

Lecture 2 Exercises

Exercise 1

Consider the random process

$$X(n) = \frac{1}{2}X(n-1) + Z(n), \quad n = 0, 1, \dots$$

Where $Z(n)$ is stationary white Gaussian noise with zero mean and $\sigma_z^2 = 1$. $X(n)$ is a Gaussian random variable, which is independent of $Z(n)$, $N \geq 1$. Find the mean and variance of $X(n)$ in order for the process to be stationary.

Exercise 2

Given the following samples of a stochastic process $X(n)$, fit the data to AR(2) model.

K = -4	0.9705
K = -3	1.0055
K = -2	0.9318
K = -1	0.9472
K = 0	1.0549
K = +1	0.8952
K = +2	1.0646
K = +3	1.0280
K = +4	0.9609

Exercise 3 (Optional)

For ARMA(1,1) process $X(n)$, find for the process

- The mean
- The variance
- The autocorrelation