Options :

6406532306499. ✔ $\begin{bmatrix} 2 & 1 \\ 1 & -2 \end{bmatrix}$

6406532306500. ✖ $\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$

6406532306501. ✖ $\begin{bmatrix} 3 & -1 \\ 1 & 3 \end{bmatrix}$

6406532306502. ✖ $\begin{bmatrix} 1.5 & 0.5 \\ -0.5 & 1.5 \end{bmatrix}$

Question Number : 62 Question Id : 640653689466 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 1

Question Label : Multiple Choice Question

Is *T* an isomorphism?

Options :

6406532306503. ✔ Yes

6406532306504. ✖ No

Statistics2

Section Id :	64065348503
Section Number :	5
Section type :	Online
Mandatory or Optional :	Mandatory

Number of Questions :	12
Number of Questions to be attempted :	12
Section Marks :	40
Display Number Panel :	Yes
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653100813
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 63 Question Id : 640653689467 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "FOUNDATION LEVEL : STATISTICS FOR DATA SCIENCE II (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406532306505. ✔ YES

6406532306506. ✖ NO

Question Number : 64 Question Id : 640653689468 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

Discrete random variables:

Distribution	PMF ($f_X(k)$)	CDF ($F_X(x)$)	$E[X]$	$\mathrm{Var}(X)$
Uniform(A) $A=\{a,a+1,\ldots,b\}$	$\frac{1}{n},\ x=k$ $n=b-a+1$ $k=a,a+1,\ldots,b$	$\begin{cases}0 & x<0\\ \frac{k-a+1}{n} & k\le x<k+1\\ & k=a,a+1,\ldots,b-1,b\\ 1 & x\ge n\end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
Bernoulli(p)	$\begin{cases}p & x=1\\ 1-p & x=0\end{cases}$	$\begin{cases}0 & x<0\\ 1-p & 0\le x<1\\ 1 & x\ge 1\end{cases}$	p	$p(1-p)$
Binomial(n,p)	${}^nC_k p^k(1-p)^{n-k},$ $k=0,1,\ldots,n$	$\begin{cases}0 & x<0\\ \sum_{i=0}^{k}{}^nC_i p^i(1-p)^{n-i} & k\le x<k+1\\ & k=0,1,\ldots,n\\ 1 & x\ge n\end{cases}$	np	$np(1-p)$
Geometric(p)	$(1-p)^{k-1}p,$ $k=1,\ldots,\infty$	$\begin{cases}0 & x<0\\ 1-(1-p)^k & k\le x<k+1\\ & k=1,\ldots,\infty\end{cases}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson(λ)	$\frac{e^{-\lambda}\lambda^k}{k!},$ $k=0,1,\ldots,\infty$	$\begin{cases}0 & x<0\\ e^{-\lambda}\sum_{i=0}^{k}\frac{\lambda^i}{i!} & k\le x<k+1\\ & k=0,1,\ldots,\infty\end{cases}$	λ	λ

Continuous random variables:

Distribution	PDF ($f_X(k)$)	CDF ($F_X(x)$)	$E[X]$	Var(X)
Uniform$[a,b]$	$\frac{1}{b-a}$, $a \le x \le b$	$\begin{cases} 0 & x \le a \\ \frac{x-a}{b-a} & a < x < b \\ 1 & x \ge b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exp(λ)	$\lambda e^{-\lambda x}$, $x > 0$	$\begin{cases} 0 & x \le 0 \\ 1-e^{-\lambda x} & x > 0 \end{cases}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
Normal(μ, σ^2)	$\frac{1}{\sigma\sqrt{2\pi}} \exp\left(\frac{-(x-\mu)^2}{2\sigma^2}\right)$, $-\infty < x < \infty$	No closed form	μ	σ^2
Gamma(α, β)	$\frac{\beta^\alpha}{\Gamma(\alpha)} x^{\alpha-1} e^{-\beta x}$, $x > 0$		$\frac{\alpha}{\beta}$	$\frac{\alpha}{\beta^2}$
Beta(α, β)	$\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)} x^{\alpha-1}(1-x)^{\beta-1}$ $0 < x < 1$		$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$

