# ASSIGNMENT 1

| Full Name | Student i.d. number |
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**Which package do you use to do this assignment?**

R☐ Python☑

**Q1: We want to study daily closing prices of**

**[Python]**

**IBM@yahoo stock index from Jan 1 2013 to Dec 31 2016.**

**( by pandas_datareader)**

**OR**

**[ R ]**

**AAPL stock index from Jan 1 2013 to Dec 31 2016.**

**( by quantmod)**

a. Construct 35-day and 100-day moving averaging lines in a plot with the original closing prices, and count the number of golden cross (buy signal) and dead cross (sell signal)

Attach your picture here


| The number of | |
|---|---|
| **Golden Cross** | **Dead Cross** |
| 5 | 5 |

b. Find a sample mean, variance, adjusted skewness and adjusted excess kurtosis of the closing prices.

(Correct your answer to 4 decimal places)

| Sample mean | Sample variance | Sample Adjusted skewness | Sample Adjusted excess kurtosis |
|---|---|---|---|
| 170.5799 | 21.5420 | -0.0350 | -0.8609 |

c. Please check if the **log returns** follow a normal distribution **by using a normal plot**.

Conclusion:We could see from the graph below that the log returns do not follow a normal distribution as the dots do not lie around the straight line.

d. Assume that the **log returns** are from the normal distribution. Do a two-sided hypothesis testing with the null hypothesis that the population mean of the log return is equal to 0 a significance level of 0.05.

Let $\mu$ be the unknown population **means** of the log returns of the daily closing prices. Write down H0 and H1 for the test.

Write down your H0 and H1:

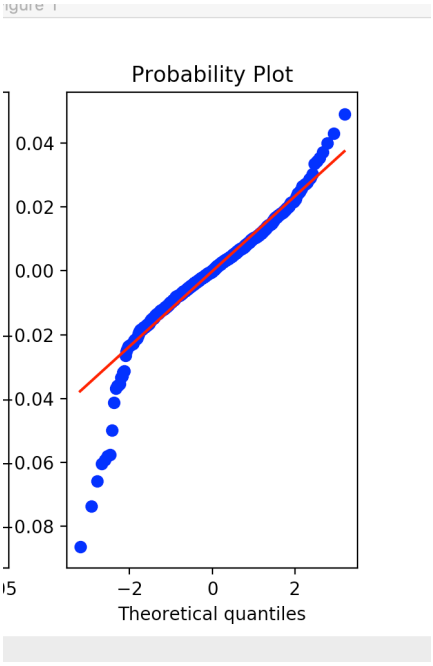
**H0: μ=0**

**H1: μ≠0**

Find

p-value: 0.7120198

95% C.I. for $\mu$ is : (-0.000897, 0.000613)




Probability Plot of question c

Then, draw your conclusion with evidence:

As the p value which is 0.712 shows above is greater than 0.05, than we can conclude that we would not reject H0 at the significance level of 5%.

e. Check a normality assumption of the log return of daily closing again by using ***normality tests*** at a significance level of 0.01.

Fill in the following table and write down your conclusion according to the results of the normal tests for the log return.

| Tests for Normality | |
|---|---|
| **Test** | **p-value** |
| **Shapiro-Wilk test** | 8.305715279986766e-22 |
| **Kolmogorov-Smirnov** | 0.00015509873885676112 |
| **Anderson-Darling** | Statistics:8.914450598436815( at 1% significance level |

Conclusion: Through the test of Shapiro-Wilk test and Kolmogorov-Smirnov, we can obviously observe the p value of both test is smaller than 0.01; and the statistic value of Anderson-Darling is greater than 1.088 which is at the significance level of 0.01. In conclude, we would reject H0 at the significance level of 0.01

**Q2: Now, we turn to make a comparison between the log returns of daily closing prices of**

**[Python] IBM@yahoo and MSFT@yahoo [R] AAPL and MSFT stock indices for the period from Jan 1 2012 to Dec 31 2016.**

**Assume that the log returns of these two indices are independent.**

Use QQ-plot to justify if they are from normal distributions first.

