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Exercise: A simple CI

(1/2 points)

Let θ be an unknown parameter, and let X be uniform on the interval $[\theta - 0.5, \theta + 0.5]$.

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

Yes ▾   ✔   **Answer:** Yes

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?

0.5   ✖

$a =$ **Answer:** 0.4

Answer:

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

Note that $\mathbf{P}(X - a \leq \theta \leq X + a) = \mathbf{P}(\theta - a \leq X \leq \theta + a) = 2a$, 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.

You have used 1 of 1 submissions

Solved problems

Additional theoretical material

Problem Set 8

Problem Set 8 due Apr 27, 2016 at 23:59 UTC

Unit summary

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