Take Home Portion Spring 2020

1. “Take Home” Portion: Consider the data in the file: FinalExamData.csv. This file contains a column Xt and a column Zt. Your goal is to simply model this data using a vector autoregressive model (VAR) and a multi-layer perceptron model (MLP). You ultimately want to forecast Xt with a horizon of 10 using Zt if it is useful. Provide the following information in your response:
   1. Identify any relationship/association between Xt and Zt. Specifically, is there evidence of a relationship/association between Xt and a lagged Zt? … if so, what is the lag?) What evidence do you have to support this relationship/association? (4 pts)
   2. For each model (VAR / MLP): (8 pts each model)
      1. Provide the code you used to fit the models and make the predictions. (If you find the Zt’s useful, you will need to forecast them to use in making predictions… a very simple univariate model will do.)
      2. Find the ASE for each model using the last 10 observations of the Xt dataset. Include your code for this as well.
   3. Make an ensemble model using both the models using the mean. (5 pts)
      1. Provide the forecasts and the corresponding plot.
      2. Find the ASE of this model.
   4. Make a quick statement about which of the 3 models you feel is most useful and why. (4 pts)
   5. Using the model you thought was most useful, provide a plot of the 10 forecasts (time points 96 – 105) as well a list of the 10 forecasts. You do **not** need prediction intervals for this question. (5 pts)

BONUS 3 pts!

Judge each model on a rolling ASE. Provide the rolling ASE and a plot displaying the forecast values versus the actual values. Does this change your answer in part d and e?

**This is the end of the course!**

**It has been my honor and extreme pleasure to have the opportunity to work with you.**

**You have my utmost respect and I look forward to see you and in person asap!**