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(Assignment 3)

## R-code.R

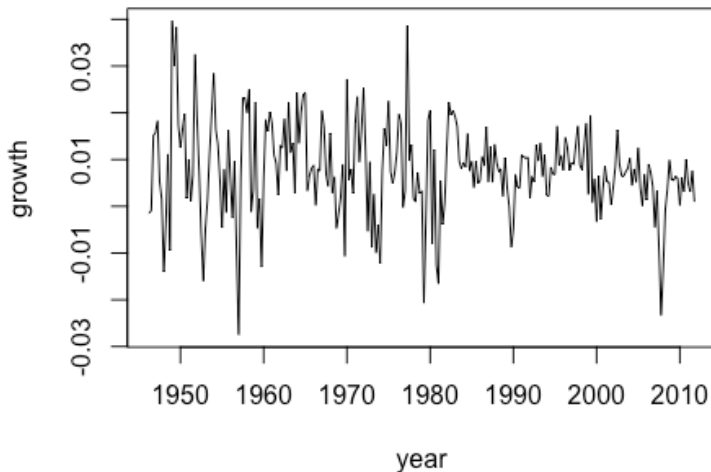
mew

2021-03-01

```
#EE435 Wasin Siwasarit Lecture4
setwd("/Users/mew/Desktop")
cat(rep("\n",50)) #clear R Console
#install.packages("quantmod")
#install.packages("fBasics")
#install.packages("sn")
#install.packages("PerformanceAnalytics")
#install.packages("car")
#install.packages("tseries")
#install.packages("forecast")
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)  
1. #1  
da=read.table("q.gdpmc1.txt",header = TRUE)  
gdp=da[,4]  
loggdp=log(gdp)  
growth=diffl(loggdp)  
length(growth)  
## [1] 263  
tdx=c(1:263)/4+1946  
plot(tdx.growth,xlab='year',ylab='growth',type='l')
```

1a.)



```
basicStats(growth)
##          growth
## nobs      263.000000
## NAs        0.000000
## Minimum   -0.027445
## Maximum    0.039624
## 1. Quartile 0.002772
## 3. Quartile 0.013047
## Mean       0.007770
## Median     0.007601
## Sum        2.043500
## SE Mean    0.000608
## LCL Mean   0.006573
## UCL Mean   0.008967
## Variance   0.000097
## Stdev      0.009855
## Skewness   -0.096390
## Kurtosis   1.365072
```

1c.)

```
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
```

since  $P\text{-value} < 0.05$ , we reject  $H_0$ .

So, mean of gdp growth is not equal to zero at 95% C.I

```
## sample estimates:
```

```
## mean of x
```

```
## 0.007769964
```

```
1b.) Box.test(growth,lag = 12, type = 'Ljung')
```

```
##
```

```
## Box-Ljung test
```

```
##
```

```
## data: growth
```

```
## X-squared = 64.259, df = 12, p-value = 3.737e-09
```

since  $P\text{-value} < 0.05$ , we reject  $H_0$ .

