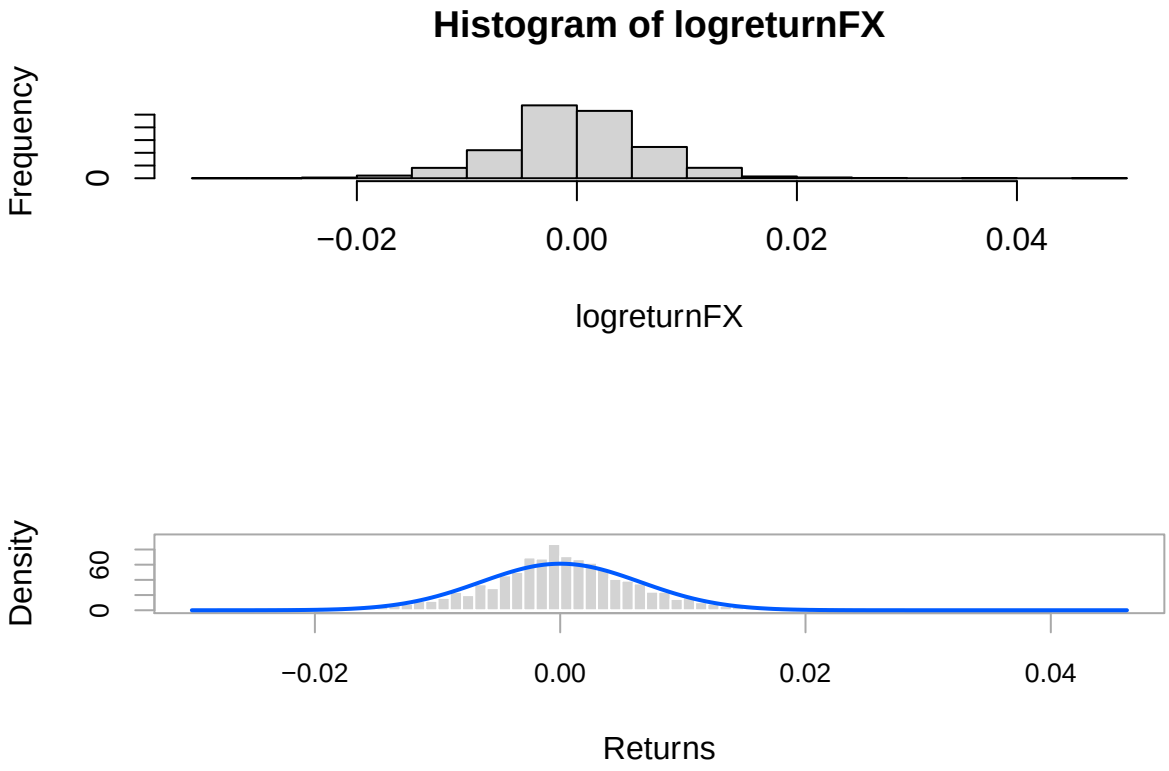
```
## [3201]  1.969294e-03 -2.046446e-02  5.340467e-03 -1.479618e-04  6.636703e-03
## [3206]  1.615628e-03  8.068361e-04 -1.402858e-02 -1.257031e-02  9.783632e-04
## [3211]  2.554280e-03  5.984458e-03  7.726636e-03  1.067403e-02  1.077863e-02
## [3216] -5.447626e-03  9.495921e-03 -6.586828e-03 -3.710579e-03  4.073622e-03
## [3221] -7.505409e-03  1.459456e-02  4.243847e-03 -1.508458e-03 -5.261463e-03
## [3226]  2.384976e-02 -5.646528e-04 -1.543910e-02 -1.962196e-02  9.243488e-03
## [3231] -4.283595e-03  1.236139e-03 -1.236139e-03  2.978679e-03 -1.380541e-02
## [3236]  2.941609e-04  1.836548e-03 -7.440456e-03 -1.405898e-03  1.258001e-03
## [3241] -7.395629e-05  2.957924e-04 -1.850139e-03 -1.139804e-02 -7.747021e-03
## [3246]  6.772545e-03  6.747386e-04  8.210227e-03  2.524129e-03 -7.516874e-03
## [3251]  5.735797e-03 -4.914381e-03 -8.214166e-04 -4.642464e-03  3.296871e-03
## [3256] -1.355647e-02 -7.153215e-03 -9.360922e-03  3.155669e-03  9.217298e-04
## [3261] -6.143922e-04  4.522293e-03 -2.756932e-03  3.833621e-04 -3.833621e-04
## [3266]  2.603969e-03 -1.138474e-02  2.009430e-03  1.620058e-03  6.760416e-03
## [3271] -1.008050e-02 -1.143403e-02 -4.704784e-03  1.727659e-03  2.898893e-03
## [3276] -7.538908e-03  1.035141e-02 -1.066677e-02  4.562985e-03  6.649741e-03
## [3281]  8.695032e-03  8.499131e-04  6.696711e-03 -2.381045e-03 -2.001386e-03
## [3286]  1.331822e-02  3.036747e-03 -5.244169e-03 -5.348424e-03  9.606661e-03
## [3291] -9.109543e-04 -4.643559e-03  1.829548e-03  8.644931e-03  6.793222e-04
## [3296]  3.314504e-03 -8.306950e-03  1.818320e-03 -4.704106e-03 -4.726339e-03
## [3301]  1.755927e-03  2.970412e-03  8.029130e-03 -3.018185e-04  4.292337e-03
## [3306]  1.157982e-02 -3.944485e-03  3.127097e-03 -6.937479e-03 -2.923650e-03
## [3311] -8.898332e-03  1.816256e-03 -8.504227e-03  2.665348e-03  8.104570e-03
## [3316] -1.122755e-02  2.514383e-03 -2.438096e-03 -6.428430e-03  3.448940e-03
## [3321]  7.697915e-03  5.376153e-03 -1.511488e-03 -2.423142e-03  3.032141e-04
## [3326]  5.216023e-03  4.888882e-03  6.000600e-04 -2.703110e-03 -2.635048e-03
## [3331]  5.188177e-03 -6.751941e-04  9.001576e-04 -1.594713e-02 -4.734640e-03
## [3336]  1.911827e-03 -1.528117e-04 -1.452877e-03  2.751033e-03  5.099916e-03
## [3341] -6.780203e-03 -1.147272e-03  4.276448e-03 -7.620499e-05  7.617887e-04
## [3346]  6.073508e-03 -6.301984e-03  5.923468e-03  2.271265e-04  1.664020e-03
## [3351]  1.208459e-03 -1.435208e-03 -2.268002e-04 -5.458694e-03 -5.322992e-04
## [3356] -4.268625e-03 -2.983592e-03 -2.838840e-03 -4.697918e-03  3.859067e-04
## [3361] -1.699105e-03 -6.981102e-03 -6.089963e-03 -3.058946e-03 -1.651009e-03
## [3366]  9.437673e-04  3.766187e-03 -2.666250e-03 -1.312064e-02  1.113232e-03
## [3371] -5.179088e-03 -2.399425e-03 -6.668566e-03 -3.310593e-03  4.519052e-03
## [3376]  6.020488e-03 -4.652664e-03  7.848831e-03  2.629169e-03 -6.866294e-03
## [3381]  1.760987e-03 -2.161644e-03  9.492354e-03  9.522299e-04  1.980905e-03
## [3386] -4.363182e-03  9.022618e-03  8.663123e-04 -9.253101e-03 -3.262905e-03
## [3391] -5.194817e-03 -7.214140e-04 -1.123235e-03 -1.928486e-03  1.872490e-02
## [3396] -6.652963e-03  2.856691e-03 -1.887754e-02 -8.189124e-03  1.301766e-03
## [3401] -3.583941e-03 -8.979959e-04 -3.682040e-03  2.701487e-03  2.857261e-03
## [3406] -2.693769e-03  2.204532e-03 -3.262909e-04 -6.630401e-03 -4.114893e-03
## [3411] -5.291893e-03  5.786575e-03  1.212533e-02  7.302264e-03 -9.748249e-03
## [3416]  5.292095e-03 -1.300073e-03 -1.227110e-02  1.964283e-02  2.579398e-03
## [3421]  0.000000e+00 -4.680070e-03 -6.979981e-03  1.627605e-03  3.328330e-03
## [3426] -8.107670e-04 -3.331034e-03  5.518599e-03 -3.323743e-03  2.271069e-03
## [3431]  1.039703e-02  0.000000e+00  8.860565e-03 -3.981531e-03 -1.517148e-03
## [3436]  3.987564e-03 -2.071549e-03 -3.275417e-03  6.460641e-03 -9.545021e-04
## [3441]  2.940127e-03  1.823299e-03  1.337444e-02 -7.815248e-05  4.911716e-03
## [3446]  2.795901e-03  1.395025e-03  1.765610e-02 -1.294400e-03 -5.654049e-03
## [3451]  1.072140e-03 -8.995563e-03  3.238495e-03 -6.255088e-03  2.784871e-03
## [3456] -7.210172e-03  1.710332e-03 -1.399145e-03  3.416683e-03  3.945694e-03
## [3461] -3.248263e-03  7.101535e-03  4.451274e-03 -1.411244e-02  9.315324e-04
## [3466]  3.098856e-03  1.391358e-03  3.089280e-04  6.618973e-03  7.413386e-03
```

```
