3. Exercise: Conditional PDF

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.

提交 You have used 1 of 1 attempt

ℹ Answers are displayed within the problem

讨论

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Lost in the other dimension

discussion posted about 17 hours ago by **chechir**

Hi, i{m a bit lost lost and perhaps tired too, so forgive me for this silly question.

I just want to get the value of c here, so, I{m doing the double integration, first I integrate for dx and then integrate the resulting expression respect to dy 1. The limits I used in the intgration are 0 and y for the first integral, and then 1 and x for the second one... So, the result for my integration is c*((1-x**4)/8).... what I am doing wrong? How can I get the value of c in this case?

此帖对所有人可见。

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1 response

markweitzman (Community TA)
about 17 hours ago

$$\int_0^1 \left(\int_0^y cxy\,dx\right) dy = \int_0^1 \left(\frac{cx^2y}{2}\Big|_0^y\right) dy = \int_0^1 \frac{cy^3}{2} dy = \frac{cy^4}{8}\Big|_0^1 = \frac{c}{8}.$$

And yes I should use a different dummy variable for y in the integral but lets not get too pedantic.

Thanks! I think I get a bit confused because in my view the limits for the external integral should be x and 1... given this rule: x<=y, you see that the value of y doesn't get to be lower than x ... Please can you explain a bit further why the limit is 0 and 1 for the external integral?

chechir 在about 4 hours ago前发表

You can also write the integral as:

$$\int_0^1 \left(\int_x^1 cxy\,dy\right) dx.$$

markweitzman (Community TA) 在about 4 hours ago前发表

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