Test 3 Part 1 (40 points)

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**Problem 1 (10 points)**

Find an Arima Model for the Viscocity data set. Make sure you follow the four steps of Arima Modelling.

Label each step below and explain your reasoning on each step, print pertinent graphs on each step and provide code for each step.

**Problem 2 (10 points)**

Find an Arima Model for the Microsoft stock prices (MSFT). Make sure you follow the four steps of Arima Modelling.

Label each step below and explain your reasoning on each step, print pertinent graphs on each step and provide code for each step.

**Problem 3 (10 points)**

Find an Arima Model for Key West hourly water temperature. Make sure you follow the four steps of Arima Modelling.

Label each step below and explain your reasoning on each step, print pertinent graphs on each step and provide code for each step.

**Problem 4 Use Stock dataset (10 points)**

[a] Graph the data with a time series plot and describe the time series plot. (1 point)

The time series plot appears to have a cyclical trend and is potentially seasonal. It continues this pattern quite consistently.

[b] What can we learn from the ACF and PACF? (1 point)

The ACF shows strong seasonal pattern and a declining trend that indicates a lack of stationarity. The PACF cuts after lag 4. From the ACF and PACF we can tell we will need to conduct differencing analysis and will need to build a seasonal ARIMA model.

[c] Provide a differencing analysis. (1 point)

When we use the difference values, the ACF becomes stationary and cuts after lag 12 and the PACF cuts after lag 12 as well.

[d] Check the models Arima(0 , 1, 1)(0, 1, 1) and Arima(1, 1, 0)(0, 1, 1) check the fit of both models and compare residuals, AIC, L’Jung Box and Standard error. (2 points)

The residuals of the two models are very similar. The AIC of the two models are very similar. The L’Jung Box test was also similar for the two models with similar p-values, df’s, and lags used. The standard error values for the two models were also very similar.

[e] Write the model on d in terms of the backshift operator, and then without using the backshift operator.

(3 points)

[f] Forecast 10 periods. (2 points)