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9. Exercise: A simple CI

Exercises due May 1, 2020 05:29 IST Completed

Exercise: A simple CI

1/2 points (graded)

Let heta be an unknown parameter, and let X be uniform on the interval [heta-0.5, heta+0.5] .

Is [X-2,X+2] an 80% confidence interval?



I form a confidence interval of the form [X-a,X+a]. What is the narrowest confidence interval of this type (i.e., what is the smallest possible choice of a) if I want to have an 80% confidence interval?

$$a = \begin{bmatrix} -0.5 \end{bmatrix}$$
 X Answer: 0.4

Solution:

 $\mathbf{P}(X-2 \le \theta \le X+2) = \mathbf{P}(\theta-2 \le X \le \theta+2) = 1 \ge 0.80$, and therefore, it is a 80% confidence interval, although, admittedly not a very intelligent one.

Note that ${f P}(X-a\leq \theta\leq X+a)={f P}(\theta-a\leq X\leq \theta+a)=2a$, for $a\in [0,0.5]$. In order to have an 80% confidence interval, I need $2a\geq 0.8$ or $a\geq 0.4$. Therefore, the smallest possible choice of a is 0.4.

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You have used 3 of 3 attempts

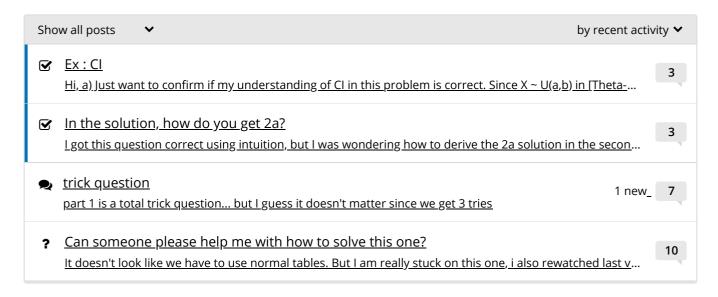
1 Answers are displayed within the problem



Discussion

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Topic: Unit 8: Limit theorems and classical statistics:Lec. 20: An introduction to classical statistics / 9. Exercise: A simple CI



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