In-class Exercise 4 : ARMA-GARCH on SP500 Index

(due Fri 4/10/2015)

Name:

Use this file as a template for your assignment. Submit your code and comments together with (selected) output from R console. Your comments must be **BOLD FACED**.

First, load daily SPY stock data from class web site using below R code.

library(fGarch)

library(forecast)

source("http://gozips.uakron.edu/~nmimoto/689/TS\_R-90.txt")

D <- read.csv("http://gozips.uakron.edu/~nmimoto/pages/datasets/SPY.csv", header=T)

X <- ts(D[,7], start=1)

plot(X)

dX <- diff(log(X))

plot(dX)

dX1 <- window(dX, start=2774, end=3773)

1. Fit dX1 with arma model using auto.arima.
2. Using ARMA(p,q) model identified above, use Arima() to reproduce the result. Perform routine diagnostics.
3. Fit residuals from (2) with GARCH(1,1) model with Normal conditional distribution. Use garchFit. Take the GARCH residuals and check for randomness.
4. Fit residuals from (2) with GARCH(1,1) model with standardized t conditional distribution. Use garchFit. Take the GARCH residuals and check for randomness. What was the degrees of freedom estimated for conditional distribution?
5. Fit residuals from (2) with GARCH(1,1) model with skewed standardized t conditional distribution. Use garchFit. Take the GARCH residuals and check for randomness. What was the degrees of freedom, and skewness parameter estimated for conditional distribution?