Mid-Term I Review
Eco 5375
Business and Economic Forecasting
Fall 2016

Our upcoming Mid-term I exam is on **Thursday, October 6, 5:00 – 6:30 in 110 Dedman Life Sciences Building.** The test is a closed notes test and thus you are not to have any notes in any form open during the test. Also you are not to use your phones during the exam. I will provide four-function calculators for your use.

I recommend that you review your notes and Exercises 1 – 6. The Keys for these exercises are posted on the course website. The main subjects to be covered on this mid-term are **(1)** Basic Time Series Decomposition: $Y = T + S + C + I$, **(2)** Stable Seasonal Pattern model, **(3)** Deterministic Trend/Deterministic Seasonal model, **(4)** Unobserved Components model (Proc UCM), **(5)** Non-seasonal Box-Jenkins ARMA Time Series models and **(6)** Detection of Seasonality through Buys-Ballot Plots, Friedman's Two-Way Anova test, Joint F-test in the DTDS model, and test of the seasonal component in the UCM model. Read very carefully the pdf files that I am recommending below that your take a look at. Also look at the comments in the SAS programs that I have demonstrated in class and that you have used in your exercises. You should be fluent in the interpretation of SAS output. This is the purpose of taking you through the SAS exercises.

Basic Decomposition of Time Series into Trend, Season, Cycle, and Irregular Components

1) See "A Demonstration of Basic Additive Time Series Decomposition.pdf" and the SAS program "Decomposition.sas."

Stable Seasonal Pattern Model

1) See "Stable Seasonal Pattern Model_v2.pdf" and Exercises 1 and 2.

Deterministic Trend/Deterministic Seasonal Model

1) See "Det Time Trend Model_v2.pdf" and Exercise 3.

Unobservable Components Model

1) "The Unobserved Components Model.pdf"
2) Exercise 4
3) SAS programs: BSM.sas; Stochastic Level Model.sas; Stochastic Level_Fixed Slope Model.sas; Stochastic Level_Stochastic Slope Model.sas; and Stochastic Seasonality.sas.

Non-Seasonal B-J Models

1) You should understand the concept and definition of "stationarity" of a time series and some useful transformations of non-stationary time series to make them stationary. Be able to distinguish graphs of non-stationary time series versus stationary time series. You should appreciate the role that "invertibility" plays in Box-Jenkins models.
2) Take a look at A Beginner's Guide to B-J Models.pdf (see the SAS program Real GDP.sas and run it.)
2) BJ_Notation.pdf
3) Stats.pdf
4) ACF_PACF_Table.pdf
5) See the many ACF/PACF plots on the class website like ARMA02a.pdf, etc. for practice on using the spiking and damping behavior of ACFs and PACFs to identify the orders of pure AR(p) and pure MA(q) models. These can be found in the ACF_PACF subdirectory in the class website.
6) Forecast Profiles.pdf

Detection of Seasonality in Time Series

1) Buys Ballot Plots.pdf (See the SAS programs Airline_Jacob_Williamson.sas and Plano_Plot_Jacob_Williamson.sas for some Buys Ballot plots of time series data.)
2) Exercise 2 for an example of using Friedman's Two-way ANOVA test for seasonality.
3) Det Time Trend Model_v2.pdf. (A tutorial on using the Deterministic Trend/Deterministic Seasonal model to detect seasonality in time series data.) See Exercise 3.
4) In the UCM model, it is possible that the seasonal component (either fixed or stochastic) would be eliminated as a non-important variance component in the process of looking for a best model to characterize a given time series. See Exercise 4 for the testing of components.