13. Exercise: From joint PDFs to probabilities

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

Exercise: From joint PDFs to probabilities

8/8 points (graded)

a) The probability of the event that $0 \leq Y \leq X \leq 1$ is of the form $\int_a^b \left(\int_c^d f_{X,Y}(x,y)\, dx \right) dy$.

Find the values of a, b, c, d. Each one of your answers should be one of the following: 0, x, y, or 1.

$a =$ 0 ✔ **Answer:** 0

$b =$ 1 ✔ **Answer:** 1

$c =$ y ✔ **Answer:** y

$d =$ 1 ✔ **Answer:** 1

b) The probability of the event that $0 \leq Y \leq X \leq 1$ is also of the form $\int_a^b \left(\int_c^d f_{X,Y}(x,y)\, dy \right) dx$. Note the different order of integration as compared to part (a).

Find the values of a, b, c, d. Each one of your answers should be one of the following: 0, x, y, or 1.

$a =$ 0 ✔ **Answer:** 0

$b =$ 1 ✔ **Answer:** 1

$c =$ 0 ✔ **Answer:** 0

$d =$ x ✔ **Answer:** x

Solution:

a) For any given $y \in [0,1]$, x ranges from y to 1, yielding $\int_0^1 \int_y^1 f_{X,Y}(x,y)\, dx\, dy$.

b) For any given $x \in [0,1]$, y ranges from 0 to x, yielding $\int_0^1 \int_0^x f_{X,Y}(x,y)\, dy\, dx$.

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

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- Hint: to solve this, draw a 3d graph. — Even 2d will suffice, but with 3d you will understand what's going on by adding "slices" of the resulting v... — 2
- Wording — I read this (the first time) as the answers 0,1, x, y all had to be used, but I was sure my answers were corr... — 1 new
- ? Do not understand the solution for c in Q1 and d in Q2 — 4
- question — for the first part, if y is between 0 & X, then how come the integral is from 0 to 1 ? — 3
- Additional MIT resource - builds out intuition and how to set up these calculations — I found this very helpful, others may as well: https://ocw.mit.edu/courses/mathematics/18-05-introducti... — 8