Due Date: June 5 and 6, respectively, for Section 01 and 85.

This assignment is concerned with VaR. Assume that the probability of interest is 1% and the financial position is long with $1 millions for each of the two stocks involved. Two data sets are used. The first data set consists of the daily simple returns of the Apple stock from January 1999 to December 2008 for 2515 observations. The second data set contains the daily simple returns of the Wal-Mart stock for the same period. The data are in files d-aapl9908.txt and d-wmt9908.txt. Each file has two columns, namely date and simple returns. Transform the simple returns into log returns, in percentages.

1. Consider the Apple stock.
   - Calculate the VaR of your position for the next trading day using the RiskMetrics method at the time point $T = 2515$. You must estimate the IGARCH(1,1) model without constant to obtain the parameter value needed in the calculation.
   - Build a GARCH(1,1) model for the log return series with Gaussian innovations. What is the VaR based on the fitted model?
   - Build a GARCH(1,1) model with $t$-innovations for the log return series. What is the VaR based on the fitted model?

2. Again, consider the daily log returns of Apple stock. Using blocks of size 21, fit a generalized extreme value distribution to the negative return series. Write down the estimates and their standard errors. Compute the 1% VaR of your financial position based on the fitted parameters. What is the 1% VaR of your financial position for the next 10 trading days?

3. Again, consider the negative log returns of the Apple stock. Fit a generalized Pareto distribution to the return series with threshold 4.0%. Based on the fitted model, what is the 1% VaR of your position? What is the associated expected shortfall? Repeat the analysis using threshold 5.0%. Are the results sensitive to the choice of thresholds?

4. Consider now the log returns of Wal-Mart stock. Calculate the VaR using RiskMetrics method. Also, what is the VaR for the combined position of Apple and Wal-Mart stocks?
5. Consider a new portfolio that holds a long position of $1 million in Apple stock, but a short position of $1 million in Wal-Mart stock. Obtain the VaR (at the 1% level) of the portfolio for the next trading day after $T = 2515$ if (a) RiskMetrics is used and (b) GARCH(1,1) models with Gaussian innovations are used.