QBUS6840: Tutorial 5 Tasks

In week03 and week04 tutorials, we have learnt how to do an additive decomposition on Airline Passengers Dataset.

This time, you still want to use this dataset for a forecasting task, but you are required to treat the task as a multiplicative decomposition situation.

Complete the following task and report what you could observe:

1. Read the data, based on the given data, do a multiplicative decomposition to extract the Trend-Cycle and Seasonal index.
2. Calculate the seasonal adjusted data and then use the seasonal adjusted data as the observed data to train a linear regression model.
3. Re-estimate your Trend-Cycle component by calling the trained linear regression model.
4. Use the extracted final Trend-Cycle and seasonal index to forecast the $\widehat{Y_{t+1}}$ to $\widehat{Y_{t+12}}$
5. Compared your results with the forecast result with additive decomposition. Which model is more appropriate for this time series?

Hint:

Normally, we will treat Y_t as the last observation to decompose the time-series data. Since we need to compare the performance with the additive decomposition, we treat the last 12 observations (Y_{t-11} to Y_t) as unknown data to test the performance. That is use Y_1 to Y_{t-12} for decomposition and training the linear regression, and use Y_{t-11} to Y_t to test the accuracy.