King Abdulaziz University
Science Faculty of Girls
Statistics Department

Exam #1   **Second term**
Stat 352   1432-1433 H

Name:………………………..   **ID NO.:……………………….**

Question 1

1- The random process $X(t)$ is given by

$$X(t) = Y \cos (2 \pi t) \quad t \geq 0$$

where Y is a random variable that is uniformly distributed between 0 and 2.

Find the expected value and autocorrelation function of $X(t)$.

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2- Prove that:

$$C_{XX}(t, s) = E\left[\{X(t) - \mu_{X(T)}\}\{X(s) - \mu_X(s)\}\right]$$

$$= R_{XX}(t, s) - \mu_X(t)\mu_X(s)$$

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Question 2

Choose the best answer for each questions of the following:

1- If $X(t)$ and $X(s)$ are independent and we have $C_{XX}(t,s) = 0$, , which means that $X(t)$ and $X(s)$ are ……….

A) Uncorrelated   B) Correlated   C) Autocorrelated   D) Crosscorrelated

2- …….. …….. is a process whose statistical properties do not vary with time.

A) Discreet- time random processes   C) Continuous- time random processes

B) Stationary random processes   D) Chain random processes.

3- The set of all possible values of $X(t, s)$ forms the…………

A) State space, E, of the random process.

B) Parameter space, T, of the random process.

C) Sample space, S, of the random process.

D) Event space.

4- A random process is also called…………

A) Chain processes.   B) Probability process

C) Stationary processes   D) Stochastic process

5- If $R_{XY}(t, s) = 0$ for all t and s, we say that X(t) and Y(t) are

A) Uncorrelated   B) Correlated   C) Orthogonal   D) Dependant

6- If the state space, E, is continuous, the process is called a………

A) Discreet- time random processes
C) Continuous- time random processes

B) Discrete-state random process.
D) Continuous-state random process

7- A random process $X(t)$ is called a *second order process* if ………… for each $t \in T$.

A) $E[X^2 (t)] < \infty$ B) $E[X^2 (t)] \leq \infty$ C) $E[X^2 (t)] > \infty$ D) $E[X^2 (t)] \geq \infty$

8- If a random process is defined by

$\qquad X(t) = K\cos wt, \quad t \geq 0$

where w is a constant and K is uniformly distributed between 0 and 2. Then

A) $E[X(t)] = K\cos wt$
B) $E[X(t)] = E[K] + E [\cos wt]$

C) $E[X(t)] = K E [\cos wt]$
D) $E[X(t)] = \cos wt$

9- For a wide-sense stationary process $X(t), E[X(t)]$ (constant)

A) Continuous
B) Constant
C) Periodic
D) Variable

10- If X(t) is a strict-sense stationary process, then the autocorrelation and autocovariance functions do not depend on t

A) Do not depend on τ
B) Do not depend on *s*

C) Do not depend on t
D) Depend on t

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good luck – Dr. F. Algashgari   26/4/1433

Type equation here.

Some important   formulas

Uniform

IF $X \sim Unif(a, b)$

$$f(x) = \frac{1}{b-a}, \quad E[X] = \frac{a+b}{2}, \quad Var(X) = \frac{(b-a)^2}{12}$$

Some Trigonometric Identities

$$\sin A \cos B = \frac{1}{2}\{\sin(A+B) + \sin(A-B)\}$$

$$\cos A \cos B = \frac{1}{2}\{\cos(A-B) + \cos(A+B)\}$$

$$\sin A \sin B = \frac{1}{2}\{\cos(A-B) - \cos(A+B)\}$$