

Assignment – Time Series Analysis

1. The data set dailyibm.dat contains data pertaining to daily IBM stock market prices from Jan. 01, 1980 to Oct. 08, 1992. Model the data following an appropriate procedure. Provide your observations at each step.
2. The data set a3q3.dat contains 2048 samples of a simulated random process. Fit an appropriate time-series model to the data.
3. Fit an appropriate time series model to the data set basiron.dat that contains the monthly basic iron production in Australia.
4. Answer the following:

- (a) Prove that the periodogram computation via the DFT of the auto-covariance of $x[n]$ is equal to the squared magnitude DFT of $x[n]$ scaled by $1/N$,

$$\sum_{l=-N}^{l=N} \hat{\sigma}_{xx}[l] e^{-j2\pi fl} = \frac{1}{N} \left| \sum_{n=0}^{N-1} x[n] e^{-j2\pi fn} \right|^2$$

- (b) If the DFT of $x[n]$ is denoted by $X[k]$ (corresponding to the k^{th} frequency), then derive expressions for (i) $\text{var}\{X[k]\}$ and (ii) autocorrelation of $X[k]$ when $x[n]$ is the white-noise process $\{e[n]\}$.

For all the modelling questions, provide your observations at each step.