MTH 325, Homework #7, Spring 2023   Name _____

Instructions: Show work or attach R code used to perform calculations (or any other technology used). Be sure to answer all parts of each problem as completely as possible, and attach work to this cover sheet with a staple.

1. Consider the data in the file **325homework7data.xlsx**. It is a time series data for tickets sold over a 4-year period. (This is the same data file from the last homework.)
   a. Plot the data in a line graph.
   b. Do you notice any trend?
   c. Is there a seasonal component to the data?
   d. Conduct a test for stationarity.
   e. If the data is not stationary, calculate the first differences and plot those values in a line graph. Conduct a test for stationarity on the first differences.
   f. Plot a regression curve to the graph all but the last five observations. How does the model do if we wanted to use it to predict the holdout values?
   g. Apply a smoothing model to your graph. Which one do you think does the best job and why?
   h. Use a package to decompose the data into trend, seasonal trend and noise. What is the period of the season trend if it exists?
   i. Do the residual errors appear to be random or correlated?

2. Consider the data in the file **325homework7data2.xlsx**. It is a time series data for revenue over a 27-year period. (This is the same data file from the last homework.)
   a. Plot the data in a line graph.
   b. Do you notice any trend?
   c. Is there a seasonal component to the data?
   d. Conduct a test for stationarity.
   e. If the data is not stationary, calculate the first differences and plot those values in a line graph. Conduct a test for stationarity on the first differences.
   f. Does the trend appear to be linear? If not, which type of model fits best?
   g. Would a transformation of the variables (such as a log or power model) make the trend linear?
   h. Plot a regression curve to the graph all but the last five observations. How does the model do if we wanted to use it to predict the holdout values?
   i. Use a package to decompose the data into trend, seasonal trend and noise. What is the period of the season trend if it exists?
   j. Do the residual errors appear to be random or correlated?