Assignment 2

DUE DATE: Thursday 11^{th}, February 2021.

I pledge to the Honor Code and to obey all rules for taking and performing homework assignments as specified by the course instructor.

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All data are downloadable from yahoo finance

You should submit your answer with (i) the code file with the name (assignment1_yourname.r) and (ii) the report in .pdf file. You can upload your files on the BE-moodle

1.(90 points) Consider the stock price of Caterpillar (CAT) stock, Airports of Thailand Public Company Limited (AOT.BK) from January 3, 2000 to January 31, 2021. The data are downloadable from yahoo finance.

(a) Calculate the log returns and the simple returns, then plot these two series on the same figure.

(b) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each simple return series.

(c) Obtain the empirical density function of the simple returns of Caterpillar stock. Are the daily simple returns normally distributed? Perform a normality test to justify your answer.

(d) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each log return series.

(e) Test the null hypothesis that the mean of the log returns of Caterpillar stock is zero. Do the same test for AOT stock.

(f) Obtain the empirical density plot of the daily log returns of Caterpillar stock and AOT stock.

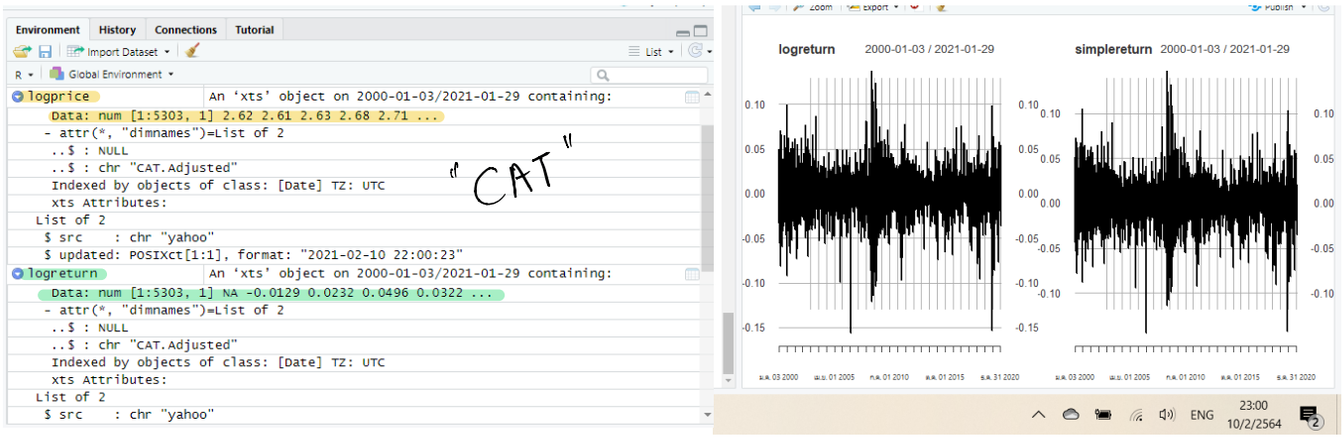
(g) Construct a 95% confidence interval for the daily log returns of CAT stock.

