



<u>Course</u> > <u>Unit 5:</u> ... > <u>Lec. 8:</u> ... > 3. Exer...

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

$$f_{X}\left(x
ight)=\left\{egin{array}{ll} c\left(1-x
ight), & ext{if }x\in\left[0,1
ight], \ 0, & ext{otherwise.} \end{array}
ight.$$

Find the following values.

1.
$$c = \boxed{ 2 } \qquad \qquad \checkmark \text{ Answer: 2}$$

2. $\mathbf{P}\left(X=1/2\right)= \boxed{0} \qquad \qquad \blacktriangleleft \text{Answer: 0}$

3.
$$\mathbf{P} \big(X \in \{1/k : k \text{ integer}, \, k \geq 2 \} \big) = \boxed{\hspace{1cm} \texttt{0}} \hspace{1cm} \blacktriangleleft \hspace{1cm} \mathsf{Answer} \text{: 0}$$

Solution:

1.



We have
$$1=\int_{-\infty}^{\infty}f_X\left(x\right)\,dx=\int_0^1c\left(1-x\right)=c\left(x-x^2/2\right)\Big|0_1=c/2,$$
 and therefore, $c=2.$

- 2. Individual points have zero probability.
- 3. Using countable additivity and the fact that single points have zero probability, we have $\mathbf{P}ig(X \in \{1/2, 1/3, 1/4, 1/5, \ldots\}ig) = \sum_{n=0}^{\infty} \mathbf{P} \left(X = 1/n\right) = \sum_{n=0}^{\infty} 0 = 0.$

$$^{4.}\mathbf{P}\left(X\leq 1/2
ight) =\int^{1/2}f_{X}\left(x
ight) \,dx=\int_{0}^{1/2}2\left(1-x
ight) \,dx=2\left(x-x^{2}/2
ight) \Bigert 0_{1/2}=rac{3}{4}.$$

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You have used 3 of 3 attempts

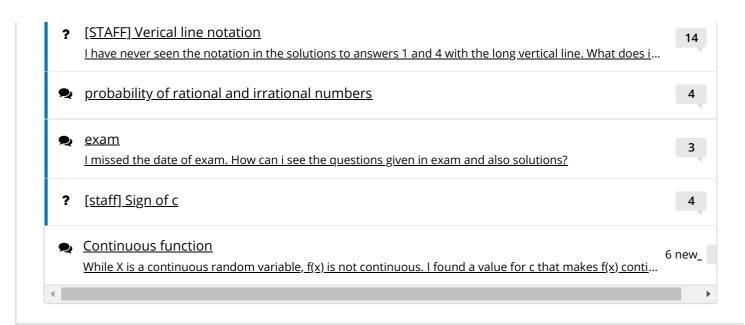
1 Answers are displayed within the problem

Discussion

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

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Q		integrals, primitives etc? s a link to a good refresher course in integral, primitives calculus etc? Thank you!		3
2	Any hint for Still not sure h	#3 ow solve this Any hint will be appreciated.		4
∀	<u>Translation</u>			11
Q		ng my head about #3 the end, but how come that the sum of infinitely many countable point-probabi	lities o	3
∀	difference be	etween 3 and 4	3 new_	7
2	Integration I thought the in	ntegration of 1 and integration of x have to have a constant added to them. Isn't tha	at corr	6



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