## [3471] -2.058006e-03 -6.429906e-03  3.143572e-03 -7.067710e-03 -1.929236e-03
## [3476]  9.264979e-04 -1.544640e-03 -2.476398e-03  5.640347e-03 -1.619309e-03
## [3481] -1.621935e-03 -6.903266e-03 -4.524542e-03  2.186817e-03 -4.613528e-03
## [3486] -1.490255e-03 -1.964251e-03  7.864417e-05  1.885607e-03  3.369513e-03
## [3491] -5.333764e-03  7.131412e-03  6.245121e-04  1.560671e-04  1.109614e-02
## [3496]  5.400193e-04 -2.007258e-03 -1.314620e-03  2.318752e-03  4.390871e-03
## [3501]  4.295144e-03  1.147359e-03 -3.058338e-04 -8.370177e-03 -2.006948e-03
## [3506] -9.276439e-04  4.783591e-03  3.534387e-03  2.986791e-03  4.349326e-03
## [3511]  2.661295e-03  4.167778e-03  2.718624e-03 -2.718624e-03 -4.395611e-03
## [3516]  9.869046e-04  3.711141e-03  0.000000e+00 -6.049607e-04 -2.575174e-03
## [3521]  6.823093e-04 -6.462672e-03 -4.817075e-03  3.977669e-03 -2.369398e-03
## [3526]  7.649354e-04  1.079941e-02  1.001024e-02  1.197515e-03 -2.021640e-03
## [3531] -2.777050e-03  3.825818e-03 -3.976148e-03  7.516819e-05  3.006163e-04
## [3536]  5.246209e-03  5.813537e-03  2.229240e-04  1.855770e-03  5.915427e-03
## [3541]  1.473405e-03  7.919091e-03 -1.212403e-02  3.100091e-03 -3.026168e-03
## [3546] -1.085109e-02 -1.196351e-03  3.584769e-03  2.680168e-03 -1.487099e-04
## [3551] -8.513232e-03  2.097693e-03  1.869229e-03 -2.767702e-03 -1.099657e-02
## [3556] -2.882065e-03  4.556155e-04 -8.998764e-03  3.822927e-03 -1.909637e-03
## [3561] -6.982036e-03  6.157636e-04  1.768211e-03 -2.229998e-03  8.279716e-03
## [3566] -8.125763e-03
```

```
#6.B
table.Stats(logreturnFX)
```

```
##
## Observations    3566.0000
## NAs                0.0000
## Minimum           -0.0300
## Quartile 1        -0.0036
## Median             0.0000
## Arithmetic Mean    0.0000
## Geometric Mean     0.0000
## Quartile 3         0.0038
## Maximum            0.0462
## SE Mean            0.0001
## LCL Mean (0.95)   -0.0002
## UCL Mean (0.95)    0.0002
## Variance           0.0000
## Stdev              0.0065
## Skewness           0.1168
## Kurtosis           2.0610
```

```
#6.C
par(mfcol=c(2,1))
hist(logreturnFX)
chart.Histogram(logreturnFX, method=c('add.normal'))
```




```
#6.D
t.test(logreturnFX)
```

```
##
##  One Sample t-test
##
## data:  logreturnFX
## t = 0.24489, df = 3565, p-value = 0.8066
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
##  -0.0001870737  0.0002404769
## sample estimates:
##    mean of x
## 2.670158e-05
```

```
#since the calculated p-value = 0.8066 is greater than 0.0, we cannot reject null hypothesis at 95 perc
```