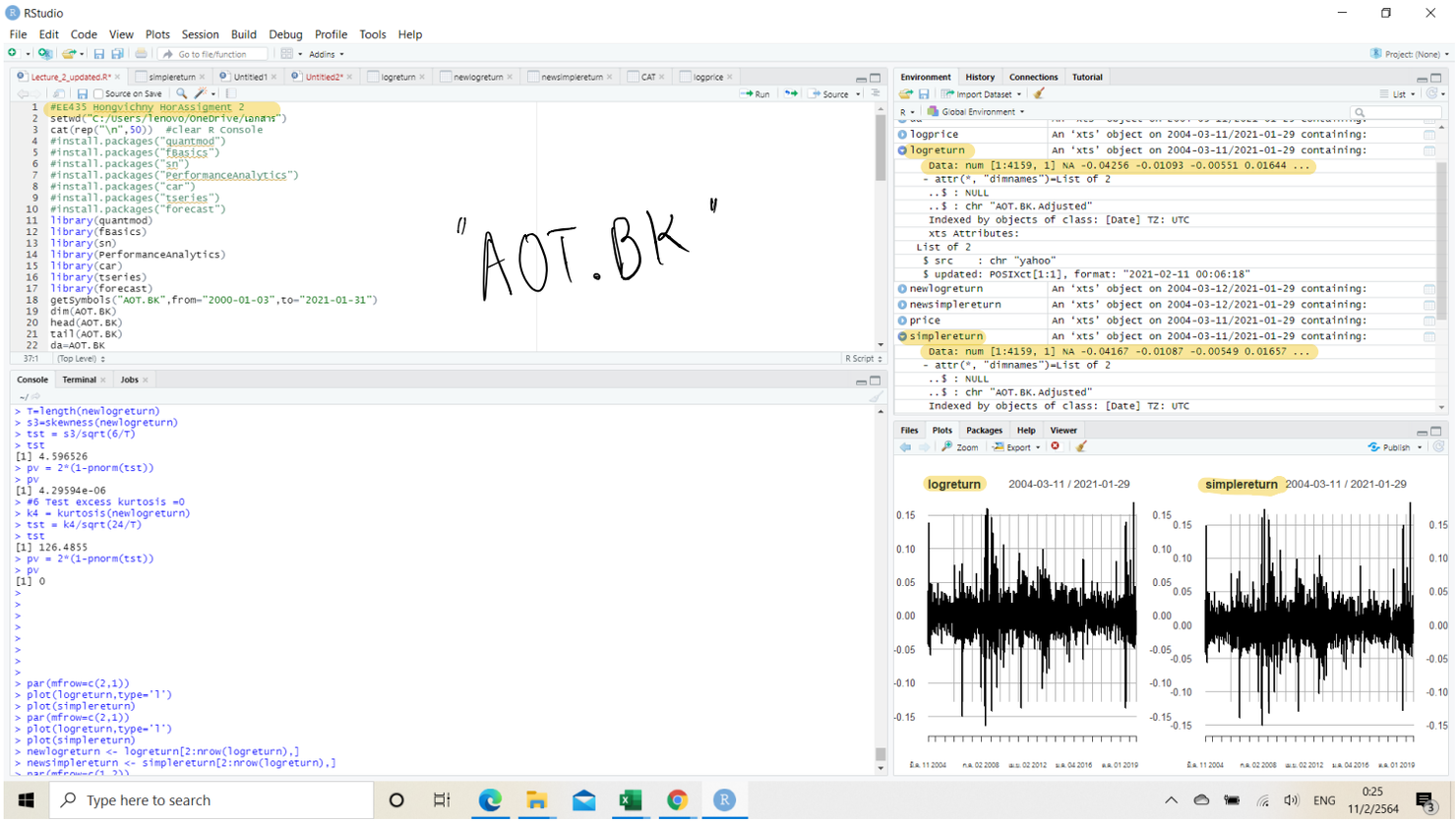
(h) Test $H_0 : m_3 = 0$ versus $H_a : m_3 \neq 0$, where m_3 denotes the skewness of the return.

(i) Test $H_0 : K = 3$ versus $H_a : K \neq 3$, where K denotes the kurtosis. (Excess kurtosis = 0.)

Answer

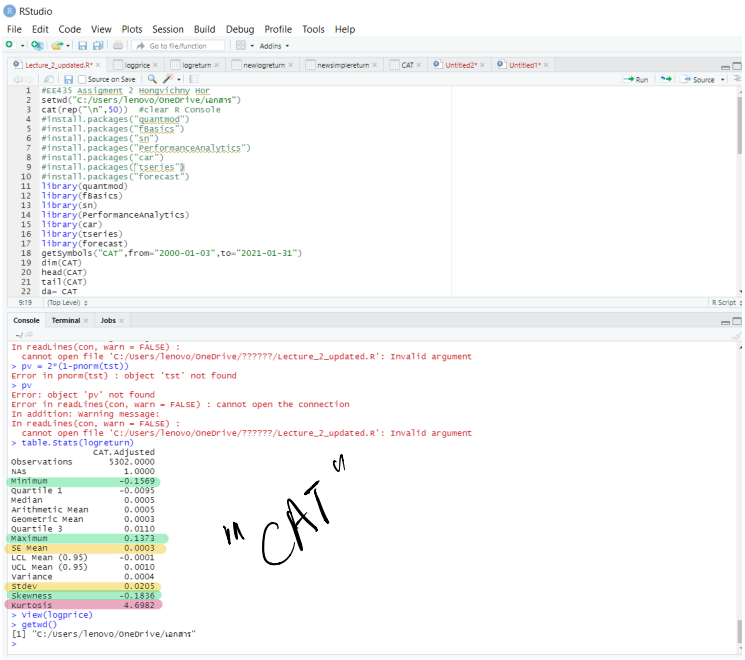
(a) Calculate the log returns and the simple returns, then plot these two series on the same figure.



