In-class Exercise 2 : Fitting Wine Sales Data with sARIMA

(due Fri 3/13/2015)

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 Australian wine sales data from class web site using below R code.

D <- read.csv("http://gozips.uakron.edu/~nmimoto/pages/datasets/wine.csv")

X <- ts(D, start=c(1980,1), freq=12)

plot(X, type='o')

1. Plot the original data, and its ACF. Describe the data briefly. (e.g. Monthly or annual data? Seasonality? Trend? Stationarity?)
2. Plot (▽\_12) Xt = (1-B^12) Xt. Do you still see the seasonality in the data? Does the transformed data look stationary?
3. Perform stationarity test of (▽\_12) Xt.
4. Plot acf of (▽\_12) Xt. Use option lag.max=40. Do you see any evidence for January to January (or Feb to Feb) dependence? Can you guess what value of P or Q should be used in sARIMA model?
5. Fit seasonal ARIMA (p,d,q)x(P,D,Q)\_s model to the original data X using auto.arima(). Check the model adequacy.
6. What happened to the upward trend found in X? How is it modeled in the model you found in (5)? Briefly explain.
7. Using the model found in (5), forecast the sale of the data for the next year. Use forecast() function.
8. Use mathematical equation and express the model you got in (5). (You can handwrite if you like.)