Time Series Midterm 2020

**Take-Home Portion**: Due 11:59pm CST Saturday February 29

Please Submit to 2DS in addition to Emailing it to bsadler @smu.edu

**By taking and submitting this exam, you are promising that you received no outside help on this exam and did not communicate with any living human being via any media with respect to this test (except for me.) With that said, please let me know if you have any questions.**

**Good luck! Have Fun!**

As for Code: Please provide either an R Markdown file or place all your code either at the end of this test or inline with your answers.

**Question about the realization.**

1. Do you think the data come from a stationary process? Defend your thoughts using the 3 conditions of stationarity. Provide acf plots for condition 3.

The Models: Consider these two models of the data in the realization in ***Midterm2020.csv***:

Model 1: (1-B12)( 1 - 0.5380B - 0.0606B2 - 0.1923B3)Xt = at

Model 2: (1 - 1.0507B + 0.0756B2)Xt = (1 - 0.5927B - 0.2751B2)at

**Questions about Model 1:**

1. Write this model in GLP form up to 4 terms.

**Questions about Model 2:**

1. Is Model 2 Invertible? Provide evidence for or against.

**Questions for each model:**

1. Provide acfs and spectral densities for each model.
2. Provide a factor table for each model.
3. Calculate the ASE for the last 12 months of the data set. (This will be only 1 ASE per model.).
4. Calculate at least 10 ASEs across the data set and find their average (the rolling window ASE).
5. Compare the single ASE to the rolling window ASE. Are they rougly the same, is one significantly larger? Does it provide evidence as to which model is more useful?

Final Question:

1. Given your analysis, which model do you feel is more useful in making 12-month forecasts?

BONUS (up to 3 points): Create an interesting, descriptive and useful plot to visualize the forecasts that the rolling window ASE was based on. This would help the analyst diagnose why the ASE is large or small and/or where it is fitting relatively well and relatively poorly. In addition, it may add confidence to the client that the model is performing adequately.