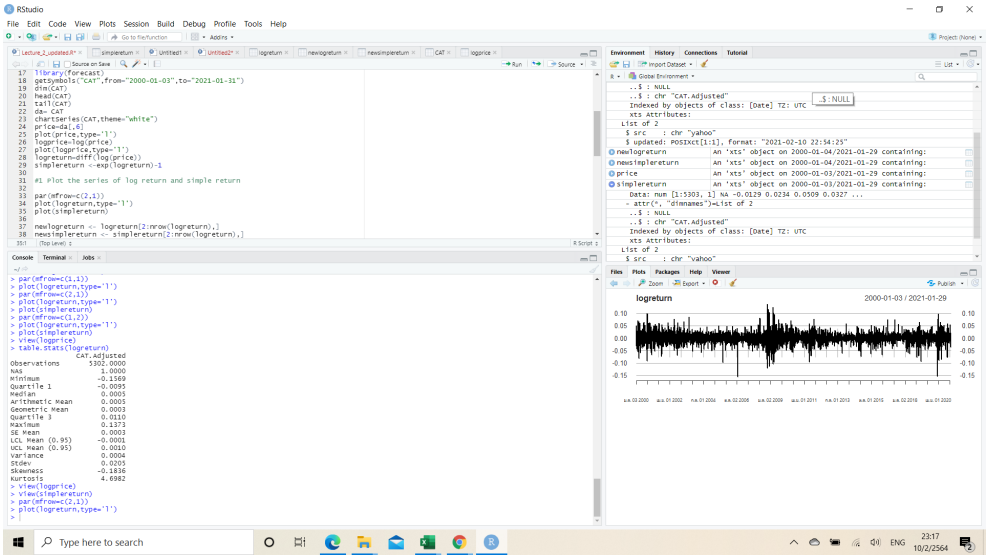


(b) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each simple return series.

(d) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of each log return series.

