Q. One: $\int_{-\infty}^{\infty} (u(x) + \sin(x+2))\, \delta(x+2)\, dx =$

A) 1 B) 0 C) 3 D) 2 E) None

Q. Two: The mean of the process $X(t) = \cos(t+\theta)$ where $\theta \sim U(-2\pi, 2\pi)$ is

A) 1 B) $\sin(t)$ C) $\frac{1}{4\pi}\sin(t)$ D) 0 E) None

Q. Three: For $X(t) = A\cos(t)$ and $Y(t) = B\sin(t)$ where both A, B are independent random variables with equal mean. If $R_{XY}(t, t+\tau) = \cos(t)\sin(t+\tau)$ then $E(A) =$

A) 1 B) 2 C) 3 D) 4 E) Non

Q. Four: The variance of a mean-ergodic process $X(t)$ with no periodic component and $R_{XX}(\tau) = Ae^{-|\tau|} + \frac{1}{1+\tau^2}$ equals 4 , then the constant A equals

A) 1 B) 2 C) 3 D) 4 E) Non

Q. Five: For the joint PDF $f(x,y) = 8b$ when $0 < x < b$, $0 < y < b$ and zero otherwise, the positive constant b equals

A) 2 B) 1/2 C) 1/3 D) 3 E) None

Q. Six: If $F(0) = 0$ and $P(0 < x < 1) = 1$, then $F(F(1)) =$

A) 2 B) 4 C) 3 D) 1 E) None

Q. Seven: A random variable X with pdf $f(x) = x^2, x \in (0, \sqrt[3]{3})$. The pdf of $Y = \sqrt[3]{X}$ is

A) $3y^8$ B) $3y^6$ C) $3y^{2/3}$ D) y^8 E) None

Q. Eight: If $P(X = x) = 0.6\,\delta(x-1) + A\,\delta(x-2)$; A is a constant, then $P(X = 2) =$

A) 0.2 B) 0.3 C) 0.4 D) 0.5 E) None

Q. Nine: For orthogonal processes $X(t) = A\cos(t)$ and $Y(t) = B\sin(t)$, the expected value of the product of the random variables A, B is

A) 0 B) 2 C) 3 D) 1 E) None

Q. Ten: If $Cov(X,Y) = 1$, $Corr(x,y) = \rho$ and $Cov(\rho X, \rho Y) \geq 1$ then $\rho =$

A) -1 B) 1 C) 0 D) ± 1 E) None

Q. Eleven: For $x > 1$, we have $2u(u(x)) + 3\delta(x) =$

A) 1 B) 2 C) 3 D) 0 E) None

Q. Twelve (✓, X) : The process $X(t) = A\cos(t)$, $A \sim U(-1,1)$ is first order stationary.

Q. Thirteen (✓, X): The joint CDF $F_{XY}(x,y) = e^{-x}\cos(x)$ gives $f(x,y) = e^{-x}\cos(x)$

Q. Fourteen (✓, X): If $\bar{X} = 1$, $Var(X) = 2$ and $Y = X + 1$, then X, Y are orthogonal r.v's.

Q. Fifteen (✓, X) : If $Cov(-X,Y) = 3Corr(-X,Y)$, then $\sigma_X \sigma_Y = 3$

Q. Sixteen (✓, X) : For the joint PDF $f(x,y) = 0.5$ when $0 < x < 1$, $0 < y < 2$ and zero otherwise, we have $f_X(x) = 0.5$

Q. Seventeen (✓, X): For two independent r.vs X,Y we have $E(XY) = 2E(X)$, then $E(Y) = 0.5$

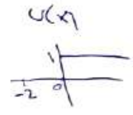
Q. Eighteen (✓, X): If $Var(E(X)X) = 0$, then either $E(X) = 0$ or $Var(X) = 0$

Q. Nineteen (✓, X): $X \sim B(n, 0.5)$ and $Y \sim P(2.3)$ cannot have the same means

Q. Twenty (✓, X): Two independent random variables X, Y with marginal pdf's $f_X(x) = 2$ when $x \in (0, 0.5)$ and $f_Y(y) = 1$ when $y \in (0,1)$. Then the joint pdf is $f(x,y) = 1$ when x and y belong to their intervals and zero otherwise

إحصاء ورقي

Q1] $\delta(x+2) \Rightarrow x+2=0 \Rightarrow x=-2$



$u(-2) + \sin(-2+2) = 0$

$0 + 0 = 0$ (B)

