DUE: April 12th, 2019 at 11:59 PM

QMM 1002 Module 11 Assignment /26

Create and submit an R script which, when run, will print the answers to the following questions. Your R script must include a title with your name and student number and comments for each question number.

1. **(26 marks)** The "Births.csv" file gives the number of births per 10000 women aged 23 in Canada. There has been a downtrend recently, and you have been tasked by Health Canada to forecast the data to estimate the number of births for women in this age group in the near future.
   a) Create a time series object for the data and a labelled time series plot. (3 marks)
   b) Choose an appropriate forecasting model for the time series data. Explain why it is appropriate by referring to the components of the time series (3 marks)
   c) Fit the forecasting model that you chose in part b). What are the values of the weighting parameters (for example: $\alpha, \beta, \text{and/or } \gamma$) that you included in your model? Interpret each value in relation to how much weight the current and historical values will receive. (5 marks)
   d) Create a labelled plot of the original time series along with the fitted values from the forecasting model you chose – give each series a different color and include a legend. (2 marks)
   e) Find the error metrics for the model that you chose. Does the model seem to be a good fit? (2 marks)
   f) Extract the fitted values of the time series model. (1 mark)
   g) Based on your model, what is the forecasted number of births per 10000 in the year 2017? (2 marks)
   h) Health Canada would like you to use your model to predict the number of births from the years 2017 to the year 2021. Give a plot of the new forecasts with the 80% and 95% confidence intervals. Based on your model, does it appear that births will continue to decline, or do they begin to increase? Explain how you know. (4 marks)
   i) Health Canada would like to know if by 2020, there is a *chance* that the births per 10000 will recover to 2016 levels. Explain using your forecasts and plot. (2 marks)
   j) Extract and plot the residuals from the model you created to predict five periods into the future in part h). Comment on any irregularities in the residual plot. (2 marks)

Save your R Script as: Last Name, First Name Module 11 Assignment

Upload your R Script to the "Module 11 Assignment" drop box on Moodle before April 12th at 11:59 PM.