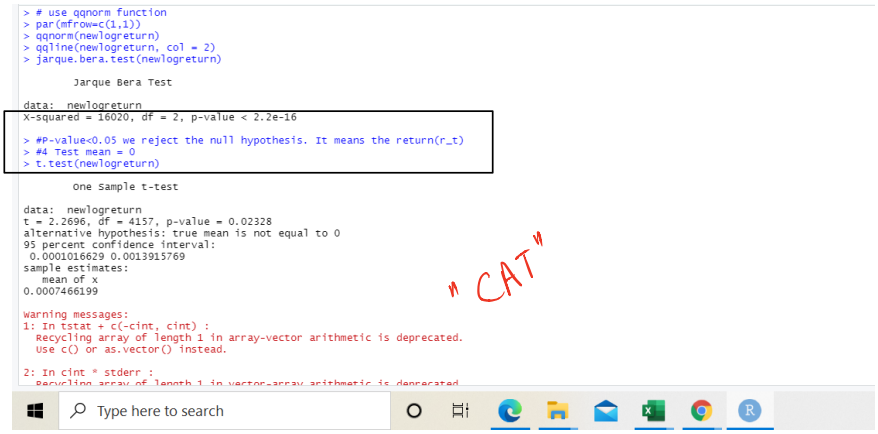


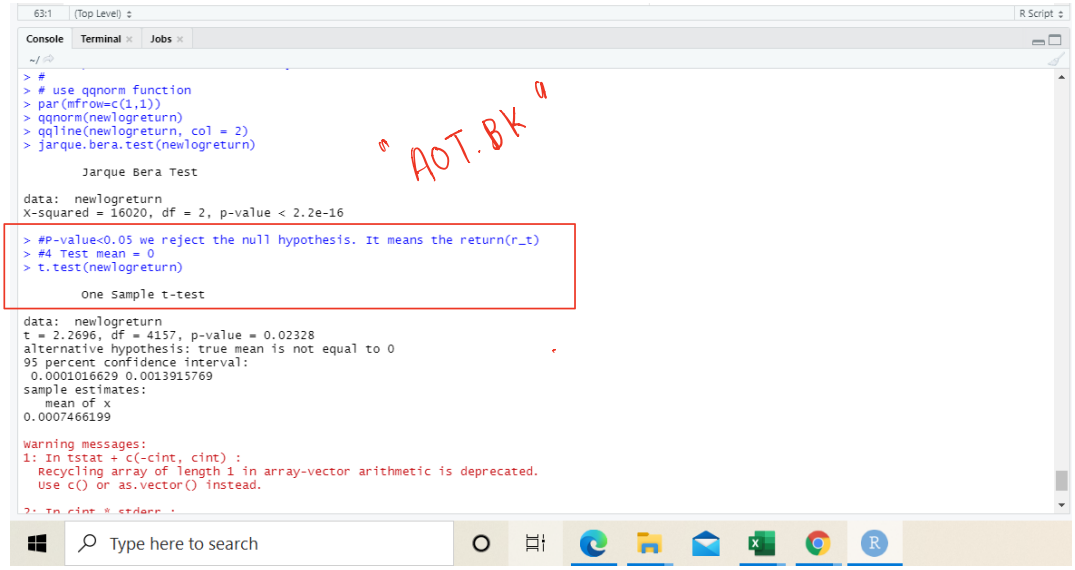
(c) Obtain the empirical density function of the simple returns of Caterpillar stock. Are the daily simple returns normally distributed? Perform a normality test to justify your answer.



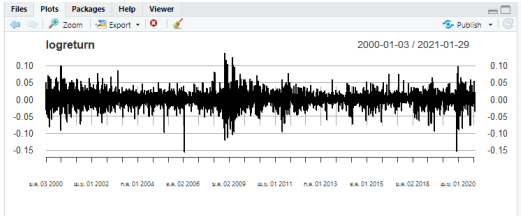
Yes, It's normally distribution.

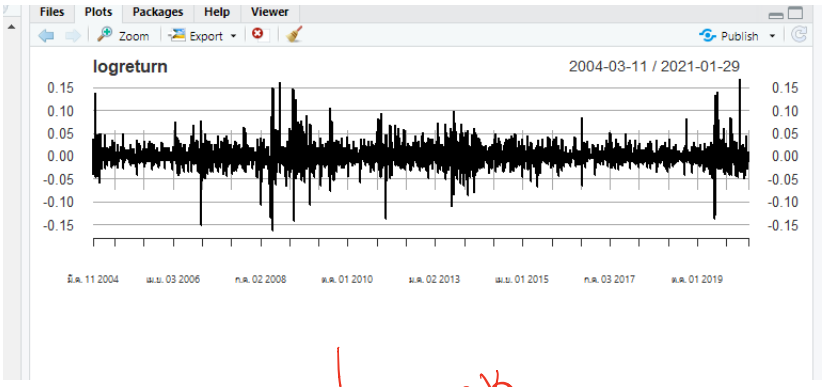
(e) Test the null hypothesis that the mean of the log returns of Caterpillar stock is zero. Do the same test for AOT stock.



