
Problem 1. (3 points)

Let $Z(t)$ denote a white noise process with mean zero and variance 0.8^2 . Define the stochastic process $X(t)$ by

$$X(t) = Z(t) - 0.7Z(t-1) - 0.4Z(t-2) + 0.3Z(t-3)$$

Provide the following, each to two decimal places.

Part (a) $\text{Var}(X(t))$ ____

Part (b) $\text{Cov}(X(t), X(t+1))$ ____

Part (c) The autocorrelation function of $X(t)$ at lag 2. ____

Answer(s) submitted:

- 1.11
- -0.35
- -0.35

submitted: (correct)

recorded: (correct)

Problem 2. (4 points)

Suppose $Z(t)$ is white noise with mean zero and variance 1.3^2 . Define the stochastic process $X(t)$ by the rule

$$X(t) = 0.6X(t-1) + Z(t)$$

Part (a) Find the variance of $X(t)$ to two decimal places. ____

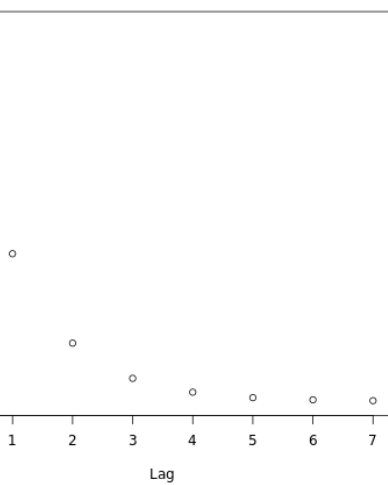
Part (b) Is $X(t)$ stationary?

- A. It is impossible to tell from the information given.
- B. No.
- C. Yes.

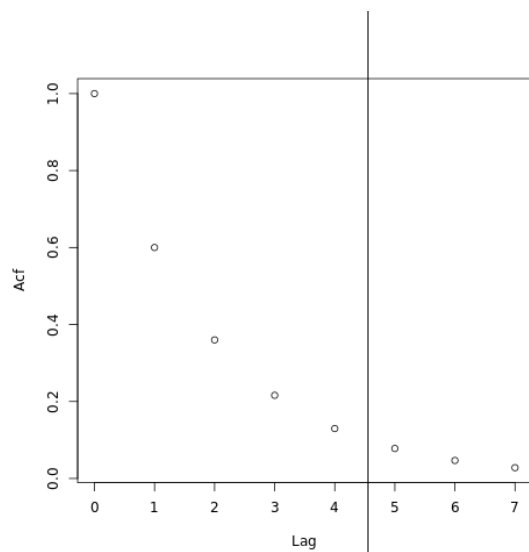
Part (c) Find the autocovariance of $X(t)$ at lag 1, to two decimal places. ____

Part (d) Which of the following is the autocorrelation function of $X(t)$?

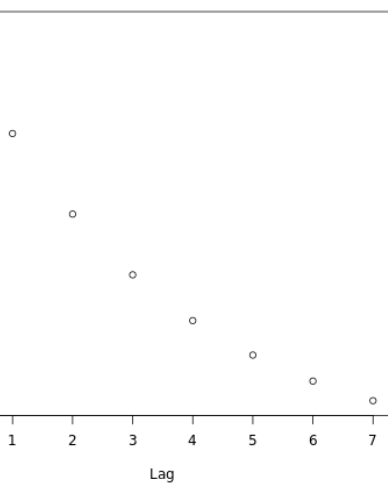
[?????/A/B/C]



A



B



C

(Click on a graph to enlarge it.)

Answer(s) submitted:

- 2.64
- C
- 1.58
- B

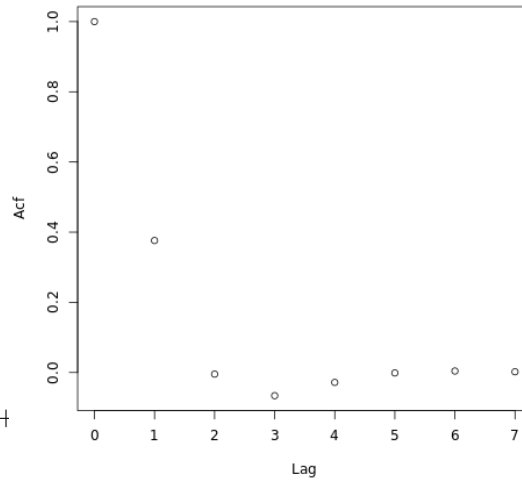
submitted: (correct)

recorded: (correct)

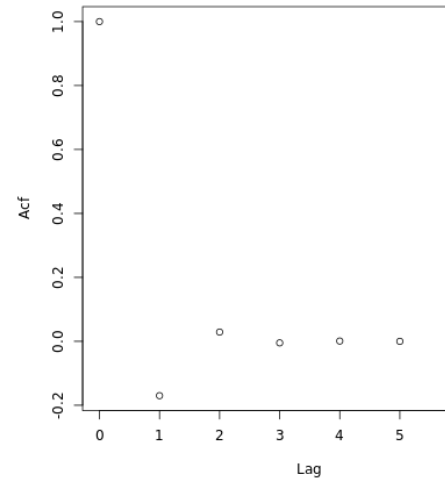
Problem 3. (3 points)

Let the stochastic process $X(t)$ be defined as

$$X(t) = 0.44X(t-1) - 0.17X(t-2) + Z(t)$$



A

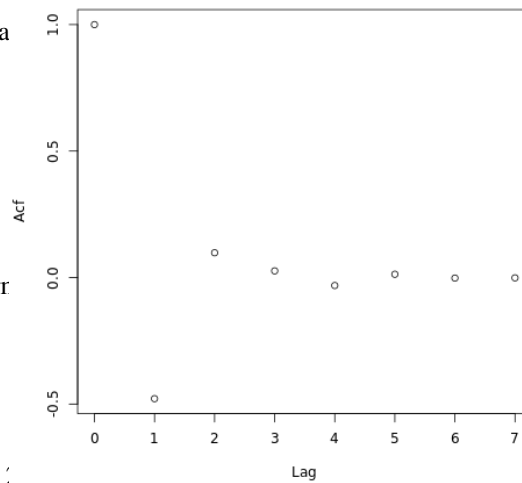


B

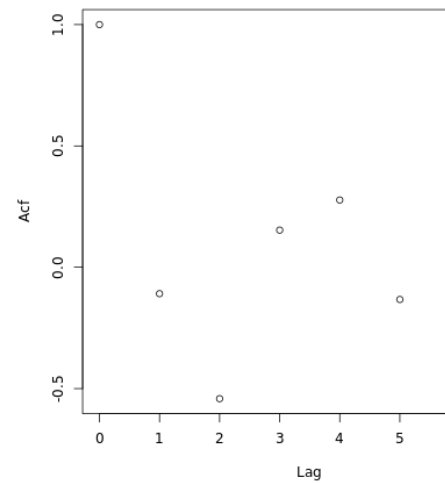
where $Z(t)$ is white noise with mean zero and variance 1.

Part (a) Is $X(t)$ stationary?

- A. No.
- B. It is impossible to tell from the information given.
- C. Yes.



C



D

Part (b) Find the autocorrelation of $X(t)$ at lag 1. (Click on a graph to enlarge it.)

Part (c) Which of the following is the autocorrelation function of $X(t)$?

[?????/A/B/C/D]

(Click on a graph to enlarge it.)

Answer(s) submitted:

- C
- 0
- A

submitted: (correct)

recorded: (correct)