Notes for Hyndman and Athanasopoulos – Chapter 2

* Frequency of a time-series is the number of observations before the seasonal pattern repeats.
  + Yearly data: Frequency = 1
  + Quarterly data: Frequency = 4
  + Monthly data: Frequency = 12
  + Weekly data: Frequency = 52
  + Daily data might have two types of seasonality:
    - Weekly seasonality (frequency = 7)
    - Annual seasonality (frequency = 365)
* Time series patterns
  + *Trend:* A trend exists when there is a long-term increase or decrease in the data. It does not have to be linear.
  + *Seasonal:* A seasonal pattern occurs when a time-series is affected by seasonal factors such as the time of the year or the day of the week. Seasonality is always fixed and of known frequency.
  + *Cyclic:* A cycle occurs when the data exhibit rises and falls that are not of a fixed frequency
* If the fluctuations are not of a FIXED FREQUENCY, then they are cyclic; if the frequency is unchanging and associated with some aspect of the calendar then the pattern is seasonal.
* An accurate forecasting method must take into account the time patterns in the data and be able to capture the patterns properly.
* A seasonal plot is similar to a time plot except that the data are plotted against individual seasons in which the data was observed.
* Scatterplots are useful for visualizing relationship between time-series. It is common in these cases to display the correlation coefficient to measure the strength of the relationship between these two variables.
* Autocorrelation measures the linear relationship between lagged values of a time-series.
* The autocorrelation coefficients are plotted to show the autocorrelation function (AFC). The plot generated is known as the *correlogram*.
* When data has a trend, the autocorrelation for small lags tend to be large and positive because observations nearby in time are also nearby in size (due to changing mean of the series as time goes by).
* When data is seasonal, the autocorrelations will be larger for the seasonal lags (at multiples of the seasonal frequency) than for other lags.
* Time series that show no autocorrelation are called **white noise**.