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7. Modes of convergence
Convergence in distribution

4/4 points (graded)
Let T_n be a sequence of random variables that converges to $\mathcal{N}(0,1)$ in distribution. What family of distribution does the limit of $2T_n + 1$ belong to?

○ χ^2 distribution

◉ Normal distribution

✔

Call this limit Y. Compute:

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$$\mathbb{E}[Y] = \boxed{1} \quad \checkmark$$

$$\mathrm{Var}[Y] = \boxed{4} \quad \checkmark$$

Let Φ be the cumulative distribution function (cdf) of the standard Gaussian distribution. In terms of Φ, what is the limit, as $n \to \infty$, of $\mathbf{P}\left(|T_n + 2| \le 8\right)$?

(Write Phi, with capital P, for Φ).

Phi(6)-Phi(-10) $\checkmark$

STANDARD NOTATION

Submit   You have used 3 of 3 attempts

✔ Correct (4/4 points)

Convergence in probability and variance

3/3 points (graded)

For $n \ge 2$, let X_n be a random variable such that $\mathbf{P}\left(X_n = \dfrac{1}{n}\right) = 1 - \dfrac{1}{n^2}$ and $\mathbf{P}\left(X_n = n\right) = \dfrac{1}{n^2}$.

Does X_n converge in probability? If yes, enter the value of the limit; if no, enter DNE.

$$X_n \xrightarrow[n \to \infty]{\mathbf{P}} \boxed{0} \quad \checkmark$$

0

Generating Speech Output $\lim_{n \to \infty} \mathbb{E}[X_n]$ and $\lim_{n \to \infty} \mathrm{Var}(X_n)$. Enter DNE if the limit diverges or does not exist.

$$\lim_{n\to\infty} \mathbb{E}\left[X_n\right] =$$
| 0 |

| 0 | ✔

$$\lim_{n\to\infty} \text{Var}\left(X_n\right) =$$
| 1 | ✔

| 1 |

STANDARD NOTATION

Submit   You have used 1 of 3 attempts

✔ Correct (3/3 points)

Modes of convergence

3/3 points (graded)

Let X_n and Y_n be two sequences of random variables. For each of the following statement, say whether it is true or false. When your answer is "false", try to think of a counter example.

1. If $X_n \xrightarrow[n\to\infty]{\text{a.s.}} X$ and $Y_n \xrightarrow[n\to\infty]{\text{a.s.}} Y$, then $X_n + Y_n \xrightarrow[n\to\infty]{\text{a.s.}} X + Y$.

- ● True

- ○ False

✔

2. If $X_n \xrightarrow[n\to\infty]{\mathbf{P}} X$ and $Y_n \xrightarrow[n\to\infty]{\mathbf{P}} Y$, then $X_n + Y_n \xrightarrow[n\to\infty]{\mathbf{P}} X + Y$.

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⦿ True

○ False

✔

3.

If $X_n \xrightarrow[n\to\infty]{(d)} X$ and $Y_n \xrightarrow[n\to\infty]{(d)} Y$, then $X_n + Y_n \xrightarrow[n\to\infty]{(d)} X + Y$.

○ True

⦿ False

✔

Submit	You have used 1 of 1 attempt

✔ Correct (3/3 points)

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Topic: Unit 2 Foundation of Inference:Homework 1: Estimation, Confidence Interval, Modes of Convergence / 7. Modes of convergence

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☑ Does subscript in the random variable have a special meaning?	5
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re some examples for this. I just don't get get this question. Was this type of question covered?

💬 <u>What do the first parts of Question 1 have to do with the last box</u>

    <u>Am I missing something?</u>

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