3. Exercise: Conditional PDF

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

Exercise: Conditional PDF

2/2 points (graded)

The random variables X and Y are jointly continuous, with a joint PDF of the form

$$f_{X,Y}(x,y) = \begin{cases} cxy, & \text{if } 0 \le x \le y \le 1, \\ 0, & \text{otherwise,} \end{cases}$$

where c is a normalizing constant.

a) Is it true that $f_{X|Y}(2 \mid 0.5)$ is equal to zero?

Yes ✔ **Answer:** Yes

b) Is it true that $f_{X|Y}(0.5 \mid 2)$ is equal to zero?

No ✔ **Answer:** No

Solution:

a) Values of Y around 0.5 have positive probability, so that $f_Y(0.5) > 0$, and $f_{X|Y}(2 \mid 0.5)$ is therefore well-defined. But $x = 2$ is outside the range of values of X, and $f_{X,Y}(2, 0.5) = 0$, from which it follows that $f_{X|Y}(2 \mid 0.5) = 0$.

b) Since $y = 2$ is outside the range of values of Y, we have $f_Y(2) = 0$, and the conditional PDF $f_{X|Y}(0.5 \mid 2)$ is undefined.

You have used 1 of 1 attempt

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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 / 3. Exercise: Conditional PDF

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- item b is ambiguous — 4 new
  It would have been clearer to have an option "undefined" rather than just "yes" or "no". It's neither equal...
- The probability of a point in continuous case — 2
  Shouldn't any given point have 0 probability for any continuous PDF?
- re: item b — 7
  the conditional is not well defined, right? better to have that as a separate option, perhaps?
- I get it, but with another approch — 1
  I just look at the definition function stating that X should be minus or equal to Y
- Do we need to find C? — 3
  Do we need to find C or do any calculations before answering? Or is this just a conceptual question?