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Courses » Advanced Topics in Probability and Random Processes

Announcements **Course** Ask a Question Progress Mentor FAQ

Unit 6 - Week 5: Markov Chain

Course outline

How to access the portal

Week 1: Introduction to probability and Random Variable

Week 2: Random process basics and infinite sequence of events

Week 3: Convergence of Sequence of Random Variables

Week 4: Applications of Convergence Theory

Week 5: Markov Chain

Cramer's Theorem for Large Deviation

Introduction to Markov Processes

Discrete Time 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 $X_n, n = 1, 2, 3, \dots, 100$ 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 $n \rightarrow \infty$

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

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

$\{\mu_n\} \xrightarrow{\text{a.s.}} \{\mu = 1\}$

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Week 7:
Continuous
Time Markov
Chain

Week 8:
Martingale
Process

New Unit

Assignment
Solutions

Accepted Answers:

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

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

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

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

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

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

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 **1 point** generating function $M_x(s) = e^{\frac{s^2}{2}}$. The variance of the random variable is

 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 **1 point** 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 $P\left(\frac{S_n}{n} \geq 3\right)$ for large n is approximately equal to

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

$$e^{-3n}$$

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

$$e^{-6n}$$

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:**

$$\mu \text{ and } \frac{\sigma^2}{n}$$

7) Suppose X_n is a sequence of independent and identically distributed random variables with mean μ . **1 point**

Define $\mu_n = \frac{1}{n} \sum_{i=1}^n X_i$. Then, according to CLT, μ_n is approximately distributed as

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

$N(\mu, \sigma^2)$

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

$N(\mu, \sigma)$

No, the answer is incorrect.**Score: 0****Accepted Answers:**

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

Previous Page

End