so, the past return has some correlation with today return at 95% C.I.

```
2 (#2)
```

```
da2=read.table("d-amzn3dx.txt",header = TRUE)
```

```
simplereturnA=da2[,2]
```

```
2a.) basicStats(simplereturnA)
```

```
## simplereturnA
```

```
## nobs 1259.000000
```

```
## NAs 0.000000
```

```
## Minimum -0.127820
```

```
## Maximum 0.267951
```

```
## 1. Quartile -0.013195
```

```
## 3. Quartile 0.014571
```

```
## Mean 0.001207
```

```
## Median -0.000451
```

```
## Sum 1.519912
```

```
## SE Mean 0.000820
```

```
## LCL Mean -0.000401
```

```
## UCL Mean 0.002816
```

```
## Variance 0.000846
```

```
## Stdev 0.029087
```

```
## Skewness 1.031884
```

```
## Kurtosis 9.360219
```

```
simplereturnV=da2[,3]
```

```
basicStats(simplereturnV)
```

```
## simplereturnV
```

```
## nobs 1259.000000
```

```
## NAs 0.000000
```

```
## Minimum -0.089763
```

```
## Maximum 0.114895
```

```
## 1. Quartile -0.006328
```

```
## 3. Quartile 0.007376
```

```
## Mean 0.000210
```

```
## Median 0.000818
```

```
## Sum 0.264749
```

```
## SE Mean 0.000469
```

```
## LCL Mean -0.000710
```

```
## UCL Mean 0.001130
```

```
## Variance 0.000277
```

```
## Stdev 0.016641
```

```
## Skewness -0.113083
```

```
## Kurtosis 6.298940
```

```
simplereturnE=da2[,4]
```

```
basicStats(simplereturnE)
```

```
## simplereturnE
```

```
## nobs 1259.000000
```

```
## NAs      0.000000
## Minimum  -0.078240
## Maximum   0.107422
## 1. Quartile -0.006365
## 3. Quartile 0.007780
## Mean      0.000517
## Median    0.001210
## Sum       0.651089
## SE Mean   0.000434
## LCL Mean  -0.000334
## UCL Mean  0.001368
## Variance  0.000237
## Stdev     0.015395
## Skewness  -0.168185
## Kurtosis  5.275824
```

```
simplereturnS=da2[,5]
```

```
basicStats(simplereturnS)
```

```
##      simplereturnS
## nobs      1259.000000
## NAs      0.000000
## Minimum  -0.090350
## Maximum   0.115800
## 1. Quartile -0.006301
## 3. Quartile 0.006978
## Mean      0.000114
## Median    0.000685
## Sum       0.143876
## SE Mean   0.000467
## LCL Mean  -0.000802
## UCL Mean  0.001031
## Variance  0.000275
## Stdev     0.016573
## Skewness  -0.018307
## Kurtosis  7.154386
```

```
logreturnA = log(simplereturnA+1)
```

2b.)

```
basicStats(logreturnA)
```

```
##      logreturnA
## nobs      1259.000000
## NAs      0.000000
## Minimum  -0.136759
## Maximum   0.237402
## 1. Quartile -0.013283
## 3. Quartile 0.014466
## Mean      0.000791
## Median    -0.000451
## Sum       0.996211
## SE Mean   0.000810
## LCL Mean  -0.000798
## UCL Mean  0.002380
## Variance  0.000826
## Stdev     0.028736
## Skewness  0.627148
## Kurtosis  7.249289
```

logreturnV = log(simplereturnV+1)

basicStats(logreturnV)

```
##          logreturnV
## nobs      1259.000000
## NAs        0.000000
## Minimum   -0.094050
## Maximum    0.108760
## 1. Quartile -0.006348
## 3. Quartile 0.007348
## Mean       0.000072
## Median     0.000818
## Sum        0.090160
## SE Mean    0.000470
## LCL Mean   -0.000850
## UCL Mean    0.000993
## Variance   0.000278
## Stdev      0.016673
## Skewness   -0.317276
## Kurtosis    6.194861
```

logreturnE = log(simplereturnE+1)

basicStats(logreturnE)

```
##          logreturnE
## nobs      1259.000000
## NAs        0.000000
## Minimum   -0.081470
## Maximum    0.102035
## 1. Quartile -0.006385
## 3. Quartile 0.007749
## Mean       0.000398
## Median     0.001209
## Sum        0.501599
## SE Mean    0.000435
## LCL Mean   -0.000454
## UCL Mean    0.001251
## Variance   0.000238
## Stdev      0.015420
## Skewness   -0.333442
## Kurtosis    5.193084
```

logreturnS = log(simplereturnS+1)

basicStats(logreturnS)

```
##          logreturnS
## nobs      1259.000000
## NAs        0.000000
## Minimum   -0.094695
## Maximum    0.109572
## 1. Quartile -0.006320
## 3. Quartile 0.006954
## Mean       -0.000023
## Median     0.000685
## Sum        -0.029133
## SE Mean    0.000468
## LCL Mean   -0.000941
## UCL Mean    0.000894
```

```
## Variance    0.000275
## Stdev      0.016594
## Skewness   -0.242090
## Kurtosis    6.952089
```

