

Assignment 5

3 Possible Points

This assignment's due date is Friday, June 29th by midnight (July 1st by 12:00 AM). The grading policy for late assignments can be found in the syllabus. You are strongly encouraged to work in groups of up to 4 students, but each of you must submit his/her own version of the assignment. Please put the names of your group members in a comment in the program.

Write a single text file that contains all of your work for this assignment. Name it `ps5_[yourlastname].txt` - for example, mine would be `ps5_hoff.txt`. The text file should submit all of the commands necessary to answer the questions. Please put the answers to the **bold questions** in a comment line in your text file, even if you think the answer is readily apparent.

This assignment is designed to be your first attempt at comparing and choosing between various stochastic models. The data can be found on the course website in a CSV file titled "ps5". Note that all of these data series are stationary and do not need to be differenced to be made stationary (i.e. they are ARMA(p,q). Finally, none of the models should include an intercept.

Some math first...

(Chapter 6, problem 3) Write the following models in ARMA(p, q) notation and determine whether they are stationary and/or invertible (w_t is white noise). In each case, check for parameter redundancy and ensure that the ARMA(p, q) notation is expressed in the simplest form.

1. $x_t = x_{t-1} - 1/4x_{t-2} + w_t + 1/2w_{t-1}$
2. $x_t = 2x_{t-1} - x_{t-2} + w_t$
3. $x_t = 3/2x_{t-1} - 1/2x_{t-2} + w_t - 1/2w_{t-1} + 1/4w_{t-2}$
4. $x_t = 3/2x_{t-1} - 1/2x_{t-2} + 1/2w_t - w_{t-1}$
5. $x_t = 7/10x_{t-1} - 1/10x_{t-2} + w_t - 3/2w_{t-1}$
6. $x_t = 3/2x_{t-1} - 1/2x_{t-2} + w_t - 1/3w_{t-1} + 1/6w_{t-2}$

Time Series $\{y1_t\}$

- Your goal is to fit the best model for the series $\{y1_t\}$. Your choice of model should be based on evidence and this evidence should be referenced in your write-up of why you choose the model that you did. You may want to discuss models that you tried, but are not the "best" model.
- Present a plot with the actual and predicted series.
- Both your write-up and graphs should be of professional quality.
- **What is the AIC_C of your preferred model?**

Time Series $\{y_{2t}\}$

- Repeat the work you did for $\{y_{1t}\}$ for the series $\{y_{2t}\}$.