Homework Assignment #1

Due date: before class on Wednesday, 9/16.

Notes:

- All tests are based on the 5% significance level.
- R packages *quantmod* and *fBasics* are helpful in doing this assignment.

1. Consider the daily simple returns of the S&P composite index (SP) from January 3, 2012 to September 8, 2015. The data can be obtained through *quantmod* package in R using **Symbol** ∧GSPC.
   (a) Provide a time series plot for the simple return series.
   (b) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of this simple return series.
   (c) Obtain the empirical density function of the simple returns of S&P composite index. Are the daily simple returns normally distributed? Why? Perform a normality test to justify your answer.
   (d) Transform the simple returns to log returns. Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of log return series.
   (e) Test the null hypothesis that the mean of the log returns of S&P composite index is zero.
   (f) Test the null hypothesis that the log returns of S&P composite index is symmetric.
   (g) Test the null hypothesis that the tail behavior of log returns of S&P composite index is normal.

2. Consider the exchange rates between the Chinese Yuan and U.S. dollar from January 3, 2012 to September 8, 2015. Note that the exchange rates can be downloaded from the FRED database using the following command: getFX("USD/CNY",from="2012-01-03",to="2015-9-8").
   (a) Compute the daily log returns of this exchange rate.
   (b) Compute the sample mean, standard deviation, skewness, excess kurtosis, minimum, and maximum of the log returns based on this exchange rate.
   (c) Obtain a density plot of the daily log returns of exchange rate.
   (d) Test $H_0 : \mu = 0$ versus $H_a : \mu \neq 0$, where μ denotes the mean of the daily log return of the exchange rate.
   (e) Are the daily log returns normally distributed? Perform a test to justify your answer.