قسم الاحصاء وبحوث العمليات

المقرر: 436 إحص: تحليل السلاسل الزمنية

Tutorial set #2

Question 1:

1- What is the difference between strict and weak stationarity? When we can say that weak stationarity leads to strict stationarity?

2- An analyst has a time series data representing number of daily car accidents in a major road at Riyadh city. He applied the techniques of regression analysis to analyze the data set, by considering the dependent variable y_t as the number of daily car accidents, and the independent variable the time indices t=1,2,3,4,… representing days. So he applied the following simple linear regression model, $y_t = \beta_0 + \beta_1 t + \varepsilon_t$ comment on what he have done, do you think his analysis is always valid, discuss.

Question 2:

1- Assume the model:

$$Y_t = 1 + \varepsilon_t + \varepsilon_{t-1}$$

where $\{\varepsilon_t\}$ is a sequence of independent and identically distributed random variables with mean zero, and variance σ_ε^2 . Find the autocorrelation function for the process $\{Y_t\}$, plot it and comment on the graph.

2- Find the autocorrelation function for the process, $Y_t = 1 + \varepsilon_t - \varepsilon_{t-1}$, plot it and compare it with the ACF in part (1).

Question 3:

If the series $\{Y_t\}$ ca n be expressed in the form:

$$Y_t = \beta_0 + \beta_1 t + \beta_2 t^2 + \varepsilon_t$$

where $\{\varepsilon_t\}$ as defined as in Q.2.

1- Find the expectation, the variance and the autocorrelation function of the series.

2- Does this series fulfill the stationarity conditions? Discuss.

Question 4:

The following data represent the total profit (in million riyals) for a company:

Year	1430	1431	1432	1433	1434	1435	1436	1437
Profit y_t	3	2	2	4	5	6.1	4.4	5.5

1- Calculate the coefficients of the sample autocorrelation function (SACF) r_k, and plot it.
2- Calculate the standard errors for these estimates.