16. Exercise: Continuous probability calculations

Exercises due Feb 5, 2020 05:29 IST   *Completed*

Exercise: Continuous probability calculations

3/3 points (graded)

Consider a sample space that is the rectangular region $[0, 1] \times [0, 2]$, i.e., the set of all pairs (x, y) that satisfy $0 \le x \le 1$ and $0 \le y \le 2$. Consider a "uniform" probability law, under which the probability of an event is half of the area of the event. Find the probability of the following events:

a) The two components x and y have the same values.

| 0 | ✔ **Answer:** 0 |

b) The value, x, of the first component is larger than or equal to the value, y, of the second component.

| 1/4 | ✔ **Answer:** 0.25 |

c) The value of x^2 is larger than or equal to the value of y.

| 1/6 | ✔ **Answer:** 0.16667 |

Solution:

a) This event is a line, and since a line has zero area, the probability is zero.

b) This event is a triangle with vertices at $(0, 0)$, $(1, 0)$, $(1, 1)$. Its area is $1/2$, and therefore the probability is $1/4$.

c) This event corresponds to the region below the curve $y = x^2$, where x ranges from 0 to 1. The area of this region is

$$\int_0^1 x^2 \, dx = \left.\frac{x^3}{3}\right|_0^1 = \frac{1}{3},$$

and therefore the corresponding probability is $1/6$.

Submit   You have used 2 of 5 attempts

🛈 Answers are displayed within the problem

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? **Question C**   2
The solution says the prob is, of course, the integral from (0,1) of x^2dx. In the solution, that is shown...

💬 **Line vs Area Probability**   4
Hello, could someone (from the staff maybe?) elaborate on the difference between a line and area in ...

☑ **Do we need to know calculus for this course?**   12
SOme people are talking about integration. Do we need that?

? **Did I get it right?**   5
So, by solving this problems I realized that Probability is equal to the Area multiplied by '1/2'. Therefo...

? **I can't submit my answers**   1 new_   3
please help me submit my answers

? **Can someone explain the solution for part c?**   2
I am not able to grasp how does y = x^2 such that x>=y is equal to computing area/2.0.

💬 **Hello, from 18.01x MITx course :)**   4
Solving the 3-rd question, I applied the lessons from 18.01x which has finished just now. Cool!

Shouldn´t the description of the "Rectangular Region" be [1,0]x[0.2] instead of [0,1]x[0.2] ?

The description if confusing.

2

Video on Integration for Question c)

Hi all, in case you need help with the integration without having to go to wolframalpha: https://www.y...

2

The sample Space is already including the probability relation P=1/2*Area

One could misinterpret the second "consider" as suggesting to add this condition in addition to the gi...

4

Steps I took on solving Question C

Placed the Equation in the Question in https://www.wolframalpha.com/ to identify what type of area i...

4

The answers here suggest a unit square, don't they?

7

? Confusion in part b&c

6