



MITx: 6.041x Introduction to Probability - The Science of Uncertainty



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Exercise: CI's via the CLT

(2/2 points)

The sample mean estimate $\hat{\Theta}$ of the mean of a random variable with variance 1, based on 100 samples, happened to be 22. The 80% confidence interval provided by the CLT is of the form $[a, b]$, with:

 $a =$ Answer: 21.872 $b =$ Answer: 22.128


Your answers should include at least 2 decimal digits.

You may want to refer to the normal table . For your reference, if we had 95% instead of 80%, the confidence interval would be of the form


- ▶ Unit 6: Further topics on random variables
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Unit overview


Lec. 18: Inequalities, convergence, and the Weak Law of Large Numbers

Exercises 18 due Apr 27, 2016
at 23:59 UTC 

Lec. 19: The Central Limit Theorem (CLT)

Exercises 19 due Apr 27, 2016
at 23:59 UTC 

Lec. 20: An introduction to classical statistics

Exercises 20 due Apr 27, 2016
at 23:59 UTC 

$$\left[\hat{\Theta} - \frac{1.96\sigma}{\sqrt{n}}, \hat{\Theta} + \frac{1.96\sigma}{\sqrt{n}} \right].$$

Answer:

The number 1.96 for the 95% confidence interval was chosen because we wanted to have 2.5% probability at either tail of the normal, and using the fact $\Phi(1.96) = 0.975$. In this case, we want to have 10% probability at each tail, and we need to find a value z such that $\Phi(z) = 0.9$. From the normal table, the closest choice is $z = 1.28$. We therefore obtain


$$\left[\hat{\Theta} - \frac{1.28\sigma}{\sqrt{n}}, \hat{\Theta} + \frac{1.28\sigma}{\sqrt{n}} \right],$$

or

$$[22 - 1.28/10, 22 + 1.28/10] = [21.872, 22.128].$$

You have used 1 of 2 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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