FIN 503 Quantitative Finance II Homework 1
Name: Chung-Hung Tsai
UIN: 665375547

1. (a)(b)

Stock	mean(%)	standard deviation(%)	skewness	excess kurtosis	minimum (%)	maximum (%)
Simple C return	-0.0378%	3.1055%	2.891528	75.115580	-26.4062%	57.8249%
Log C return	-0.0845%	3.0427%	0.538784	45.782920	-30.6609%	45.6316%

```
> mean(C)
[1] -0.0003779209
> sd(C)
[1] 0.03105476
> skewness(C)
[1] 2.891528
> kurtosis(C)
[1] 75.11558
> min(C)
[1] -0.264062
> max(C)
[1] 0.578249
```

```
> mean(logC)
[1] -0.0008447986
> sd(logC)
[1] 0.03042745
> skewness(logC)
[1] 0.5387837
> kurtosis(logC)
[1] 45.78292
> min(logC)
[1] -0.3066094
> max(logC)
[1] 0.456316
```

(c)
Since p-value = 0.2133 > 0.05, the mean of the mean of log returns of Citigroup stock is NOT statistically different from zero.

```
> t.test(logC)

        One Sample t-test

data:  logC
t = -1.2451, df = 2010, p-value = 0.2133
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -0.002175465  0.000485868
sample estimates:
    mean of x
-0.0008447986
```

(d)
Since p-value = 0.7486 > 0.05, the mean of the simple return of the S&P 500 index is NOT significantly different from zero.

```
> t.test(SP)

        One Sample t-test

data:  SP
t = -0.32059, df = 2010, p-value = 0.7486
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -0.0006896678  0.0004958677
sample estimates:
    mean of x
-9.690005e-05
```

2.

Stock	mean(%)	standard deviation(%)	skewness	excess kurtosis	minimum (%)	maximum (%)
Log GM return	0.0144%	8.9999%	-0.998984	7.468586	-49.3171%	24.4215%
Log SP return	0.4667%	4.4294%	-0.705898	5.772422	-24.5427%	15.1043%

```
> mean(logGM)
[1] 0.0001443634
> sd(logGM)
[1] 0.08999946
> skewness(logGM)
[1] -0.9989839
> kurtosis(logGM)
[1] 7.468586
> min(logGM)
[1] -0.4931707
> max(logGM)
[1] 0.2442152
```

```
> mean(logSP)
[1] 0.004666594
> sd(logSP)
[1] 0.04429413
> skewness(logSP)
[1] -0.7058976
> kurtosis(logSP)
[1] 5.772422
> min(logSP)
[1] -0.2454275
> max(logSP)
[1] 0.1510433
```

3.
(a) stating the null and alternative hypothesis
(b) perform the test, report the test statistic and p-value
(c) draw your conclusion.

(a)
- Null hypothesis: log returns of Citigroup stock is normally distributed
- Alternative hypothesis: log returns of Citigroup stock is NOT normally distributed

(b)
Jarque-Bera test results:

- X-squared is 153467.72, which is significantly larger than 0.

- P-value < 2.2e-16.

(c)

We can conclude that log returns of Citigroup stock is NOT normally distributed.

```
> jarqueberaTest(logC)

Title:
 Jarque - Bera Normalality Test

Test Results:
  STATISTIC:
    X-squared: 153467.7178
  P VALUE:
    Asymptotic p Value: < 2.2e-16
```

4.

(a) Both excess returns of GM stock and S&P 500 index are NOT significantly different from zero since the p-value > 0.05.

```
> t.test(ERGM)

        One Sample t-test

data:  ERGM
t = -0.18902, df = 501, p-value = 0.8502
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -0.008380936  0.006909864
sample estimates:
    mean of x
-0.0007355359
```

```
> t.test(ERSP)

        One Sample t-test

data:  ERSP
t = 0.42306, df = 501, p-value = 0.6724
alternative hypothesis: true mean is not equal to 0
95 percent confidence interval:
 -0.003029102  0.004691612
sample estimates:
  mean of x
0.000831255
```

(b) The mean excess return of the S&P 500 index is NOT significantly positive since the p-value > 0.05. If the significance level is 10%, the mean excess return of the S&P 500 index is NOT significantly positive since the p-value > 0.05.

```
> t.test(ERSP, alternative = "greater")

        One Sample t-test

data:  ERSP
t = 0.42306, df = 501, p-value = 0.3362
alternative hypothesis: true mean is greater than 0
95 percent confidence interval:
 -0.002406619          Inf
sample estimates:
  mean of x
0.000831255
```

```
> t.test(ERSP, alternative = "greater",conf.level = 0.9)

        One Sample t-test

data:  ERSP
t = 0.42306, df = 501, p-value = 0.3362
alternative hypothesis: true mean is greater than 0
90 percent confidence interval:
 -0.001690124          Inf
sample estimates:
  mean of x
0.000831255
```