Hyndman and Athanasopoulos – Chapter 3 (answers)

1. The box-cox transformation is characterized by a parameter alpha. If alpha is equal to zero, then the transformation is equivalent to the natural logarithm. However, if the alpha parameter is different than zero, it consists in a power transformation. It is useful to normalize variables (normality is usually required for a variety of statistical tests). In the time-series context, it is used to perform variance stabilization.
2. Cangas dataset: because it does not address one of the main problems of the cangas time-series. The seasonal variation does not stabilize or shrink after the transformation was applied. The variation increases, stabilizes, and then shrinks again, just like in the original series.
3. Notice that the appropriate box-cox transformation reduces the greater variation in more recent events.
4. A transformation won’t likely stabilize the dole series. A box-cox transformation does not reduce the variation, which is likely tied to the business cycle and not necessarily a product of seasonality. For the usdeaths series, it definitely shrunk the variability. Meaningless for bricksq series, since the seasonal variability still changes considerably/
5. The mean of the residuals is not zero, which suggests that the forecasts from the seasonally naïve method are biased downward. This could be easily fixed by adding the constant to the original series. However, the results of the autocorrelation plot and of the Ljung-box test show that there is enough evidence to reject the null hypothesis that the residuals are uncorrelated. It is possible, at least in theory, to predict the next residual using past values, suggesting thus there is information contained in the residuals that should be used in the model.
6. The residuals of the naïve forecast are biased upward; and show a high degree of autocorrelation. Finally, the Ljung-box test rejects the null of no autocorrelation in the residuals. Same problems as wwwusage series. Forecasts are biased upward and the correlogram and the Ljung-box test show evidence of autocorrelation.