Time series Analysis & Modeling

LAB # 8 ARMA Model- Theoretical mean-variance-autocorrelation

DATS 6450

Perform the following tasks:

1- Let consider an ARMA(1,1) process as

$$y(t) - 0.5y(t-1) = e(t) + 0.8e(t-1)$$

Where $e(t)$ as a WN (2,1).

a. Calculate theoretical mean & variance of above process. No need to use python. Show all your work in the report.
b. Calculate the first 3 theoretical ACF of y(t). No need to use python. Show all your work in the report.
c. Using python, simulate above process for 10000 samples and calculate the experimental mean and variance. Compare your answer with part a. Write down your observations.

2- Repeat all the steps in the previous question for the ARMA(2,2) process defined below:

$$y(t) - 0.5y(t-1) + .25y(t-2) = e(t) + 0.1e(t-1) - 0.4e(t-2)$$

Where $e(t)$ as a WN (2,1).

Hint: You need to solve a system of linear equations with 3 unknowns and 3 equations to be able to calculate the theoretical autocorrelation values. You can use software, or calculator to perform this task. The general method to solve nxn system of linear equation is called Cramer's rule.

Please upload the **solution <u>report (as a single pdf</u>**) through BB by the due date. Homework may not be collected, and a quiz may be given on the due date.