UCLouvain
LACTU2210 QRM 2024/25
Guidelines for Project 1

You can choose between working alone or in groups of two people. Register this single-person or two-person group in moodle before **Wednesday, March 26, 2025, at 6pm**. Write a report of maximum 5 pages in total. Send the report in pdf format and the R code (or whatever program you used) before the deadline, **Tuesday, April 15, 2025, at 6pm** to christian.hafner@uclouvain.be. The first page should contain the group name and its members. You can write in English or in French.

1. Download the file stocks.csv, and take the column with the same letter as your group (e.g. group B chooses column "B", group C chooses column C, etc.), except for group A which will choose column Z. Your column contains the stock prices of a company traded at the NYSE. Plot the time series of stock prices, where the date (column "A") should be on the abscissa. Transform the stock prices to obtain log returns.
2. Show a Box-plot of the returns and report results for the Jarque-Bera normality test, and conclude. Report the autocorrelation function of returns and of squared returns. Explain the graphs and the difference between them. What is the interpretation ?
3. Suppose you hold constantly one stock of the company. For each trading day t, we want to know the conditional one-day-ahead 1% Value-at-Risk, VaR_t.
   (a) Use first the RiskMetrics model and Gaussian innovations. Do a backtest using the DQ test at 5% with five lags. Is the model adequate ?
   (b) Now fit a GARCH(1,1) model combined with an adequate innovation distribution. Report detailed estimation results. Does the model pass diagnostic specification tests ? Based on the estimated volatility series, calculate the VaR_t series and plot it together with the return series. Do a backtest using the DQ test

at 5% with five lags. Is the model adequate ? If not, try asymmetric GARCH models such as GJR.