2c.) `t.test(logreturnA)`

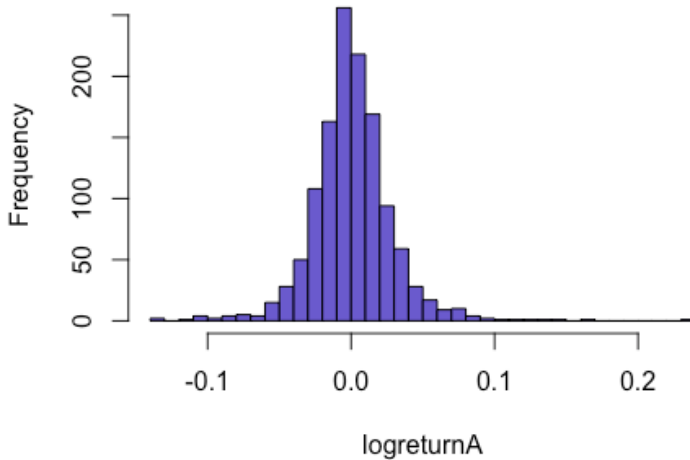
```
##
## One Sample t-test
##
## data: logreturnA
## t = 0.97705, df = 1258, p-value = 0.3287
## alternative hypothesis: true mean is not equal to 0
## 95 percent confidence interval:
## -0.0007975567  0.0023801007
## sample estimates:
## mean of x
## 0.000791272
```

since  $p\text{-value} > 0.05$ , we cannot reject  $H_0$ .

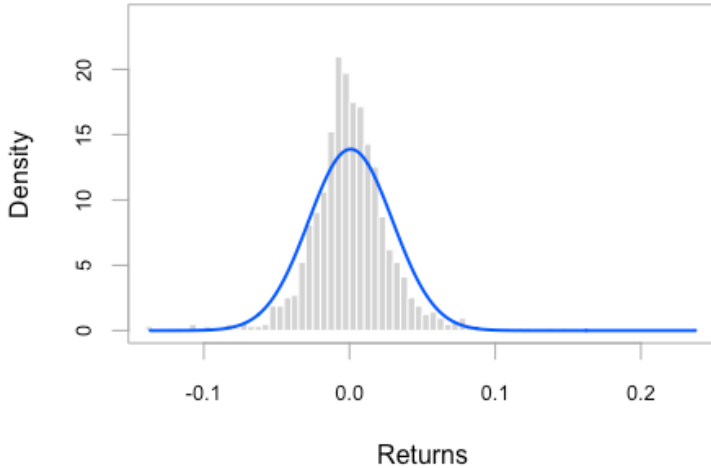
So, mean of logreturn of AMZN is equal to zero at 95% CI.

2d.) `hist(logreturnA, breaks = 40, col = 'slateblue')`

### Histogram of logreturnA



```
chart.Histogram(logreturnA, methods = c("add.normal"))
```



3.) #3  
`da3=read.table("m-abt3dx.txt",header = TRUE)`

30.)  
`monthlyreturnABT=da3[,2]`  
`basicStats(monthlyreturnABT)`  

```
##      monthlyreturnABT
## nobs      492.000000
## NAs        0.000000
## Minimum   -0.234146
## Maximum    0.382326
## 1. Quartile -0.024230
## 3. Quartile  0.055840
## Mean       0.014073
## Median     0.014083
## Sum        6.923863
## SE Mean    0.002921
## LCL Mean   0.008333
## UCL Mean   0.019812
## Variance   0.004198
## Stdev      0.064795
## Skewness   0.097058
## Kurtosis   2.469971
monthlyreturnVW=da3[,3]
basicStats(monthlyreturnVW)
##      monthlyreturnVW
## nobs      492.000000
## NAs        0.000000
```

```

## Minimum      -0.225363
## Maximum       0.165585
## 1. Quartile  -0.017196
## 3. Quartile   0.039484
## Mean          0.009020
## Median        0.012626
## Sum           4.437612
## SE Mean       0.002089
## LCL Mean      0.004915
## UCL Mean      0.013124
## Variance      0.002147
## Stdev         0.046341
## Skewness      -0.555341
## Kurtosis       2.073657
monthlyreturnEW=da3[,4]
basicStats(monthlyreturnEW)
##      monthlyreturnEW
## nobs      492.000000
## NAs       0.000000
## Minimum   -0.272248
## Maximum    0.299260
## 1. Quartile -0.020694
## 3. Quartile  0.044462
## Mean       0.011583
## Median     0.014379
## Sum        5.699074
## SE Mean    0.002583
## LCL Mean   0.006508
## UCL Mean   0.016659
## Variance   0.003283
## Stdev      0.057299
## Skewness   -0.200025
## Kurtosis   3.288104
monthlyreturnS=da3[,5]
basicStats(monthlyreturnS)
##      monthlyreturnS
## nobs      492.000000
## NAs       0.000000
## Minimum   -0.217630
## Maximum    0.163047
## 1. Quartile -0.018948
## 3. Quartile  0.035349
## Mean       0.006386
## Median     0.009091
## Sum        3.142113
## SE Mean    0.002019
## LCL Mean   0.002419
## UCL Mean   0.010354
## Variance   0.002006
## Stdev      0.044788
## Skewness   -0.444303
## Kurtosis   1.889777

