Statistics 565 Applied Time Series Analysis   Spring 2019

Homework 3

Due: Mon 02/18/19 @ 6:00pm   rutgers.instructure.com/courses/21204

1. Problem 3.6 (d) and (f).

2. Problem 3.12.

3. Problem 4.2.

4. Problem 4.3.

5. Problem 4.19. Hint: The sequence $\{\theta_1, ..., \theta_6\}$ decays in a particular way. What is the process that has such a general linear representation?

6. Consider four AR(2) processes of the form $Y_t = \phi_1 Y_{t-1} + \phi_2 Y_{t-2} + e_t$, where $e_t \sim WN(0, \sigma^2)$ for the following values of ϕ_1 and ϕ_2:

   (a) $\phi_1 = 0.6$ and $\phi_2 = 0.3$.
   (b) $\phi_1 = -0.4$ and $\phi_2 = 0.5$.
   (c) $\phi_1 = 1.2$ and $\phi_2 = -0.7$.
   (d) $\phi_1 = -1$ and $\phi_2 = -0.6$.

   (i) Prove that all of the above four processes are stationary.
   (ii) For each of these processes, compute the ψ_j coefficients in the linear process representation $Y_t = \sum_{j=0}^{\infty} \psi_j e_{t-j}$ for $j = 0, 1, 2, 3, 4$.
   (iii) Using the Yule-Walker equations, write a function to compute the autocorrelation coefficients for each of the four processes up to lag 20, and plot them against the lags.