3. Exercise: CLT

Exercises due May 1, 2020 05:29 IST   *Completed*

Exercise: CLT

2/2 points (graded)

Let X_n be i.i.d. random variables with mean zero and variance σ^2. Let $S_n = X_1 + \cdots + X_n$. Let Φ stand for the standard normal CDF. According to the central limit theorem, and as $n \to \infty$, $\mathbf{P}\left(S_n \leq 2\sigma\sqrt{n}\right)$ converges to $\Phi\left(a\right)$, where:

$a =$ [2]   ✔ **Answer: 2**

Furthermore,

$\mathbf{P}\left(S_n \leq 0\right)$ converges to: [0.5]   ✔ **Answer: 0.5**

(Here, enter the numerical value of the probability.)

Solution:

We have

$$\lim_{n\to\infty} \mathbf{P}\left(S_n \leq 2\sigma\sqrt{n}\right) = \lim_{n\to\infty} \mathbf{P}\left(\frac{S_n - 0}{\sigma\sqrt{n}} \leq 2\right) = \Phi\left(2\right).$$

Similarly,

$$\lim_{n\to\infty} \mathbf{P}\left(S_n \leq 0\right) = \lim_{n\to\infty} \mathbf{P}\left(\frac{S_n - 0}{\sigma\sqrt{n}} \leq 0\right) = \Phi\left(0\right) = \frac{1}{2}.$$

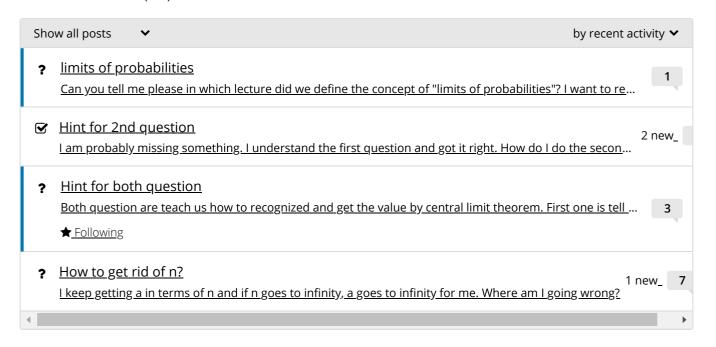| Submit	You have used 3 of 3 attempts

ℹ Answers are displayed within the problem

Discussion

Hide Discussion

Topic: Unit 8: Limit theorems and classical statistics:Lec. 19: The Central Limit Theorem (CLT) / 3. Exercise: CLT

Show all posts ⌄   by recent activity ⌄

? limits of probabilities   1
Can you tell me please in which lecture did we define the concept of "limits of probabilities"? I want to re...

☑ Hint for 2nd question   2 new_
I am probably missing something. I understand the first question and got it right. How do I do the secon...

? Hint for both question   3
Both question are teach us how to recognized and get the value by central limit theorem. First one is tell ...
★ Following

? How to get rid of n?   1 new_   7
I keep getting a in terms of n and if n goes to infinity, a goes to infinity for me. Where am I going wrong?