Unit 11 - Week 9

Assignment 9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-10-03, 23:59 IST.

Each of the following questions has four options out of which one or more options can be correct. Individual marks are mentioned corresponding to each question. In the case of multiple answers, no partial marks will be awarded if all the correct choices are not selected. 0 marks for questions not

1) ***2 points***

2) ***2 points***

No, the answer is incorrect.
Score: 0

Accepted Answers:
0

3) Consider a simple symmetric random walk model. Let $X_1, X_2, \ldots$ be independent and identically distributed random variables with ***2 points***

$$P(X_1 = 1) = 0.5 \text{ and } P(X_1 = -1) = 0.5.$$

Define $S_n = \sum_{i=1}^{n} X_i,\ n \geq 1$

The value of the probability $P(S_6 = 4 \mid S_1 = 1)$ is equal to

- $\frac{6}{2^6}$
- $\frac{6}{2^6}$
- 0
- $\frac{5}{2^5}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{5}{2^5}$

4) Let $\{N(t), t \geq 0\}$ be a Poisson process with rate 2. The value of ***2 points***

$$P(N(1.7) = 10, N(2.3) = 19, N(4.1) = 31)$$

is equal to

- $\frac{e^{-2*1.8}*(2*1.8)^{12}}{12!} * \frac{e^{-2*0.6}*(2*0.6)^{9}}{9!} \times \frac{e^{-2*1.7}*(2*1.7)^{10}}{10!}$
- $\frac{e^{-2*4.1}*(2*4.1)^{31}}{31!} * \frac{e^{-2*2.3}*(2*2.3)^{19}}{19!} \times \frac{e^{-2*1.7}*(2*1.7)^{10}}{10!}$
- $\frac{e^{-2*1.7}*(2*1.7)^{9}}{9!} * \frac{e^{-2*0.6}*(2*0.6)^{12}}{12!} \times \frac{e^{-2*1.8}*(2*1.8)^{31}}{31!}$
- $\frac{e^{-2*2.3}*(2*2.3)^{19}}{19!} * \frac{e^{-2*0.6}*(2*0.6)^{9}}{9!} \times \frac{e^{-2*1.8}*(2*1.8)^{12}}{12!}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{e^{-2*1.8}*(2*1.8)^{12}}{12!} * \frac{e^{-2*0.6}*(2*0.6)^{9}}{9!} \times \frac{e^{-2*1.7}*(2*1.7)^{10}}{10!}$

5) Let Z_1 and Z_2 be two independent normally distributed random variables, each having mean 0 and variance σ^2. Let $\lambda \in \mathbb{R}$. Let ***2 points***

$$X_t = Z_1 \cos \lambda t + Z_2 \sin \lambda t,\ t \geq 0$$

Which of the following is not TRUE?

$\{X(t), t \geq 0\}$ is a second order process.

$E(X(t)) = 0$

$E(X(t)^2) = 1$

$\{X(t), t \geq 0\}$ is a wide sense stationary process

No, the answer is incorrect.
Score: 0

Accepted Answers:
$E(X(t)^2) = 1$

6) In a communication system, a carrier signal at a receiver is modeled as a stochastic process ***2 points***

$$\{X(t) = cos(2\pi ft + \theta); t \geq 0\}$$

where $\theta \sim U[-\pi, \pi]$ and f is a constant. Then, which of the following is/are TRUE?

$\{X(t), t \geq 0\}$ is a second order process

$E(X(t)) = 0$

$Cov(X(t), X(s))$ is a function of $|t - s|$

$\{X(t), t \geq 0\}$ is a wide sense stationary process

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\{X(t), t \geq 0\}$ *is a second order process*
$E(X(t)) = 0$
$Cov(X(t), X(s))$ *is a function of* $|t - s|$
$\{X(t), t \geq 0\}$ *is a wide sense stationary process*

7) Let $\{X(t), t \geq 0\}$ be a strict sense stationary stochastic process. Let A be a positive random variable independent of the stochastic process $\{X(t), t \geq 0\}$. Define ***2 points***

$$Y(t) = AX(t),\ t \geq 0$$

Then, which of the following is/are TRUE?

$\{Y(t), t \geq 0\}$ is always a strict sense stationary process.

$\{Y(t), t \geq 0\}$ is never a strict sense stationary process.

$\{Y(t), t \geq 0\}$ may or may not be a strict sense stationary process.

$\{Y(t), t \geq 0\}$ is not even a stochastic process.

Score: 0

Accepted Answers:
$E(X_1(t)X_2(t)) = \mu_1\mu_2$
$X_1(t)X_2(t)$ *is a wide sense stationary process*
Auto covariance function of $X_1(t)X_2(t)$ is $R_1(h)R_2(h)$

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