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Courses » Advanced Topics in Probability and Random Processes

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Unit 6 - Week 5: Markov Chain

Assignment 5

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2018-09-12, 23:59 IST.

1) Suppose $X_n, n = 1, 2, 3, \ldots\ldots, 100$ are 100 independent random numbers, each uniformly distributed between 0 to 6. According to the weak law of large numbers, the approximate value of $\sum_{i=1}^{100} \frac{X_i^2}{100}$ is *1 point*

- 3
- 6
- 9
- 12

No, the answer is incorrect.
Score: 0

Accepted Answers:
12

2) Suppose X_n is a sequence of independent and identically distributed random variables with $P(X_n = -1) = P(X_n = 1) = \frac{1}{4}$ and $P(X_n = 0) = \frac{1}{2}$. *1 point*

Define $\mu_n = \frac{1}{n} \sum_{i=1}^{n} X_i$ .According to the strong law of the large numbers, as $n \to \infty$

- $\{\mu_n\} \xrightarrow{\text{a.s.}} \{\mu = 0\}$
- $\{\mu_n\} \xrightarrow{\text{a.s.}} \{\mu = \frac{1}{4}\}$
- $\{\mu_n\} \xrightarrow{\text{a.s.}} \{\mu = \frac{1}{\ldots}\}$

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Accepted Answers:
$\{\mu_n\} \xrightarrow{\text{a.s.}} \{\mu = 0\}$

3) Suppose S represents the total number of tails obtained in *100* independent tossing of a fair coin. According to the central limit theorem, the approximate value for $P(S \geq 60)$ is *1 point*

- $\frac{\int_2^\infty e^{\frac{-x}{2}}\,dx}{\sqrt{2\pi}}$
- $\frac{\int_2^\infty e^{\frac{-x^2}{2}}\,dx}{\sqrt{2\pi}}$
- $\frac{\int_1^\infty e^{\frac{-x^2}{2}}\,dx}{\sqrt{2\pi}}$
- $\frac{\int_2^\infty e^{\frac{-x^3}{2}}\,dx}{\sqrt{2\pi}}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\frac{\int_2^\infty e^{\frac{-x^2}{2}}\,dx}{\sqrt{2\pi}}$

4) X_n is a sequence of independent random variables with identical moment generating function $M_x(s) = e^{\frac{s^2}{2}}$. The variance of the random variable is *1 point*

- 1
- 0
- 2
- 5

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

5) X_n is a sequence of independent random variables with identical moment generating function $M_X(s) = e^{\frac{s^2}{2}}$ and $S_n = \sum_{i=1}^{n} X_i$. According to Cramer's theorem, the probability $P(\frac{S_n}{n} \geq 3)$ for large n is approximately equal to *1 point*

- $e^{\frac{-3n}{2}}$
- e^{-3n}
- $e^{\frac{-9n}{2}}$
- e^{-6n}

No, the answer is incorrect.

Score: 0

Accepted Answers:

$e^{\frac{-9n}{2}}$

6) X_n is a sequence of independent random variables with identical mean μ and identical variance σ^2 . If $S_n = \sum_{i=1}^{n} X_i$, then $E(\frac{S_n}{n})$ and $Var(\frac{S_n}{n})$ respectively are *1 point*

- μ and $\frac{\sigma^2}{n}$
- μ and σ^2
- μ and $\frac{\sigma^2}{\sqrt{n}}$
- μ^2 and σ^2

No, the answer is incorrect.
Score: 0

Accepted Answers:

μ and $\frac{\sigma^2}{n}$

7) Suppose X_n is a sequence of independent and identically distributed random variables with mean μ .
Define $\mu_n = \frac{1}{n} \sum_{i=1}^{n} X_i$. Then , according to CLT, μ_n is approximately distributed as *1 point*

- $N(\mu, \frac{\sigma^2}{n})$
- $N(\mu, \sigma^2)$
- $N(\mu, \frac{\sigma^2}{\sqrt{n}})$
- $N(\mu, \sigma)$

No, the answer is incorrect.
Score: 0

Accepted Answers:

$N(\mu, \frac{\sigma^2}{n})$

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