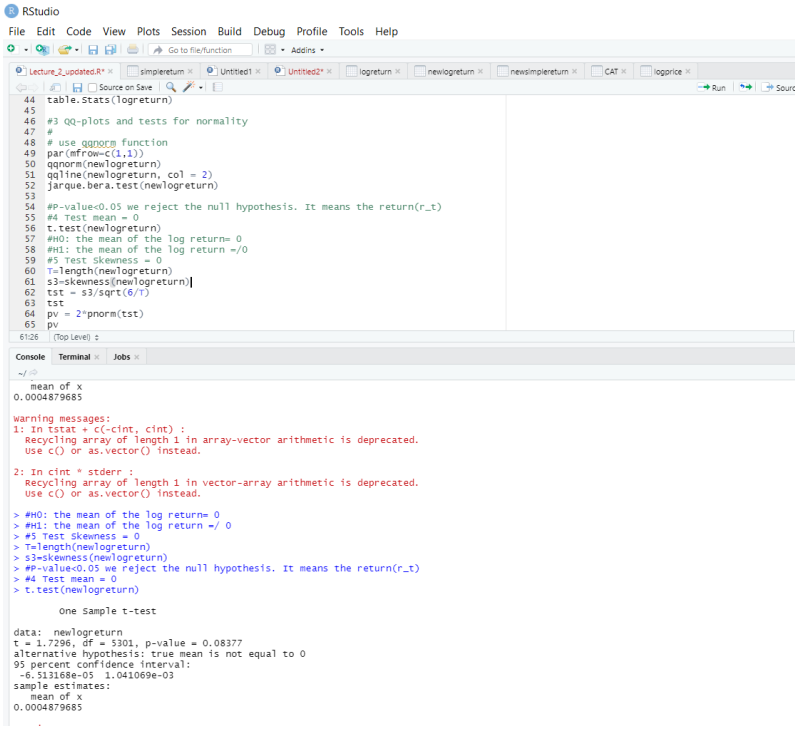


(f) Obtain the empirical density plot of the daily log returns of Caterpillar stock and AOT stock.

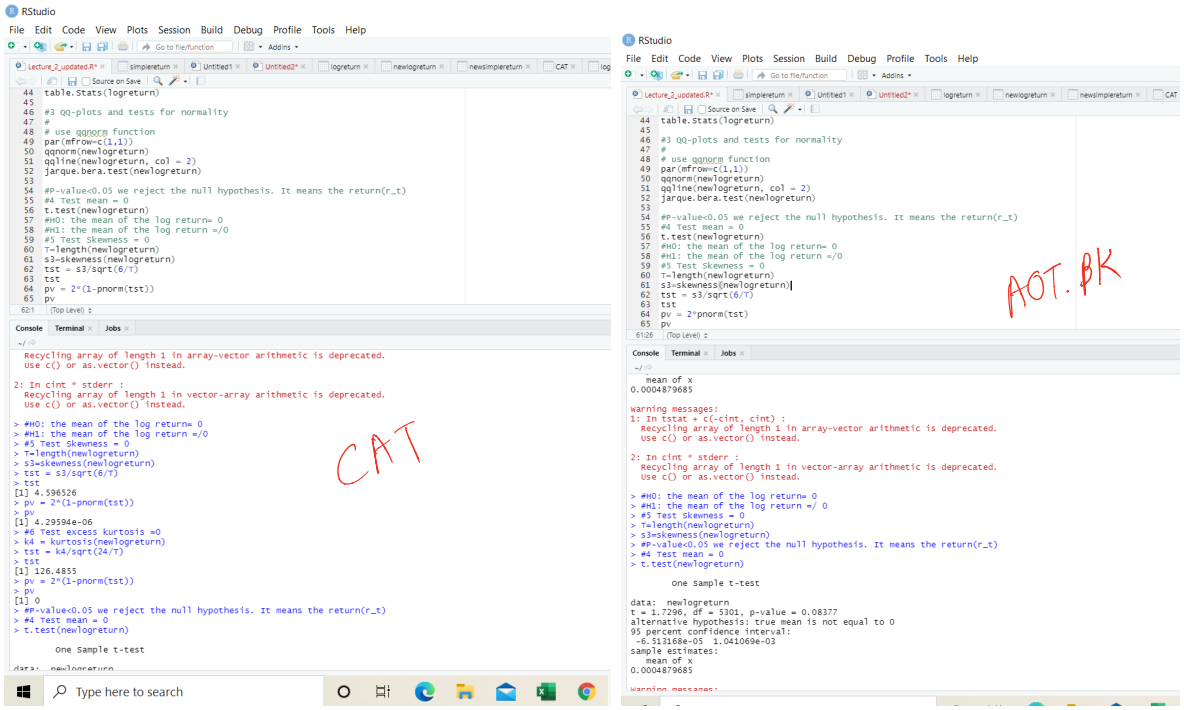




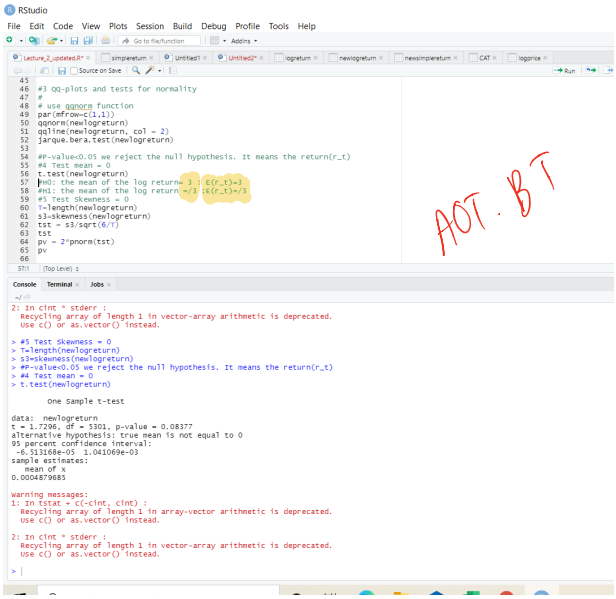
(g) Construct a 95% confidence interval for the daily log returns of CAT stock.