```

```
logreturnABT = log(monthlyreturnABT+1)
```

3b.)

```
basicStats(logreturnABT)
##          logreturnABT
## nobs      492.000000
## NAs        0.000000
## Minimum    -0.266764
## Maximum     0.323768
## 1. Quartile -0.024528
## 3. Quartile  0.054337
## Mean        0.011924
## Median      0.013985
## Sum         5.866748
## SE Mean     0.002898
## LCL Mean    0.006230
## UCL Mean    0.017619
## Variance    0.004133
## Stdev       0.064287
## Skewness    -0.297125
## Kurtosis    2.005416
logreturnVW = log(monthlyreturnVW+1)
basicStats(logreturnVW)
##          logreturnVW
## nobs      492.000000
## NAs        0.000000
## Minimum    -0.255361
## Maximum     0.153223
## 1. Quartile -0.017345
## 3. Quartile  0.038724
## Mean        0.007903
## Median      0.012547
## Sum         3.888033
## SE Mean     0.002107
## LCL Mean    0.003762
## UCL Mean    0.012043
## Variance    0.002185
## Stdev       0.046745
## Skewness    -0.839542
## Kurtosis    3.003331
logreturnEW = log(monthlyreturnEW+1)
basicStats(logreturnEW)
##          logreturnEW
## nobs      492.000000
## NAs        0.000000
## Minimum    -0.317795
## Maximum     0.261795
## 1. Quartile -0.020911
## 3. Quartile  0.043501
## Mean        0.009887
## Median      0.014277
## Sum         4.864341
## SE Mean     0.002592
## LCL Mean    0.004794
## UCL Mean    0.014979
## Variance    0.003305
## Stdev       0.057491
```

```

## Skewness    -0.662276
## Kurtosis    3.976081
logreturnSP = log(monthlyreturnS+1)
basicStats(logreturnSP)
##          logreturnSP
## nobs      492.000000
## NAs       0.000000
## Minimum   -0.245428
## Maximum    0.151043
## 1. Quartile -0.019130
## 3. Quartile 0.034738
## Mean      0.005360
## Median    0.009050
## Sum       2.636920
## SE Mean   0.002035
## LCL Mean  0.001361
## UCL Mean  0.009359
## Variance  0.002038
## Stdev     0.045145
## Skewness  -0.711215
## Kurtosis  2.659018

```

3c.) t.test(logreturnABT)

```

##
## One Sample t-test
##
## data: logreturnABT
## 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

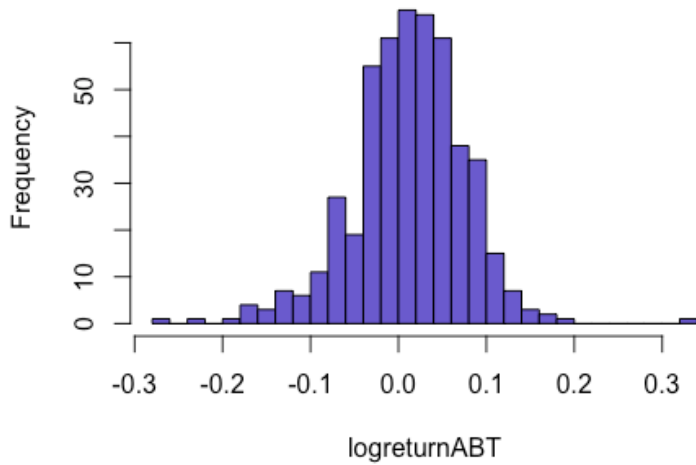
```

since P-value < 0.05, we reject  $H_0$ .

