7. Exercise: Uniform PDF

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

Exercise: Uniform PDF

3/3 points (graded)

Let X be uniform on the interval $[1,3]$. Suppose that $1 < a < b < 3$. Then,

(a) $\mathbf{P}(a \leq X \leq b) =$ (b-a)/2 ✔ **Answer:** (b-a)/2 (Your answer to part (a) should be an algebraic expression involving a and b.)

(b) $\mathbf{E}[X] =$ 2 ✔ **Answer:** 2

(c) $\mathbf{E}[X^3] =$ 10 ✔ **Answer:** 10

Solution:

(a) The value of the PDF on the interval $[1,3]$ must be equal to 1/2, so that it integrates to 1. Thus, $\mathbf{P}(a \leq X \leq b) = \int_a^b \frac{1}{2}\,dx = \frac{b-a}{2}$.

(b) The expected value of a uniform is the midpoint of its range: $\mathbf{E}[X] = (1+3)/2 = 2$.

(c) Using the expected value rule,

$$\mathbf{E}[X^3] = \int_1^3 x^3 \cdot \frac{1}{2}\,dx = \frac{1}{2}\cdot\frac{1}{4}x^4\Big|_1^3 = \frac{1}{2}\cdot\frac{1}{4}\cdot(81-1) = 10.$$

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 5: Continuous random variables:Lec. 8: Probability density functions / 7. Exercise: Uniform PDF

Show all posts | by recent activity

?	Q3 pictorially Hi I got all the answers right mathematically but I can't understand the last question intuitively, is there s...	8
	Pedantic Semantics The semantics here still throws me off.. "Let X be uniform on the interval [1,3]" Maybe I'm fastidious, but,...	2
	Q1 Some hints for question 1	2
?	Why The value of the PDF on the interval [1,3] must be equal to 1/2 Anyone could explain to me this fact? I do not manage to get it. Thank you!	2
?	What is the shape of f_{X^3}	4
	Hint: watch the next video first If you're struggling with this I recommend having a look at the next video first.	4 new 8