Question Number : 147 Question Id : 640653738271 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Consider the vectors $v_1 = (1, -1, 0)$, $v_2 = (2, 3, -1)$ and $v_3 = (a, b, c)$ in $\mathbb{R}^3$. Choose the correct options from the following.

Options :

6406532470522. ✖ If $a = 5, b = 0, c = -1$, then the set $\{v_1, v_2, v_3\}$ forms a basis for $\mathbb{R}^3$.

6406532470523. ✔ If $a = 5, b = 0, c = -1$, then the vectors $\{v_1, v_2, v_3\}$ are linearly dependent.

6406532470524. ✖ If $a = 5, b = 0, c = -1$ and A is the matrix with v_1, v_2 and v_3 as its columns, then $rank(A) = 3$.

6406532470525. ✔ If $a = 2, b = 3, c = 1$, then the subspace spanned by the vectors $\{v_1, v_2, v_3\}$ has dimension 3.

6406532470526. ✔ If $a = 2, b = 3, c = 1$ and A is the matrix with v_1, v_2 and v_3 as its columns, then A is invertible.

Sem2 Statistics2

Section Id :	64065351400
Section Number :	7
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
Section Negative Marks :	0
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 :	640653107952
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 148 Question Id : 640653738280 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 : SEMESTER II: 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 :

6406532470539. ✔ YES

6406532470540. ✖ NO

Question Number : 149 Question Id : 640653738281 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) $A=\{a,a+1,\ldots,b\}$	$\frac{1}{n}, \quad x=k$ $n=b-a+1$ $k=a,a+1,\ldots,b$	$\begin{cases} 0 & x<0 \\ \frac{k-a+1}{n} & k\le x<k+1 \\ & k=a,a+1,\ldots,b-1,b \\ 1 & x\ge n \end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
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 ($F_X(x)$)	$E[X]$	$\mathrm{Var}(X)$
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,
$$P(|X - \mu| \ge k\sigma) \le \frac{1}{k^2}$$

Options :

6406532470541. ✔ Useful Data has been mentioned above.

6406532470542. ✖ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number : 2

Sub-Section Id : 640653107953

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 150 Question Id : 640653738282 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

Naveen tosses a fair coin twice and Suman tosses another fair coin two times. Let the random variables X and Y denote the number of heads observed by Naveen and Suman respectively. Identify the correct joint PMF table of X and Y .

Options :

6406532470543. ✖

Y \ X	0	1	2
0	$\frac{1}{16}$	$\frac{1}{16}$	$\frac{1}{8}$
1	$\frac{1}{4}$	$\frac{1}{8}$	$\frac{1}{8}$
2	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$

6406532470544. ✔

Y \ X	0	1	2
0	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{16}$
1	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
2	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{16}$

6406532470545. ✖

Y \ X	0	1	2
0	$\frac{1}{8}$	$\frac{1}{4}$	$\frac{1}{8}$
1	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{16}$
2	$\frac{1}{16}$	$\frac{1}{8}$	$\frac{1}{16}$

6406532470546. ✖

Y \ X	1	2
1	$\frac{1}{4}$	$\frac{1}{4}$
2	$\frac{1}{4}$	$\frac{1}{4}$

Question Number : 151 Question Id : 640653738286 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 X and Y are independent random variables with means 10 and 20, and variances 2 and 4, respectively. Find the value of Var(XY).

Hint: If X and Y are independent, then X^2 and Y^2 are also independent.

Options :

6406532470552. ✖ 0

6406532470553. ✖ 40000

6406532470554. ✔ 1208

6406532470555. ✖ Cannot be determined

Question Number : 152 Question Id : 640653738288 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

The CDF of a random variable X is given as

$$F_X(x) = \begin{cases} 1 - e^{-4x}, & x \geq 0, \\ 0, & \text{otherwise.} \end{cases}$$

What is the value of $P(-4 < X \leq 6)$?

Options :

6406532470557. ✖ $e^{-20} - e^{-24}$

6406532470558. ✔ $1 - e^{-24}$

6406532470559. ✖ $e^{-24} - e^{-20}$

6406532470560. ✖ e^{-24}

Sub-Section Number :	3
Sub-Section Id :	640653107954
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653738283 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 : (153 to 154)

Question Label : Comprehension

An analyst is responsible for conducting emissions inspections on bikes. During the inspections, the analyst found that 10% of the bikes fail the inspection. Let *X* be a geometric variable which denotes the number of bikes the analyst inspects until a bike fails an inspection. Assume that the results of each inspection are independent.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 153 Question Id : 640653738284 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

What is the range of X?

Options :

6406532470547. ✖ $T_X = \{0, 1, 2, \ldots\}$

6406532470548. ✔ $T_X = \{1, 2, \ldots\}$

6406532470549. ✖ $T_X = \{1, 2, \ldots, 100\}$

6406532470550. ✖ $T_X = \{0, 1\}$

Question Number : 154 Question Id : 640653738285 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

What is the probability that the first failed inspection occurs on the analyst's 5^{th} inspection? Enter the answer correct to three decimal places.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.046 to 0.086

