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OM 352, Quiz 1
Time: 45 minutes

Lab D3

29 September 2023
Total points: 22

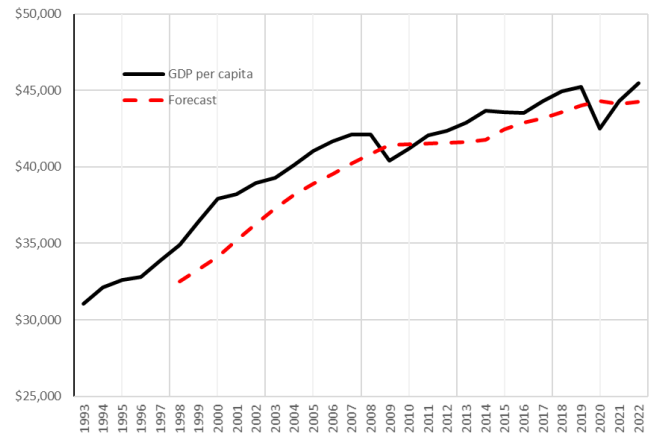
Multiple Choice Questions (5 pts.)

1. (1 pt.) Which of the following is true about modelling?
 - a. We judge the usefulness of a model based on its closeness to reality
 - b. There is a tradeoff between the usefulness of a model and its closeness to reality
 - c. A more simple model requires more data
 - d. A more complex model is always more useful
2. (1 pt.) Assume that in the Fish model we catch no fish at all (that is, September catch is zero every year). The population growth from April to August reaches its highest value
 - a. in the first year
 - b. in the last year
 - c. when April population is equal to the capacity
 - d. when April population is about half of the capacity
3. (1 pt.) Three forecasting methods have been used to predict the sales of organic avocados in November at a local grocery store. The 95% prediction intervals for each forecasting method are given below. Which forecasting method has had the lowest RMSE?

Method	95% prediction interval
SES	[1500, 2500]
DES	[2100, 2500]
TES	[1600, 2100]

- a. We cannot tell based on the provided information
- b. SES
- c. DES
- d. TES

4. (1 pt.) Which one of the following is true?
 - a. BIAS in an input
 - b. BIAS is a decision variable
 - c. BIAS can be negative
 - d. BIAS with value of zero means no forecasting error



5. (1 pt.) The graph above shows Canada's GDP per capita from 1993 to 2022 and forecasts that were calculated using one of the "simple" time series forecasting methods. Which method was used?
 - a. Simple moving average
 - b. Triple exponential smoothing
 - c. Last point
 - d. Average

Forecasting Performance Measures (3 pts.)

The "DES" worksheet contains a DES forecast model with $LS = TS = 0.75$ using the holdout strategy. We used Year 4 as the holdout data. Answer Questions 6-8 based on this worksheet.

6. (1 pt.) What is the absolute forecast error for Year 4, Quarter 3 (that is, Period 15)?
7. (1 pt.) Calculate the within-sample BIAS.
8. (1 pt.) Calculate the out-of-sample MAPE.

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Predicting Water Levels of the North Saskatchewan River (9 pts.)

The City of Edmonton Open Data portal has data on the water level of the North Saskatchewan River at several locations. A local fisherman named Don loves to go fishing at the “Whirlpool” location, but the water level needs to be high enough for the fish to enter the “Whirlpool” area.

The “TES” worksheet contains a TES forecast model with a seasonal pattern $p = 12$. All formulas already entered are correct.

9. (1 pt. for feasibility, 1 pt. for consistency, 1 pt. for optimality.) Find the values for LS, TS, and SS that minimizes the RMSE for the last 2 years (October 2021 to September 2023), subject to the constraint that LS, TS, and SS are between 0.05 and 0.95. Report LS, TS, SS, and the resulting RMSE.
10. (3 pts.) Using the LS, TS, and SS from Question 9, calculate and report the TES forecasts for October 2023 to December 2024.
11. (3 pts.) Using the values for LS, TS, SS and the resulting RMSE from Question 9, as well as the forecasts from Question 10, calculate and report a 95% prediction interval for each month from October 2023 to December 2024. How many of the months from October 2023 to December 2024 have the 95% prediction interval for the water level at least 0.4m (that is, the lower value of the prediction interval is at least 0.4m)?

Bug Hunt (3 pts.)

The “Bugs” worksheet contains a modified version of the completed WMA forecast from Labs.

The cells in this sheet contain one or more errors. An error could be an incorrect formula, a formula where there should be a number, or a number where there should be a formula.

12. (3 pts.) Report the cells that you think have errors. To report a cell, type its cell reference. For example, type A1 if you think there is an error in cell A1. If an incorrect formula is propagated to other cells in a range then report only the first cell in the range that has the incorrect formula. You might not need all of the answer cells provided.

Your mark for this question will equal $\text{MAX}(0, X * (\text{right} - \text{wrong}))$ where “right” is the number of errors you found and “wrong” is the number of instances where you reported an error in a cell that does not have any error. We do not tell you the value of X to avoid giving away information about how many errors the model has.

Short Answer Question (2 pts.)

13. (2 pts.) In lecture, we saw an animation of a car on a road, where the driver can only see through the rearview mirror. The driver cannot see through the front windshield. How is the driver's situation analogous to a person using time series forecasting methods? Keep your answer under 200 characters.