8. Some examples of convergence

Rescaled Poisson random variables

2/2 points (graded)

For $n \geq 1$, let X_n be a Poisson random variable with parameter $1/n$. Compute

$\mathbf{P}(X_n = 0) =$ exp(-1/n) ✔

$\exp\left(-\frac{1}{n}\right)$

What can you conclude?

- $X_n \to 0$ in probability, but nX_n does not converge in probability

- $X_n \to 0$ in probability, $nX_n \to 0$ in probability, and $\mathbb{E}\left[(nX_n)^2\right]$ converges.
- ✔ $X_n \to 0$ and $nX_n \to 0$ in probability, but $\mathbb{E}\left[(nX_n)^2\right]$ does not converge.

STANDARD NOTATION

Submit You have used 2 of 2 attempts

✔ Correct (2/2 points)

Limit of rescaled Binomials

1.0/1 point (graded)

Let X_n be a binomial random variable with parameters n and $p = \lambda/n$, where λ is a fixed positive number.

Let $k \in \mathbb{N}$ be fixed. As $n \to \infty$, the probability mass function $\mathbf{P}(X_n = k)$ converges to a number that only depends on λ and k. What is the limit?

(If necessary, enter **fact** to indicate the factorial function. For instance, **fact(10)** denotes $10!$. Note that **fact(10)** may not be rendered correctly by the parser, but do not worry, the grader will work independently. If you want proper rendering, enclose the factorial by extra parentheses, i.e. **(fact(10))**.

$\lim_{n\to\infty} \mathbf{P}(X_n = k) =$ exp(-lambda) * (lambda^k) / (fact(k)) ✔

(*Food for thought:* What can you conclude?)

STANDARD NOTATION

You have used 1 of 3 attempts

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[STAFF] Please consider to extend the due date of course by some days. Dear Staff I completed 6.431x then enrolled in 14.310x and 18.6501 and now am lacking in the course. Now it seems that am doing course for sake of certificate but I don't wa...	5
[Staff] I think fact(number or variable) does not properly expressed. I entered fact(variable) in the answer, but I think factorial was not properly expressed. Could you please check my answer?	7
"Food for thought" in the last question "Food for thought" note in the last question makes me think that we are supposed to derive the solution rather than know it (thank goodness, it was covered in 6.431x). Hats ...	4

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