Department of Statistics
STATS 326: Applied Time Series

First Semester, 2020
Test 2
Total Marks = 100
6.30 to 7.30 pm

1. Briefly discuss the plot of the Global Nitrous Oxide data on page 1 of the Appendix.
(5 marks)

2. Are the assumptions satisfied for the Seasonal Factor model of the Global Nitrous Oxide data on pages 2 and 3 of the Appendix? Briefly explain.
(10 marks)

3. Calculate the predictions for July and August 2019 using the Seasonal Factor model on page 3 of the Appendix. Calculate the RMSEP statistic for July to October 2019. (Note: the actual values for July to October 2019 and the predictions for September and October 2019 are at the bottom of page 3 of the Appendix.)
(20 marks)

4. What would the predictions and RMSEP statistic be for a Full Harmonic model of the Global Nitrous Oxide data for July to October 2019.
(5 marks)

5. Comment on the predictions and RMSEP statistics for the Reduced Harmonic models on page 4 of the Appendix.
(5 marks)

6. What is the difference between the Reduced Full Harmonic Models in relation to the explanatory variables that would be included in each model? (Assume the *P*-values do not change with respect to their level of significance during the backward elimination process.)
(5 marks)

7. If you wanted to try a Cosine model of the Global Nitrous Oxide data, write down the model formula that you would use in R. Assume that a lagged response variable is required as an additional explanatory variable in the Cosine model. Using the Seasonal Factor model output on page 3 of the Appendix for any information you may require, write down the formula you would use for the "Seasonal" cosine variable. Using the selected R output at the bottom of page 4 of the Appendix, comment on the usefulness of the Cosine model.
(20 marks)

8. What Stationary model would you initially fit to each of the 4 simulated Stationary Time Series (`TS1`, `TS2`, `TS3` and `TS4`) on pages 5 – 8 of the Appendix? Justify your choice of model and write down the equation of the model you have chosen for each series. List the model(s) you would initially try to see if there was a better model than the one you chose.
(30 marks)