قسم الاحصاء وبحوث العمليات

المقرر: 436 إحص: تحليل السلاسل الزمنية

Tutorial set #3

Question 1:

Write the Yule-Walker equations for every model of the following, where $\varepsilon_t \sim i.i.d(0, \sigma_\varepsilon^2)$:

1- $y_t = 0.5y_{t-1} + \varepsilon_t$
2- $y_t = 1.2\, y_{t-1} - 0.7\, y_{t-2} + \varepsilon_t$
3- find ρ_1, ρ_2 , ϕ_{kk} for the models in (1) and (2).

Question 2:

Assume $\varepsilon_t \sim i.i.d(0, \sigma_\varepsilon^2)$, and let the observed series be defined as $y_t = \varepsilon_t - \theta\varepsilon_{t-1}$

Where the parameter θ can take either the value $\theta = 3$ or $\theta = \frac{1}{3}$.

1- Find the autocorrelation function of the series $\{Y_t\}$ for both cases, compare them.
2- Is the process $\{Y_t\}$ stationary in both cases?
3- For simplification, assume that the mean of the process $\{Y_t\}$ equal zero, and the variance is equal to one, and that you obtained the observed series $\{Y_t\}$ for $t = 1,2, \ldots, n$, and that you have obtained a credible estimates for the coefficients of the ACF ρ_k, can you tell which process generated the data (i.e. which value $\theta = 3$ or $\theta = \frac{1}{3}$ to be used in the model to model the data?)

Question 3: Write the following models using the backshift operator B:

1- $y_t - 0.5\, y_{t-1} = \varepsilon_t$:
2- $y_t = \varepsilon_t - 1.3\, \varepsilon_{t-1} + 0.4\, \varepsilon_{t-2}$
3- $y_t - 0.5\, y_{t-1} = \varepsilon_t - 1.3\, \varepsilon_{t-1} + 0.4\, \varepsilon_{t-2}$

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Question 4:

Express the following models in terms of the process $\{y_t\}$ and $\{\varepsilon_t\}$:

1- $\nabla^3 y_t = \nabla \varepsilon_t$

2- $\nabla^2 y_t = \nabla^3 \varepsilon_t$

Question 5:

Open the MINITAB program, and get acquainted with following icons:

1- The icon for "Time series Plot".
2- The icon for "Differences".
3- The icon for "lag".
4- The icon for "Autocorrelation function".
5- The icon for "Partial Autocorrelation function".