Hyndman and Athanasopoulos – Chapter 6 Exercises

1: Solved by pen and paper

2:

1. Plastics has a frequency of 12 (monthly sales). There is a clear seasonal effect, because the series always start to increase after February, peaking around August, and then it slowly decreases until February. The data also appears to be trending upwards, which means that the average of the distribution is shifting up with time.
2. Classical multiplicative decomposition is used because we assume that the variations in seasonal patterns are changing according to the level of the time series. The seasonal indices support the graphical interpretation of part a). September has the largest seasonal index, followed by August, while February has the smallest. The trend cycle also shows an upward trend, although it slowly ticks downward in the end of the series, reflecting the fact that it appears that the data for year 6 behaves slightly differently from past years.
3. Yes.
4. Plotted with script.
5. The outlier has a very large residual. The seasonal effect does not change considerably, but the estimate of the trend-cycle for that observation changes significantly.