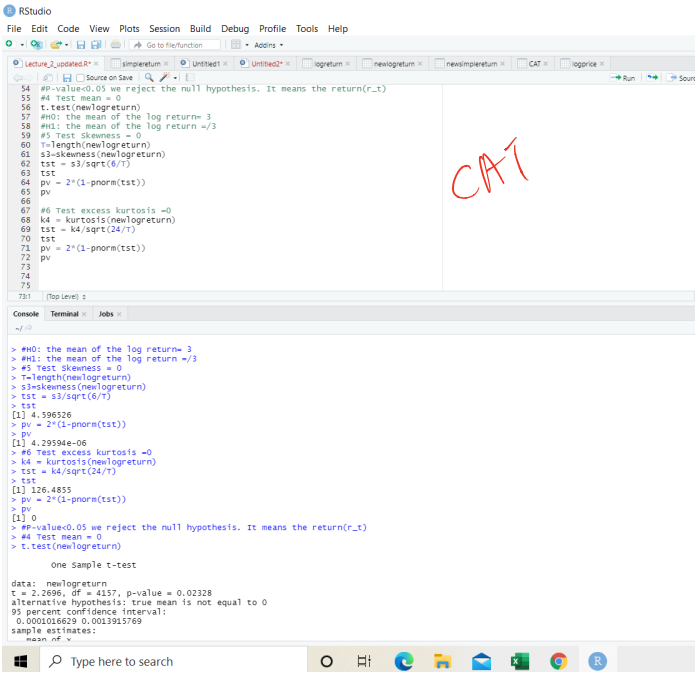


(h) Test $H_0 : m_3 = 0$ versus $H_a : m_3 \neq 0$, where m_3 denotes the skewness of the return.



(i) Test $H_0 : K = 3$ versus $H_a : K \neq 3$, where K denotes the kurtosis. (Excess kurtosis = 0.)




RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Lecture_2_updated.R*
simpleretum
Untitled1
Untitled2*
logreturn
newlogreturn
newsimpleretum
CAT
logprice
Source on Save
Run
54 #P-value<0.05 we reject the null hypothesis. It means the return(r_t)
55 #4 Test mean = 0
56 t.test(newlogreturn)
57 #H0: the mean of the log return= 3
58 #H1: the mean of the log return =/3
59 #5 Test Skewness = 0
60 T=length(newlogreturn)
61 s3=skewness(newlogreturn)
62 tst = s3/sqrt(6/T)
63 tst
64 pv = 2*(1-pnorm(tst))
65 pv
66
67 #6 Test excess kurtosis =0
68 k4 = kurtosis(newlogreturn)
69 tst = k4/sqrt(24/T)
70 tst
71 pv = 2*(1-pnorm(tst))
72 pv
73
74
75
CA1
(Top Level)
Console
Terminal
Jobs
~/
> #H0: the mean of the log return= 3
> #H1: the mean of the log return =/3
> #5 Test Skewness = 0
> T=length(newlogreturn)
> s3=skewness(newlogreturn)
> tst = s3/sqrt(6/T)
> tst
[1] 4.596526
> pv = 2*(1-pnorm(tst))
> pv
[1] 4.29594e-06
> #6 Test excess kurtosis =0
> k4 = kurtosis(newlogreturn)
> tst = k4/sqrt(24/T)
> tst
[1] 126.4855
> pv = 2*(1-pnorm(tst))
> pv
[1] 0
> #P-value<0.05 we reject the null hypothesis. It means the return(r_t)
> #4 Test mean = 0
> t.test(newlogreturn)
One Sample t-test
data: newlogreturn
t = 2.2696, df = 4157, p-value = 0.02328
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
0.0001016629 0.0013915769
sample estimates:
mean of x
Type here to search