

Stat 142(Time Series Analysis)

Second Semester AY 2024-2025

Laboratory Exercise No. 3

INSTRUCTIONS: Answer the following as indicated. Prepare your answer sheet in R Mark-down and submit in PDF format.

The **plastics** data set in the **fma** package consists of the monthly sales (in thousands) of product A for a plastics manufacturer for five years.

1. Plot the time series of sales of product A. Can you identify seasonal fluctuations and/or a trend-cycle? [5 points]
2. Which model do you think best describes the series, additive or multiplicative? Explain your answer. [3 points]
3. Based on your answer in (b), apply classical decomposition to calculate the trend-cycle and seasonal indices. Print the trend-cycle estimates for the first 6 months and the last 6 months. Print also the seasonal indices [10 points]
4. Plot the seasonally adjusted data. Do the results support the graphical interpretation from (a)? [4 points]
5. Add 500 to the 31st observation to simulate an outlier, and recompute and plot the seasonally adjusted data. What is the effect of the outlier? [5 points]
6. Decompose the series with the outlier using X11, SEATS, and STL methods. Compare the results. How are they different? [8 points]