1. **Markov's inequality:** Let X be a discrete random variable taking non-negative values with a finite mean μ. Then,

$$P(X \ge c) \le \frac{\mu}{c}$$

2. **Chebyshev's inequality:** Let X be a discrete random variable with a finite mean μ and a finite variance σ^2. Then,

$$P(|X-\mu| \geq k\sigma) \leq \frac{1}{k^2}$$

3. **Weak Law of Large numbers:** Let $X_1, X_2, \ldots, X_n \sim$ iid X with $E[X] = \mu, \text{Var}(X) = \sigma^2$.
Define sample mean $\overline{X} = \frac{X_1 + X_2 + \ldots + X_n}{n}$. Then,

$$P(|\overline{X} - \mu| > \delta) \leq \frac{\sigma^2}{n\delta^2}$$

4. **Using CLT to approximate probability:** Let $X_1, X_2, \ldots, X_n \sim$ iid X with $E[X] = \mu, \text{Var}(X) = \sigma^2$.
Define $Y = X_1 + X_2 + \ldots + X_n$. Then,

$$\frac{Y - n\mu}{\sqrt{n}\sigma} \approx \text{Normal}(0,1).$$

Useful data:

1. Use the following values of F_Z if required:
$F_Z\left(\frac{1}{\sqrt{5}}\right) = 0.67, F_Z\left(\frac{3}{\sqrt{5}}\right) = 0.91, F_Z(3) = 0.999, F_Z\left(\frac{-2}{\sqrt{5}}\right) = 0.19,$
$F_Z(0.2) = 0.58, F_Z(2) = 0.98$

Options :

6406532306507. ✔ Useful Data has been mentioned above.

6406532306508. ✖ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :	2
Sub-Section Id :	640653100814
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 65 Question Id : 640653689470 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let X be a continuous random variable with PDF

$$f_X(x) = \begin{cases} 4x^3, & 0 < x \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

Find the PDF of $Y = X^3$.

Options :

6406532306510. ✖

$$f_Y(y) = \begin{cases} \frac{1}{3}\left(\frac{y}{4}\right)^{1/3}, & 0 < y \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306511. ✔

$$f_Y(y) = \begin{cases} \frac{4}{3}(y)^{1/3}, & 0 < y \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306512. ✖

$$f_Y(y) = \begin{cases} \frac{1}{3}(y)^{1/3}, & 0 < y \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306513. ✖

$$f_Y(y) = \begin{cases} 4(y)^{1/3}, & 0 < y \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

Question Number : 66 Question Id : 640653689471 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Let $(X, Y) \sim \text{Uniform}(D)$, where $D := \{(x, y) : x + y < 3, x > 0, y > 0\}$. What is the marginal density function of $f_X(x)$?

Options :

6406532306514. ✔

$$f_X(x) = \begin{cases} \frac{2}{9}(3 - x), & 0 < x < 3, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306515. ✖ $$f_X(x) = \begin{cases} \frac{9}{2}(3-x), & 0 < x < 3, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306516. ✖ $$f_X(x) = \begin{cases} 9(3-x), & 0 < x < 3, \\ 0, & \text{otherwise.} \end{cases}$$

6406532306517. ✖ $$f_X(x) = \begin{cases} 2(3-x), & 0 < x < 3, \\ 0, & \text{otherwise.} \end{cases}$$

Question Number : 67 Question Id : 640653689473 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Suppose the moment generating function of a random variable X is given by

$$M_X(\lambda) = e^{2\lambda^2}$$

Let X_1, X_2, X_3, X_4 be i.i.d. samples with distribution X and Y be a random variable defined as $Y = X_1 + X_2 + X_3 + X_4$. Which of the following option is true?

Options :

6406532306519. ✖ $Y \sim \text{Normal}(0, 8)$

6406532306520. ✖ $Y \sim \text{Normal}(0, 4)$

6406532306521. ✖ $Y \sim \text{Normal}(0, 32)$

6406532306522. ✔ $Y \sim \text{Normal}(0, 16)$

Sub-Section Number : 3

Sub-Section Id : 640653100815

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 68 Question Id : 640653689469 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Suppose Manoj owns a lightbulb manufacturing company and determines that 3 out of every 75 bulbs are defective. What is the probability that he will find the first faulty bulb on the 6^{th} one that he tested? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.02 to 0.04

Question Number : 69 Question Id : 640653689472 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

A certain type of thread is manufactured with a mean tensile strength of 40 kilograms at a standard deviation of 5 kilograms. If the variance of the sample mean for a sample size of n_1 is 0.0625 and the variance of the sample mean for a sample size of n_2 is 0.0417, then find an approximate value for $n_2 - n_1$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

198 to 202

Sub-Section Number :	4
Sub-Section Id :	640653100816
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653689474 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (70 to 71)

Question Label : Comprehension

The probability mass function of a random variable X is given as

x	1	2	3	4	5
$P(X = x)$	k	$2k$	k^2	k^2	$2k^2$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 70 Question Id : 640653689475 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Find the value of *k*? Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.25

Question Number : 71 Question Id : 640653689476 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

What is the value of
$P(1 < X < 4 | X > 2)$?

