



3. Exercise: PDFs

Exercises due Mar 13, 2020 05:29 IST Completed

Exercise: PDFs

4/4 points (graded)

Let X be a continuous random variable with a PDF of the form

$$f_X(x) = \begin{cases} c(1-x), & \text{if } x \in [0, 1], \\ 0, & \text{otherwise.} \end{cases}$$

Find the following values.

1.

$c =$

2

✓ Answer: 2

2.

$\mathbf{P}(X = 1/2) =$

0

✓ Answer: 0

3.

$\mathbf{P}(X \in \{1/k : k \text{ integer}, k \geq 2\}) =$

0

✓ Answer: 0

4.

$\mathbf{P}(X \leq 1/2) =$

3/4

✓ Answer: 0.75

Solution:

1.



We have $1 = \int_{-\infty}^{\infty} f_X(x) dx = \int_0^1 c(1-x) = c(x - x^2/2) \Big|_0^1 = c/2$, and therefore, $c = 2$.

2. Individual points have zero probability.

3. Using countable additivity and the fact that single points have zero probability, we

$$\text{have } \mathbf{P}(X \in \{1/2, 1/3, 1/4, 1/5, \dots\}) = \sum_{n=2}^{\infty} \mathbf{P}(X = 1/n) = \sum_{n=2}^{\infty} 0 = 0.$$

$$4. \mathbf{P}(X \leq 1/2) = \int_{-\infty}^{1/2} f_X(x) dx = \int_0^{1/2} 2(1-x) dx = 2(x - x^2/2) \Big|_0^{1/2} = \frac{3}{4}.$$

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You have used 3 of 3 attempts

i Answers are displayed within the problem

Discussion

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Topic: Unit 5: Continuous random variables:Lec. 8: Probability density functions / 3. Exercise: PDFs

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Refresher in integrals, primitives etc ?

3

Hi, Anyone has a link to a good refresher course in integral, primitives calculus etc? Thank you !



Any hint for #3

4

Still not sure how solve this.. Any hint will be appreciated.



Translation

11



Still scratching my head about #3...

3

I got it right in the end, but... how come that the sum of infinitely many countable point-probabilities o...



difference between 3 and 4

3 new_ 7



Integration

6

I thought the integration of 1 and integration of x have to have a constant added to them. Isn't that corr...



? [STAFF] Verical line notation

14

I have never seen the notation in the solutions to answers 1 and 4 with the long vertical line. What does i...

🗨 probability of rational and irrational numbers

4

🗨 exam

3

I missed the date of exam. How can i see the questions given in exam and also solutions?

? [staff] Sign of c

4

🗨 Continuous function

6 new_

While X is a continuous random variable, $f(x)$ is not continuous. I found a value for c that makes $f(x)$ conti...

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