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NPTEL

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Courses » Introduction to Probability Theory and Stochastic Processes

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Unit 7 - Week-5 Higher Dimensional Distributions

Course outline

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Assignment 5

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

Due on 2018-09-12, 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 attempted.

1) Let X and Y be two random variables with joint probability mass function given by ***2 points***

$X \setminus Y$	0	1	2
1	0.1	a	b
2	c	0.2	0.06
3	d	f	0.3

Given that $P(X=1)=0.16, P(X=3)=0.50, P(Y=0)=0.24$. Which of the following set of possible values is correct?

- ☐ $a=0.04, b=0.02, d=0.06, f=0.14$
- ☐ $a=0.04, c=0.08, d=0.06, f=0.04$
- ☐ $b=0.02, c=0.06, d=0.08, e=0.06$
- ☐ $a=0.02, d=0.06, d=0.08, f=0.10$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$a=0.04, b=0.02, d=0.06, f=0.14$

- [ ] 0.2
- [ ] 0.08
- [ ] 0.8
- [ ] 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.08

3) Let X and Y be independent random variables. The range of X is $\{1, 3, 4\}$ and the range of Y is $\{1, 2\}$. ***2 points***
Partial information on the probability mass function is as follows:
$P(X = 3) = 0.50; \quad P(Y = 2) = 0.60; \quad P(X = 4, Y = 2) = 0.18$.
The probability $P(|X - Y| \geq 1)$ equals

- [ ] 0.98
- [ ] 0.92
- [ ] 0.18
- [ ] 0.82

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.92

4) Let X and Y be two random variables with joint pdf given by ***2 points***

$$f(x, y) = \begin{cases} 24xy & 0 < x, y < 1, x + y < 1 \\ 0, & \text{otherwise} \end{cases}$$

The probability $P(X < Y)$ equals

- [ ] 0.2
- [ ] 0.6
- [ ] 0.4
- [ ] 0.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.5

5) Let X and Y be two random variables with joint pdf given by ***2 points***

$$f(x, y) = \begin{cases} ke^{-3x-4y} & x, y > 0 \\ 0, & \text{otherwise} \end{cases}$$

The probability $P(0 < X < 1, 0 < Y < 2)$ equals

- [ ] $.05$
- [ ] 0.95
- [ ] 0.4
- [ ] 0.6

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.95

6) Let $F(x, y)$ be given by ***2 points***

$$F(x,y) = \begin{cases} 0, & \text{if} \quad x+y<0 \\ 1, & \text{if} \quad x+y \geq 0 \end{cases}$$

Which of the following statement is incorrect?

- [ ] $F(x, y)$ is a distribution function.
- [ ] $\lim_{x \to -\infty, y \to -\infty} F(x, y) = 0.$
- [ ] $\lim_{x \to \infty, y \to \infty} F(x, y) = 1.$
- [ ] $F(x, y)$ is not a distribution function.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$F(x, y)$ is a distribution function.

7) Let X and Y be two random variables with joint PMF given by ***2 points***

$$P(X = x, Y = y) = cxy, \ x = 1, 2, 3 \ y = 1, 2, 3,$$

where c is a constant. Which of the following are correct?

- [ ] $c = \frac{1}{36}$.
- [ ] X and Y are independent.
- [ ] $P(X \leq 2, Y \leq 3) = \frac{1}{2}$.
- [ ] $P(X = 2) = \frac{1}{3}$.

No, the answer is incorrect.
Score: 0

Accepted Answers:
$c = \frac{1}{36}$.
X and Y are independent.
$P(X \leq 2, Y \leq 3) = \frac{1}{2}$.

$P(X=2)=\frac{1}{3}$.

8) Let X and Y be two random variables with joint pdf given by **2 points**

$$f(x,y)=\begin{cases} k & x^2+y^2\leq 1 \\ 0, & \text{otherwise} \end{cases}$$

where k is a constant. Which of the following are correct?

- [ ] $k=\pi$
- [ ] X and Y are not independent.
- [ ] X and Y are independent.
- [ ] $P(Y\leq 0)=0.5$

No, the answer is incorrect.
Score: 0

Accepted Answers:
X *and* Y *are not independent.*
$P(Y\leq 0)=0.5$

9) Let X and Y be two random variables with joint pdf given by **2 points**

$$f(x,y)=\begin{cases} kxy & 0<y<x<1 \\ 0, & \text{otherwise} \end{cases}$$

where k is a constant. Which of the following are correct?

- [ ] $k=4.$
- [ ] $P(X=0.5)=0.5.$
- [ ] X and Y are independent.
- [ ] $K=8.$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$K=8.$

10) Let X and Y be two random variables with joint pdf given by **2 points**

$$f(x,y)=\begin{cases} \dfrac{1+xy}{4} & -1<x,y<1 \\ 0, & \text{otherwise} \end{cases}$$

Which of the following are correct?

- [ ] $P(X<0.5)=0.25.$
- [ ] Y follows uniform distribution.
- [ ] X and Y are independent.
- [ ] $P(X^2<\frac{1}{4},Y^2<\frac{1}{4})=0.25.$

No, the answer is incorrect.

Score: 0

Accepted Answers:

Y *follows uniform distribution.*

$P(X^2 < \frac{1}{4}, Y^2 < \frac{1}{4}) = 0.25.$

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