Options :

6406532306524. ✖ $\frac{1}{16}$

6406532306525. ✖ $\frac{3}{4}$

6406532306526. ✔ $\frac{1}{4}$

6406532306527. ✖ $\frac{1}{2}$

Question Id : 640653689477 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (72 to 73)

Question Label : Comprehension

Let $X \sim \text{Uniform}[0, 5]$ and $g(x) = (x - 2)^2$. Define a new random variable $Y = g(X)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 72 Question Id : 640653689478 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Multiple Choice Question

Find the CDF of Y .

Options :

6406532306528. ✖ $F_Y(y) = \frac{2\sqrt{y}}{5},\ 0 \le y \le 9$

6406532306529. ✖ $F_Y(y) = \frac{\sqrt{y}}{3},\ 0 \le y \le 9$

6406532306530. ✔
$$F_Y(y) = \begin{cases} \frac{2\sqrt{y}}{5}, & 0 \le y \le 4 \\ \frac{2+\sqrt{y}}{5}, & 4 < y \le 9 \end{cases}$$

6406532306531. ✖
$$F_Y(y) = \begin{cases} \frac{3\sqrt{y}}{10}, & 0 \le y \le 4 \\ \frac{2\sqrt{y}-1}{5}, & 4 < y \le 9 \end{cases}$$

Question Number : 73 Question Id : 640653689479 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

Find $P(1 \leq Y \leq 6.25)$. Enter the answer correct to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Question Id : 640653689480 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (74 to 75)

Question Label : Comprehension

The joint density of two continuous random variables X and Y is given as

$$f_{XY}(x,y) = \begin{cases} e^{-(x+y)}, & 0 \leq x < \infty, 0 \leq y < \infty, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 74 Question Id : 640653689481 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Are *X* and *Y* independent?

Options :

6406532306533. ✔ Yes

6406532306534. ✖ No

Question Number : 75 Question Id : 640653689482 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Find the value of $P(X < Y)$.
Enter the answer correct to
one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Question Id : 640653689483 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (76 to 77)

Question Label : Comprehension

Let $X_1, X_2, \ldots, X_n \sim$ i.i.d. Exp(1/3) and $\overline{X} = \dfrac{X_1 + X_2 + \cdots + X_n}{n}$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 76 Question Id : 640653689484 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following inequalities are true w.r.t Chebyshev inequality?

Options :

6406532306536. ✔ $P\left(|\overline{X}-3| \geq 0.25\right) \leq \frac{144}{n}$

6406532306537. ✖ $P\left(|\overline{X}-3| \geq 0.5\right) \leq 1-\frac{144}{n}$

6406532306538. ✔ $P\left(|\overline{X}-3| \leq 0.5\right) \geq 1-\frac{36}{n}$

6406532306539. ✖ $P\left(|\overline{X}-3| \leq 0.25\right) \geq \frac{36}{n}$

Question Number : 77 Question Id : 640653689485 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Find the minimum value of *n* such that the sample mean lies in [2.5, 3.5] with probability more than 0.95 using the Chebyshev inequaliy.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

718 to 722

Question Id : 640653689486 Question Type : COMPREHENSION Sub Question Shuffling

Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (78 to 79)

Question Label : Comprehension

In a telecom system, each data file consists of 500 bits. Due to noise, each data bit received may have an error with probability 0.1. It is assumed that bit errors occur independently.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 78 Question Id : 640653689487 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Multiple Choice Question

Suppose *Y* represents the total number of bits without an error in a certain data file. Which of the following is true?

Options :

6406532306541. ✖ $Y \sim \text{Bernoulli}(0.9)$

6406532306542. ✖ $Y \sim \text{Bernoulli}(0.1)$

6406532306543. ✔ $Y \sim \text{Binomial}(500, 0.9)$

6406532306544. ✖ $Y \sim \text{Binomial}(500, 0.1)$

Question Number : 79 Question Id : 640653689488 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

Using Central limit theorem, find the approximate probability that there are more than 53 errors in a certain data file. Enter the answer correct to two decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.30 to 0.36

DBMS

Section Id :	64065348504
Section Number :	6
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	13
Number of Questions to be attempted :	13
Section Marks :	50
Display Number Panel :	Yes
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653100817
Question Shuffling Allowed :	No
Is Section Default? :	null