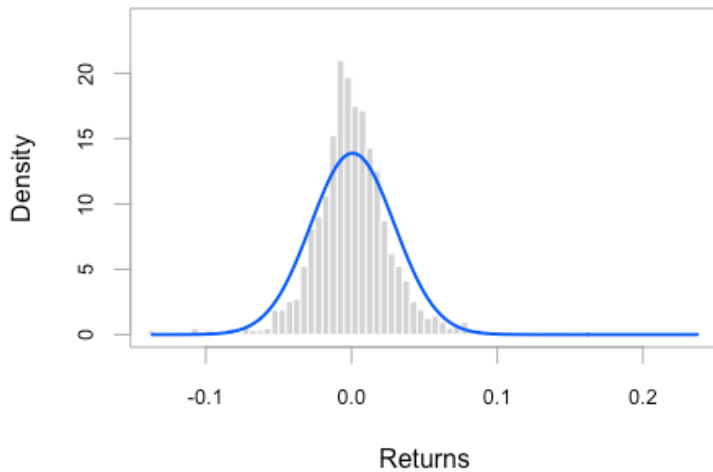
So, mean of log return is not equal to zero at 95% C.I

3d.) hist(logreturnABT, breaks = 40, col = 'slateblue')

## Histogram of logreturnABT



```
chart.Histogram(logreturnA,methods = c("add.normal"))
```



4.) (#4)

4a.) t.test(logreturnVW)

##

## One Sample t-test

##

## data: logreturnVW

## t = 3.7499, df = 491, p-value = 0.000198

## alternative hypothesis: true mean is not equal to 0

## 95 percent confidence interval:

## 0.003761858 0.012043156

## sample estimates:

## mean of x

## 0.007902507

T=length(logreturnVW)

T

## [1] 492

4b.) M3=skewness(logreturnVW)

M3

## [1] -0.8421084

tst=M3/sqrt(6/T)

tst

## [1] -7.625616

pv=2\*pnorm(tst)

pv

## [1] 2.428715e-14

4c.) K=kurtosis(logreturnVW)

K

## [1] 3.02781

tstk=K/sqrt(24/T)

tstk

## [1] 13.70899

pv=2\*(1-pnorm(tstk))

pv

## [1] 0

5.) (#5)

T1=length(logreturnA)

T1

## [1] 1259

5a.) (i) M3A=skewness(logreturnA)

M3A

## [1] 0.6278955

tst=M3A/sqrt(6/T1)

tst

## [1] 9.095459

pv=2\*(1-pnorm(tst))

pv

## [1] 0

(ii) K1=kurtosis(logreturnA)

K1

## [1] 7.26559

tstk=K1/sqrt(24/T1)

tstk

## [1] 52.62331

since P-value < 0.05, we reject  $H_0$ .

So, mean of logreturn is not equal to zero at 95% CI

since P-value < 0.05, we reject  $H_0$ .

So, the logreturnVW is not symmetry at 95% CI  
(skewness is not equal to zero)

since P-value < 0.05, we reject  $H_0$ .

so, excess kurtosis is not equal to zero and  
kurtosis is not equal to 3 at 95% CI.

since P-value < 0.05, we reject  $H_0$ .

