15. Exercise: A function of multiple r.v.'s

Exercises due Mar 25, 2020 05:29 IST *Completed*

Exercise: A function of multiple r.v.'s

2/2 points (graded)

Suppose that X and Y are described by a joint PDF which is uniform inside the unit circle, that is, the set of points that satisfy $x^2 + y^2 \leq 1$. In particular, the joint PDF takes the value of $1/\pi$ on the unit circle. Let $Z = \sqrt{X^2 + Y^2}$, which is the distance of the outcome (X, Y) from the origin. The PDF of Z, for $z \in [0, 1]$, takes the form $f_Z(z) = az^b$. Find a and b.

$a =$ 2 ✔ **Answer:** 2

$b =$ 1 ✔ **Answer:** 1

Solution:

Note that the set of points that satisfy $x^2 + y^2 \leq z^2$ is a circle of radius z, has area πz^2, and probability z^2. Therefore,

$$F_Z(z) = \mathbf{P}(Z \leq z) = \mathbf{P}(X^2 + Y^2 \leq z^2) = z^2,$$

from which it follows that $f_Z(z) = 2z$.

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

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?	Why can't I enter the answer? My answer is a = 2, b = 1. But when I typed in, the error message popped up " invalid syntax", then "C...	6
?	What is Z? Is Z the distance from the center of the circle to the circumference or to any point (x,y) Within the unit...	2
💬	clarification on 1/pi I'm failing to see why the PDF "takes on the value of 1/pi on the unit circle". If x^2 + y^2 = 1 on the circ...	7
💬	A funny way to do this (or is that what I was supposed to do?) Think about what the CDF of Z would be within the unit circle (e.g. what is the formula for the area of ...	5 new
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?	Interpretation of Probability of Z Can the probability of z interpreted as the volume of cylinder with an base area of pi*z*z and height (...	1
💬	Just funny thoughts-ignore if you don't have the time My reactions and steps when solving a math problem in this course: - panic - no idea so repeatedly re...	7
💬	Can't see the problem Dear staff, I enter value for a and b, I can no longer see the question nor the answer. This has kept ha...	2
?	Exercise 15 Hello staff, I am not completely clear about the answer provided. Should the probability of Z represen...	4
☑	A little guidance Hi! I have taken a few different approaches. I re-watched the video. I would appreciate any informatio...	3
💬	any suggestions on how to approach this problem? any suggestions on how to approach this problem?	4
?	The Z set points [0,1] Shouldn't be half the area of the circle, due to the points of z for fz the problem is asking about?	4