

STA457H1: Time Series Analysis
Assignment 3 - Question 7 **Due date December 2, 2022**

Student Name.....ID number.....

Instructions: *Show your answers in details.*

Q7 (9 points): Quarterly earnings per share for the Johnson & Johnson Company are given in the data file named *jj*. The data cover the years from 1960 through 1980.

1. Plot the time series and also the logarithm of the series. Argue that we should transform by logs to model this series.
2. Display a time series plot of the differences of the transformed values. Does this plot suggest that a stationary model might be appropriate for the differences?
3. Display a quantile-quantile plot of the transformed data. Are they looks like normal?
4. Calculate and graph the sample ACF of the first differences. Interpret the results.
5. Display the plot of seasonal differences and the first differences. Interpret the plot.
6. Graph and interpret the sample ACF of seasonal differences with the first differences.
7. Fit the model $\text{ARIMA}(0, 1, 1) \times (0, 1, 1)_4$, and assess the significance of the estimated coefficients.
8. Perform all of the diagnostic tests on the residuals.
9. Calculate and plot forecasts for the next two years of the series. Also include the 95% forecast limits.