Department of Statistics
STATS 326: Applied Time Series

First Semester, 2019
Test 1
Total Marks = 100
6.30 to 7.30 pm

1. Identify the main features of Stationary and Non-stationary Time Series.
(10 marks)

2. Briefly, why is dependence on the past so important in Time Series modelling?
(10 marks)

3. Sketch a plot of the autocorrelation function for a Time Series that has no trend but has a quarterly seasonal component.
(10 marks)

4. If we had a Time Series with 169 observations, what are the 95% confidence bands in a plot of the autocorrelation function?
(5 marks)

5. Assume we had a Non-stationary Time Series and we differenced once to remove the trend and once to remove the monthly seasonal component which produced a White Noise Residual Series. Write down the model using backshift notation and show your final model in the form: y_t = ……..
(10 marks)

6. Briefly discuss the plot of the Arctic Sea Ice data on page 1 of the Appendix.
(10 marks)

7. Calculate the predictions for January to March 2018 using the Holt-Winters model on page 2 of the Appendix. Calculate the RMSEP statistic for those predictions. (Note: the actual values for January to March 2018 are at the bottom of page 1 of the Appendix.)
(15 marks)

8. a. Identify the most important feature of the STL decomposition plot on page 3 of the Appendix.
(5 marks)

   b. Using the information on pages 3 and 4 of the Appendix, are the assumptions of the Seasonal Trend Lowess Seasonally Adjusted model satisfied? Explain briefly.
(10 marks)

9. Calculate the prediction for February 2018 using the Seasonal Trend Lowess Seasonally Adjusted model on page 4 of the Appendix. Calculate the RMSEP statistic for the January to March 2018 predictions. (Note: the actual values for January to March 2018 are at the bottom of page 1 of the Appendix and the January and March STL predictions are given at the bottom of page 4 of the Appendix.)
(10 marks)

10. Which model is the best predicting model for January to March 2018? Justify your answer.
(5 marks)