Quiz for Week 7

ⓘ This is a preview of the published version of the quiz

Started: 5 Oct at 23:25

Quiz instructions

Quiz time is from 17.15 to 18.00 of October 04, 2023.

Question 1

1 pts

Which of the following $f(x,y)$ can **NOT** be the joint probability function of the independent random variables X and Y?

Note: they are all legitimate joint probability functions.

- ○ $f(x,y) = \begin{cases} e^{-x-y}, & x>0, y>0 \\ 0, & \text{elsewhere} \end{cases}$
- ○ $f(x,y) = \begin{cases} \frac{4}{3}(x+1)(y+1), & 0 \le x \le 1; -1 \le y \le 0 \\ 0, & \text{elsewhere} \end{cases}$
- ○ $f(x,y) = \begin{cases} \frac{1}{90}(x+1)(y+1), & x=1,2,3; y=-1,0,1,2,3 \\ 0, & \text{elsewhere} \end{cases}$
- ◉ All are probability function of independent random variables

Question 2

1 pts

Let $f_{X,Y}(x,y)$ be the joint probability function for the continuous random vector (X,Y). Let $f_X(x)$ and $f_Y(y)$ be the marginal probability function for X and Y, and let $f_{X|Y}(x|y)$ and $f_{Y|X}(y|x)$ be the conditional probability functions. Which of the following statements is **WRONG**?

- ○ If $f_X(1)=0$, then for any real numbers $a<b$, we must have $\int_a^b f_{X,Y}(1,y)dy = 0$.

- ○ If $f_{Y|X}(y|x) = f_Y(y)$ for any x such that $f_X(x) > 0$, then X and Y are independent.
- ○ If X and Y are independent, then $f_{Y|X}(y|x) = f_Y(y)$ for any x such that $f_X(x) > 0$.
- ◉ We must have $\int_{-\infty}^{\infty} f_{X|Y}(x|y)dy = 1$ for any real number x; likewise, $\int_{-\infty}^{\infty} f_{Y|X}(y|x)dx = 1$ for any real number y.

Question 3

1 pts

Let X and Y be random variables. Which of the following is **IMPOSSSIBLE**?

- ○ $E(XY) = E(X)E(Y)$
- ○ $E(XY) < E(X)E(Y)$
- ◉ $\frac{1}{2}V(X) + \frac{1}{2}V(Y) < Cov(X, Y)$
- ○ $\frac{1}{2}V(X) + \frac{1}{2}V(Y) > Cov(X, Y)$

Saved at 23:26

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