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## 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)  $\mathbf{P}(a \le X \le b) = \boxed{\text{(b-a)/2}}$   $\checkmark$  Answer: (b-a)/2 (Your answer to part (a) should be an algebraic expression involving a and b.)
- (b)  $\mathbf{E}\left[X\right]=$  2  $\checkmark$  Answer: 2
- (c)  $\mathbf{E}[X^3] = \boxed{10}$   $\checkmark$  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, 
$$\mathbf{P}\left(a \leq X \leq b
ight) = \int_a^b rac{1}{2} \, dx = rac{b-a}{2}.$$

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

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

Submit

You have used 2 of 3 attempts

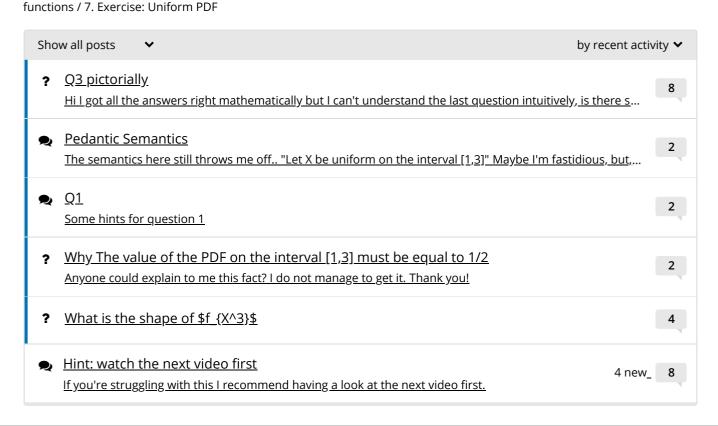


**1** Answers are displayed within the problem

## Discussion

**Hide Discussion** 

**Topic:** Unit 5: Continuous random variables:Lec. 8: Probability density



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