



16. Exercise: Moments of the Beta distribution

Exercises due Apr 8, 2020 05:29 IST Completed

Exercise: Moments of the Beta distribution

2/2 points (graded)

Suppose that Θ takes values in $[0, 1]$ and its PDF is of the form

$$f_{\Theta}(\theta) = a\theta(1 - \theta)^2, \quad \text{for } \theta \in [0, 1],$$

where a is a normalizing constant.

Use the formula

$$\int_0^1 \theta^{\alpha} (1 - \theta)^{\beta} d\theta = \frac{\alpha! \beta!}{(\alpha + \beta + 1)!}$$

to find the following:

a) $a =$ ✓ Answer: 12

b) $\mathbf{E}[\Theta^2] =$ ✓ Answer: 0.2

Solution:



a) Let $I(\alpha, \beta)$ be the integral in the formula given in the problem statement. The normalizing constant must be equal to $1/I(1, 2)$: this is needed for the PDF to integrate to 1. We have $I(1, 2) = 2!/4! = 1/12$, so that $a = 12$.

b)

$$\mathbf{E}[\Theta^2] = \int_0^1 \theta^2 f_{\Theta}(\theta) d\theta = \int_0^1 a\theta^3 (1-\theta)^2 d\theta = a \cdot I(3, 2) = 12 \cdot \frac{3! 2!}{6!} = \frac{1}{5}.$$

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You have used 2 of 3 attempts

i Answers are displayed within the problem

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? part b answer is NOT Correct

3!2!/6!= 0.0167 NOT 0.2. The answer for part b is not Correct!!!!

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💬 Confused about a normalizing constant.

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✓ Big Theta's Second Moment

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? What is Capital I, and where is $I(1,2)$ come from

I am kind of confusing about the answer of Part a, can someone explain more about part a, I didn't see a...

2

? (Staff) Moments?

Although this problem can be solved based on the coverage in previous lecture, I could not understand ...

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