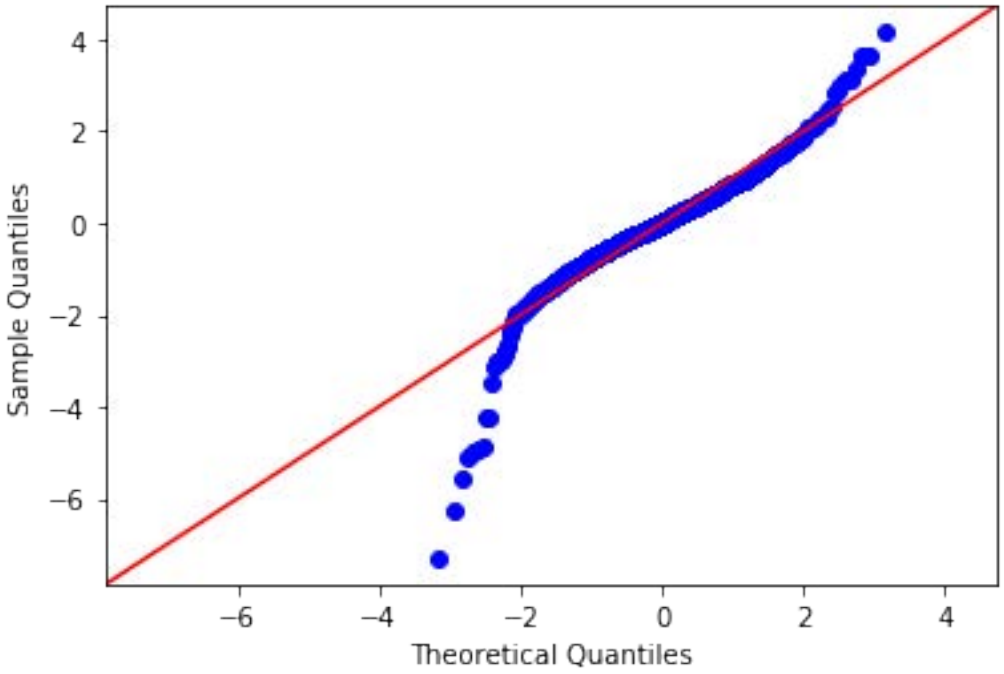
Then, use an appropriate test **to see if they are equal at a significance level of 0.05. Please write down your p-value and draw a conclusion.**

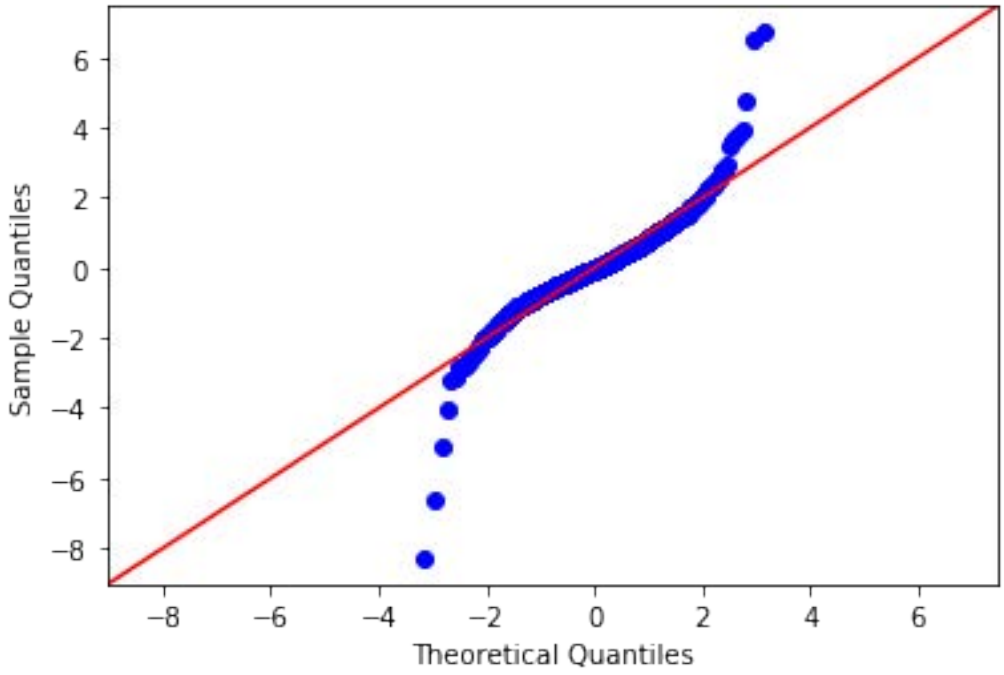
Which test do you use? [Circle your answer]

Independent t-test/ Two-sample Wilcoxon test.

p-value: 0.4819324413453949

Then, draw your conclusion with evidence: Since p value is greater than 0.05, thus we would conclude that we would not reject H0 at the significance level of 0.05




Graph2:QQ-Plot of log return of MSFT

Conclusion: Obviously, the log returns of these two indices do not follow normal distribution, thus we use two-sample Wilcoxon test.