So, the logreturnVW is not symmetry at 95% CI  
(skewness is not equal to zero)

```
pv=2*(1-pnorm(tstk))
```

```
pv
```

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

```
t.test(logreturnA)
```

```
##
```

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

```
##
```

```
## data: logreturnA
```

```
## t = 0.97705, df = 1258, p-value = 0.3287
```

```
## alternative hypothesis: true mean is not equal to 0
```

```
(iii) ## 95 percent confidence interval:
```

```
## -0.0007975567 0.0023801007
```

```
## sample estimates:
```

```
## mean of x
```

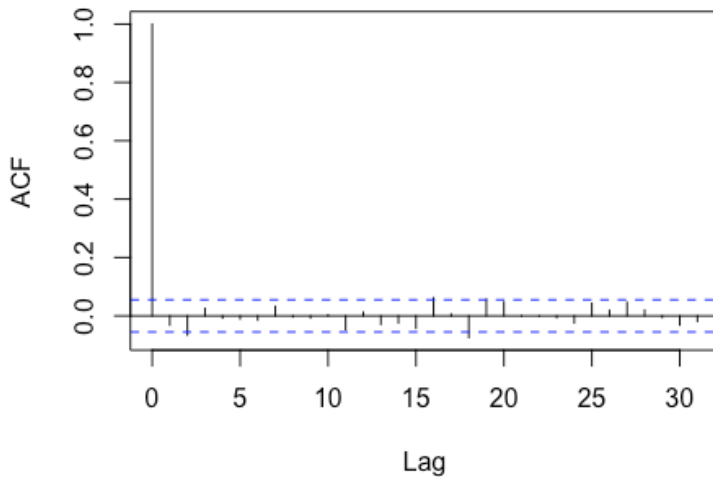
```
## 0.000791272
```

```
5b.) m3=acf(logreturnA)
```

since P-value  $< 0.05$ , We reject  $H_0$ .

So, excess kurtosis is not equal to zero and kurtosis is not equal to 3 at 95% CI.

## Series logreturnA



```
names(m3)
```

```
## [1] "acf" "type" "n.used" "lag" "series" "snames"
```

```
m3$acf
```

```
## , 1
```

```
##
```

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

```
## [1,] 1.0000000000
```

```
## [2,] -0.0316614625
```

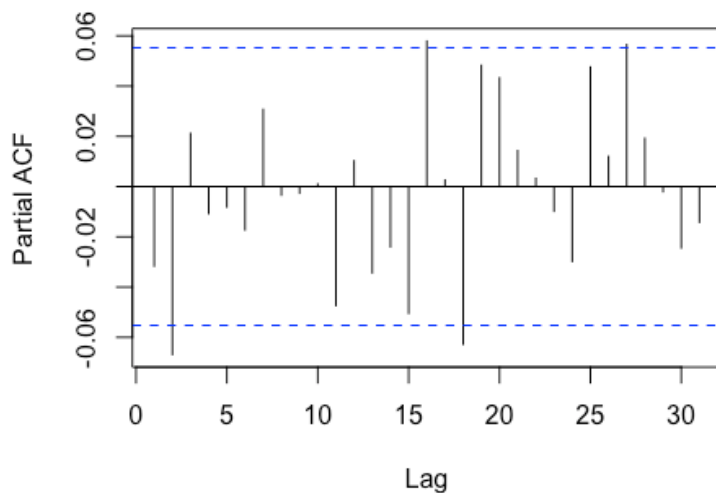
```
## [3,] -0.0657963636
```

```
## [4,] 0.0254218662
```

```
## [5,] -0.0078449975
## [6,] -0.0106049170
## [7,] -0.0148006161
## [8,] 0.0323683041
## [9,] -0.0036167194
## [10,] -0.0071029841
## [11,] 0.0036460656
## [12,] -0.0470650529
## [13,] 0.0124225728
## [14,] -0.0292344042
## [15,] -0.0243312999
## [16,] -0.0427496969
## [17,] 0.0620802986
## [18,] 0.0061473042
## [19,] -0.0744147656
## [20,] 0.0568749860
## [21,] 0.0471836320
## [22,] 0.0003109035
## [23,] -0.0006986516
## [24,] -0.0062326764
## [25,] -0.0244831099
## [26,] 0.0430134379
## [27,] 0.0192213377
## [28,] 0.0464068477
## [29,] 0.0197592080
## [30,] -0.0055967072
## [31,] -0.0317808897
## [32,] -0.0189335815
```

```
m4=pacf(logreturnA)
```