Q2] $E(x(t)) = \int_{-2\pi}^{2\pi} (\cos(t+\theta)) \cdot \frac{1}{4\pi}\, d\theta$

$\theta \sim U(-2\pi, 2\pi)$

$f(\theta) = \frac{1}{+2\pi+2\pi} = \frac{1}{4\pi}$

$= \frac{1}{4\pi}\left[\sin(t+\theta)\right]_{-2\pi}^{2\pi}$

$= \frac{1}{4\pi}\left[\sin(t+2\pi) - \sin(t-2\pi)\right]$

$= \frac{1}{4\pi}[0] = 0$ (D)

Q3] $R_{xy}(t, t+\tau) = \cos(t)\sin(t, t+\tau)$

$\Rightarrow E[x(t) \cdot y(t+\tau)] = [\quad]$

$\Rightarrow E[A\cos(t) \cdot B\sin(t+\tau)] = [\quad]$

$\Rightarrow E[AB][\cancel{\cos(t)\sin(t+\tau)}] = [\cancel{\cos(t)\sin(t+\tau)}]$

$\Rightarrow$ then: $E(A) = E(B)$

$E(AB) = E(A)\,E(B) = E(A)^2 = 1 \Rightarrow \boxed{E(A) = 1}$ (A)

Q4] $\mathrm{var}_x = Ex^2 - [Ex]^2$

$4 = A + 1 - 0$

$\boxed{A=3}$ (C)

$[Ex]^2 = \lim_{\tau \to \infty} R_{xx}(\tau) = \cancel{A e^{-\infty}} + \cancel{\frac{1}{1+\infty}} = 0$

$Ex^2 = R_{xx}(0) = A e^{0} + \frac{1}{1+0} = A + 1$

Q5] $\int_0^b \int_0^b [8b]\, dx\, dy = 1$

$\int_0^b 8b^2\, dy = 1$

$8b^3 = 1 \Rightarrow \boxed{b = \frac{1}{2}}$ (B)

Q6] $P(0 < x < 1) = 1$

$F(1) - F(0) = 1$

$F(1) - 0 = 1$

$F(1) = 1$

$\Rightarrow F(F(1))$

$\Rightarrow F(1) = 1$

(D)

Q9] orthognal processes

then $E(xy) = 0$ (A)

مهم

Q10] $cov(\rho X, \rho y) \geq 1$

$(\rho)(\rho)\ cov(x,y) \geq 1$

$(\rho^2)\ (\ 1\ ) \geq 1$

$\rho^2 \geq 1 \Rightarrow \boxed{\rho = 1}\ \boxed{\rho = -1}$ (B)

Q12] $E(x(t)) = \int_{-1}^{1} A\cos(t) \times \frac{1}{2}\, dA$

$A \sim U(-1,1)$

$f(A) = \frac{1}{1-(-1)} = \frac{1}{2}$

$= \frac{\cos(t)}{2\times 2}[A^2]_{-1}^{1}$

$= \frac{\cos(t)}{4}[1-1] = 0$ firstorder (True ✓)

Q13] Joint cdf → محذوف

مهم

Q15] $cov(-X,y) = 3\ corr(-X,-y)$

$(-1)\ cov(x,y) = -3\ \frac{cov(x,y)}{(\sigma x\, \sigma y)}$

$\sigma x\, \sigma y = 3$ (True ✓)

Q16] $f_x(x) = \int_y f(x,y)\, dy = \int_0^2 [0.5]\, dy$

$= 2 \times [0.5] = 1$ (False ✗)

Q17] $E_{xy} = 2E_x$

independent:

$\cancel{E(x)}E(y) = 2\cancel{E(x)} \Rightarrow E(y) = 2$ (false ✗)

Q18] $Var[E(x)X] = 0$

$[E(x)]^2 Var\,x = 0 \Rightarrow Var\,x = 0$ or $E(x) = 0$ (True ✓)

Q19] $x \sim B(n, 0.5)$

$Y \sim P(2.3)$

mean $= 2.3$

mean $= n \times P$

mean $= n \times (0.5)$

the mean can't [2.3], because (n) integar number

(True ✓)

مهم

Q20] $f(x,y) = f_x(x).f_y(y)$

$f(x,y) = (2).(1) \Rightarrow f(x,y) = 2$ (False ✗)

محمد صالحية

خدمتكم عبادة أتقرب بها إلى الله