9. Exercise: Definition of independence

Exercises due Mar 13, 2020 05:29 IST *Completed*

Exercise: Definition of independence

1/1 point (graded)

Suppose that X and Y are independent, with a joint PDF that is uniform on a certain set S: $f_{X,Y}(x,y)$ is constant on S, and zero otherwise. The set S

- must be a square.
- must be a set of the form $\{(x,y) : x \in A,\ y \in B\}$ (known as the Cartesian product of two sets A and B).
- can be any set.

Solution:

Let A be the set of all x on which $f_X(x)$ is positive and let B be the set of all y on which $f_Y(y)$ is positive. Then, the set S, on which $f_{X,Y}(x,y) = f_X(x)\, f_Y(y) > 0$, will be the Cartesian product of A with B; it is not necessarily a square, but it cannot be an arbitrary set.

Submit You have used 2 of 2 attempts

Answers are displayed within the problem

Discussion

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Topic: Unit 5: Continuous random variables:Lec. 10: Conditioning on a random variable; Independence; Bayes' rule / 9. Exercise: Definition of independence

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- Can S be a circle (as per the answer)?
  The answer states : Let A be the set of all x on which fX(x) is positive and let B be the set of all y on which ... — 3
- Can someone provide an example of an arbitrary set that cannot be S?
  The answer says: "Let A be the set of all x on which fX(x) is positive and let B be the set of all y on which f... — 2
- Watch Unit 5, Lecture 9, Video "14. From the joint to the marginal"
  and think about what independence means. — 1 new — 3