## Series logreturnA



```
names(m4)
## [1] "acf" "type" "n.used" "lag" "series" "snames"
m4$acf
## , 1
##
## [1]
## [1,] -0.031661462
## [2,] -0.066865841
## [3,] 0.021198224
## [4,] -0.010767266
## [5,] -0.008175617
## [6,] -0.017271554
## [7,] 0.030726846
## [8,] -0.003403192
## [9,] -0.002629988
## [10,] 0.001032256
## [11,] -0.047363651
## [12,] 0.010284023
## [13,] -0.034370971
## [14,] -0.024008840
## [15,] -0.050490587
## [16,] 0.057915450
## [17,] 0.002614565
## [18,] -0.062793034
## [19,] 0.048259706
## [20,] 0.043316077
## [21,] 0.014313942
```

```
## [22,] 0.003269419
## [23,] -0.009825781
## [24,] -0.029795895
## [25,] 0.047586551
## [26,] 0.012023445
## [27,] 0.056509305
## [28,] 0.019236094
## [29,] -0.002035994
## [30,] -0.024437113
## [31,] -0.014212519
```

```
Box.test(logreturnA,lag = 12,type = "Ljung")
```

```
##
## Box-Ljung test
##
## data: logreturnA
## X-squared = 12.488, df = 12, p-value = 0.4073
```

since  $p$ -value  $> 0.05$ , we cannot reject  $H_0$ .

so, there is no correlation between today and past return at 95% CI

6.) 6

```
da4=read.table("d-exuseu.txt",header = TRUE)
returnX=da4[,4]
```

6q.) `logreturnX=diff(log(returnX))`

```
logreturnX
## [1] -4.412021e-03 -1.060020e-02 3.089071e-03 -1.016111e-02 -1.732502e-03
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## [1941] 1.418216e-03 2.280682e-03 5.171210e-03 -3.836672e-03 -4.718103e-03  
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## [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  
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## [2011] 6.721318e-03 -8.845267e-03 -5.711473e-03 -6.820211e-03 1.383126e-03

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## [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 -9.945012e-04
## [3441] 2.940127e-03 1.823299e-03 1.337444e-02 -7.815248e-03 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

```

6b.)

```

basicStats(logreturnX)
##          logreturnX
## nobs      3566.000000
## NAs         0.000000
## Minimum   -0.030031
## Maximum    0.046208
## 1. Quartile -0.003585

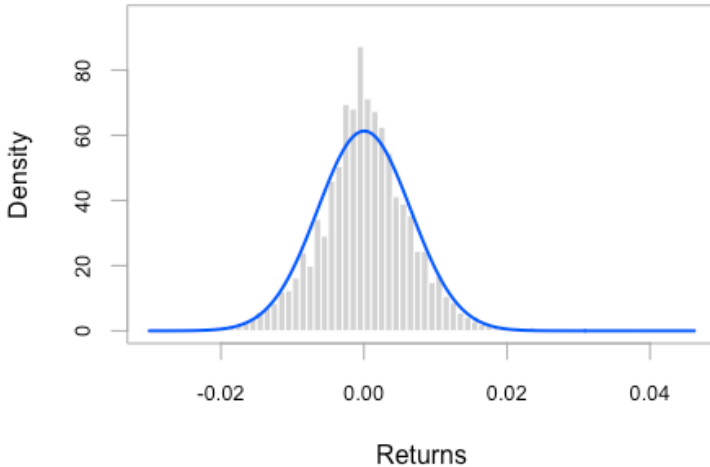
```

```

## 3. Quartile 0.003767
## Mean 0.000027
## Median 0.000000
## Sum 0.095218
## SE Mean 0.000109
## LCL Mean -0.000187
## UCL Mean 0.000240
## Variance 0.000042
## Stdev 0.006511
## Skewness 0.116750
## Kurtosis 2.058184

```

6c.) `chart.Histogram(logreturnX, methods = c("add.normal"))`



6d.) `t.test(logreturnX)`

```

##
## One Sample t-test
##
## data: logreturnX
## 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  $p\text{-value} > 0.05$ , we cannot reject  $H_0$ .  
 So, mean of daily logreturn of  $\$-\epsilon$  is equal to zero at 95% C.I.