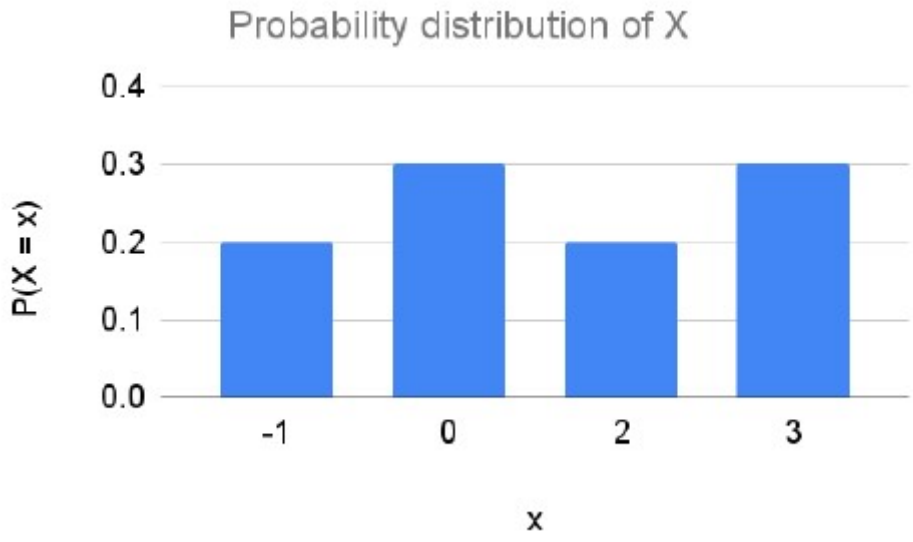
Sub-Section Number :	4
Sub-Section Id :	640653107955
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 155 Question Id : 640653738287 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

The probability distribution of a discrete random variable *X* is given as below:



Calculate the expected value of *X*. 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 :

1.1

Sub-Section Number :	5
Sub-Section Id :	640653107956
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653738289 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 : (156 to 157)

Question Label : Comprehension

Let X and Y be i.i.d. Uniform $\{-1, 0, 1\}$. Define a new random variable $Z = |X + Y|$, where $|\ .\ |$ denotes the absolute value.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 156 Question Id : 640653738290 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 PMF of *Z*.

Options :

6406532470561. ✖

z	0	1	2
$f(z)$	1/3	1/3	1/3

6406532470562. ✔

z	0	1	2
$f(z)$	1/3	4/9	2/9

6406532470563. ✖

z	0	1	2
$f(z)$	2/9	4/9	1/3

6406532470564. ✖

z	0	1
$f(z)$	1/2	1/2

Question Number : 157 Question Id : 640653738291 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 $P(X = 0 \mid Z = 1)$. Enter the answer correct to one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.4 to 0.6

Question Id : 640653738292 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 : (158 to 159)

Question Label : Comprehension

Kunal and Sanskriti are playing a game. Kunal will roll a fair six-sided die, and Sanskriti will flip a fair coin as many times as the number shown on the die. Let *X* represent the number displayed on the die, and *Y* represent the number of heads obtained by Sanskriti.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 158 Question Id : 640653738293 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

If $X = 5$, then which of the following options are true?

Options :

6406532470566. ✖ $\text{Range of } (Y|X=5) = \{1,2,3,4,5,6\}$

6406532470567. ✔ $\text{Range of } (Y|X=5) = \{0,1,2,3,4,5\}$

6406532470568. ✖ $(Y|X=5) \sim \text{Binomial}\left(5, \frac{1}{6}\right)$

6406532470569. ✔ $(Y|X=5) \sim \text{Binomial}\left(5, \frac{1}{2}\right)$

Question Number : 159 Question Id : 640653738294 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 $P(Y = 1|X = 5)$. 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 :

0.13 to 0.19

Question Id : 640653738295 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 : (160 to 161)

Question Label : Comprehension

A fair die is thrown two times independently. Let

X_1 represent the number obtained in the 1st throw,

X_2 represent the number obtained in the 2nd throw,

Define a new random variable Z such that

$$Z = \max(X_1, X_2)$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 160 Question Id : 640653738296 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 value of $P(Z \leq 3)$.

Options :

6406532470571. ✔ $\frac{1}{4}$

6406532470572. ✖ $\frac{1}{2}$

6406532470573. ✖ $\frac{3}{4}$

6406532470574. ✖ $\frac{1}{8}$

Question Number : 161 Question Id : 640653738297 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

If $P(Z = 4) = \frac{a}{36}$, what is the value of a?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

7

Question Id : 640653738298 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 : (162 to 163)

Question Label : Comprehension

Suppose that a random variable *X* denotes the number of items produced in a factory during a week with mean 50 and variance 25.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 162 Question Id : 640653738299 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

Using Markov's inequality, find a bound on the probability that this week's production will exceed 74.

Options :

6406532470576. ✖ $P(X \geq 74) \geq \frac{25}{37}$

6406532470577. ✖ $P(X \geq 75) > \frac{2}{3}$

6406532470578. ✔ $P(X \geq 75) \leq \frac{2}{3}$

6406532470579. ✖ $P(X \geq 74) < \frac{25}{37}$

Question Number : 163 Question Id : 640653738300 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 Chebyshev's inequality, find a lower bound on the probability that this week's production will be between 40 and 60. 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 :

0.72 to 0.78

Question Id : 640653738301 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 : (164 to 165)

Question Label : Comprehension

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

$$f_X(x) = \begin{cases} \frac{1}{10}, & 0 \le x < 1, \\ kx, & 1 \le x < 2, \\ \frac{3}{10}, & 2 \le x < 3, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 164 Question Id : 640653738302 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 one decimal place.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.4

Question Number : 165 Question Id : 640653738303 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

What is the value of $P(1 < X < 2.5)$? 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 :

0.72 to 0.78

Sem2 Intro to Python

Section Id :	64065351401
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	15
Number of Questions to be attempted :	15
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1