

**Assignment 2** (Due 30/10/2021):

1. Consider the conventional 30-year mortgage rate of U.S. from June 1976 to March 2007. The data are obtained from Federal Reserve Bank at St Louis. Take the natural log transformation of the mortgage rate to build a time series model for the series. Perform model checking using  $Q(12)$  for residuals. Write down the fitted model. Use the fitted model to produce 1-step to 4-step ahead forecasts at the forecast origin March, 2007. (all tests are based on the 5% significance level) [The data format is (year, mm, dd, rate).]
  
2. Recall the monthly simple returns of the Decile 1 portfolio from January 1980 to December 2006. Use seasonal model to analyze the Deceile 1 returns. The model is a multiplicative seasonal model as  $ARIMA(0,0,1)(1,0,1)$  with period 12. Perform model checking on the fitted model, e.g., compute  $Q(24)$  of the residuals. Is the model adequate? Write down the fitted model. (all tests are based on the 5% significance level)
  
3. Consider the quarterly earnings per share of the Alcoa stock from the 4th quarter of 1991 to the most recent quarter. Note that some earnings are negative. Build a model for the earning series. Perform model checking to ensure that the model is adequate using  $Q(12)$  of the residuals. Use the model to produce 1-step to 4-step ahead forecasts. (all tests are based on the 5% significance level) 2