



**MSCA 31006 Time Series Analysis and Forecasting**

**Assignment #2 - Time Series Decomposition**

Due Date – Beginning of Session #3

Total Points: 6%

**Instructions:**

- Total number of points is 30. The assignment's final grade will be multiplied by 1/5 to calculate its weight on the final grade.
- Mark the question number and your final answer clearly (use a textbox.)
- Remember to show and explain your work (*If you can't explain it, you don't understand it.*)
- Please submit your solution through Canvas.

For this exercise, use the Quarterly international arrivals to Australia from the US. 1981Q1 - 2012Q3 dataset. (Dataset Name: visitors.rda)

**(4 points) Question 1:**

Load the visitors.rda dataset, make a time plot of your data and describe the main features of the series.

**(4 points) Question 2:**

What is the appropriate Holt-Winters method for this data set (multiplicative / additive)? why?

**(8 points) Question 3**

Use the hw() function to forecast the next 20 quarters using Holt-Winters' methods.

Experiment with the following methods

- Linear trend with additive seasonality
- Linear trend with multiplicative seasonality
- Linear trend with additive seasonality and damping
- Linear trend with multiplicative seasonality and damping

**(5 points) Question 4:**

Use the accuracy() function to compare the Root-Mean-Square-Error (RMSE) values of the forecasts from the various methods. Which do you prefer and why?



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**(5 points) Question 5:**

Use the `checkresiduals()` function to check that the residuals from the best model look like white noise and provide a summary of the model's smoothing parameters using the `summary()` function.

**(4 points) Question 6:**

Use the `snaive()` function to forecast the next 20 quarters, and the `accuracy()` function to evaluate the model. Did your best model beat the seasonal naïve approach?