Statistics2

Section Id :	64065328977
Section Number :	3
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 :	64065363287
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 50 Question Id : 640653445483 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 2/DIRECT ENTRY DIPLOMA : STATISTICS FOR DATA SCIENCE 2"

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 :

6406531484399. ✔ Yes

6406531484400. ✖ No

Question Number : 51 Question Id : 640653445484 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

Use the following values of F_Z if required:

$F_Z(\frac{-5}{6}) = 0.20,\ F_Z(\frac{5}{6}) = 0.80,\ F_Z(2) = 0.977,\ F_Z(-2) = 0.023,\ F_Z(1) = 0.84,$
$F_Z(\frac{2}{3}) = 0.75,\ F_Z(\frac{-2}{3}) = 0.25$

Discrete random variables:

Distribution	PMF ($f_X(k)$)	CDF ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
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 ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
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 :

6406531484401. ✔ Useful Data has been mentioned above.

6406531484402. ✖ This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :	2
Sub-Section Id :	64065363288
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653445485 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 : (52 to 53)

Question Label : Comprehension

Suppose a fair die is thrown twice. Let the random variable X denote the number obtained on the first die. Let the random variable Y denote the number obtained on the second die. Define $Z = | X - Y |$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 52 Question Id : 640653445486 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

Find the range of *Z*.

Options :

6406531484403. ✔ $T_Z = \{0, 1, 2, 3, 4, 5\}$

6406531484404. ✖ $T_Z = \{1, 2, 3, 4, 5\}$

6406531484405. ✖ $T_Z = \{1, 2, 3, 4, 5, 6\}$

6406531484406. ✖ $T_Z = \{0, 1, 2, 3, 4, 5, 6\}$

Question Number : 53 Question Id : 640653445487 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

Find the probability mass function (PMF) of *Z*.

Options :

6406531484407. ✖

z	1	2	3	4	5
$f_Z(z)$	6/36	16/36	24/36	30/36	34/36

6406531484408. ✔

z	0	1	2	3	4	5
$f_Z(z)$	6/36	10/36	8/36	6/36	4/36	2/36

6406531484409. ✖

z	1	2	3	4	5	6
$f_Z(z)$	6/36	10/36	8/36	6/36	4/36	2/36

6406531484410. ✖

z	0	1	2	3	4	5
$f_Z(z)$	0	6/36	16/36	24/36	30/36	34/36

6406531484411. ✖

z	0	1	2	3	4	5	6
$f_Z(z)$	6/36	6/36	6/36	6/36	4/36	2/36	6/36

Question Id : 640653445488 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 : (54 to 55)

Question Label : Comprehension

Let the random variables X and Y have the following joint PDF:

$$f_{XY}(x,y) = \begin{cases} 2x & \text{for } 0 \le x < 1\ ,\ 0 \le y < 1 \\ 0 & \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 54 Question Id : 640653445489 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Selectable Option : 0

Question Label : Multiple Select Question

Which of the following statements are true?

Options :

6406531484412. ✔ Marginal density of X is $2x$, for $0 \le x < 1$.

6406531484413. ✖ Marginal density of X is $\frac{x^2}{2}$, for $0 \le x < 1$.

6406531484414. ✖ Marginal density of Y is $2y$, for $0 \le y < 1$.

6406531484415. ✔ Marginal density of Y is 1, for $0 \le y < 1$.

Question Number : 55 Question Id : 640653445490 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

Are *X* and *Y* independent?

Options :

6406531484416. ✔ YES

6406531484417. ✖ NO

Sub-Section Number :	3
Sub-Section Id :	64065363289
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 56 Question Id : 640653445491 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 density function of a continuous random variable X is given by

$$f(x) = \begin{cases} 2x & \text{for } 0 \leq x < 1 \\ 0 & \text{otherwise} \end{cases}$$

Find the value of $E[X]$. 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 :

0.65 to 0.68

Question Number : 57 Question Id : 640653445493 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

Let $X_1, X_2, \ldots, X_n$ be i.i.d. Poisson(9). Using Chebyshev's inequality, what should be the minimum value of n such that the probability that the sample mean $(\overline{X})$ lies in between 8.6 and 9.4 is at least 0.95?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1125

Sub-Section Number :	4
Sub-Section Id :	64065363290
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 58 Question Id : 640653445492 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 iron rods are manufactured with a mean weight of 10 kg and a standard deviation of 0.4 kg. How does the variance of the sample mean change when the sample size is increased from 25 to 64?

Options :

6406531484419. ✖ Variance is increased from 0.00625 to 0.016.

6406531484420. ✖ Variance is increased from 0.0025 to 0.0064.

6406531484421. ✔ Variance is reduced from 0.0064 to 0.0025.

6406531484422. ✖ Variance is reduced from 0.016 to 0.00625.

Sub-Section Number :	5
Sub-Section Id :	64065363291
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653445494 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 : (59 to 60)

Question Label : Comprehension

Let X be a random variable denoting the survival time (in years) of patients after the treatment of a certain disease. It is known that X is exponentially distributed with a mean of 2 years.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 59 Question Id : 640653445495 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

What is the probability that a patient selected at random (who went through the treatment) will survive for more than 2 years?

Options :

6406531484424. ✖ $\frac{1}{2}e^{-1}$

6406531484425. ✔ e^{-1}

6406531484426. ✖ $2e^{-1}$

6406531484427. ✖ e^{-4}

Question Number : 60 Question Id : 640653445496 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 $P(X > 6 \mid X > 4)$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.35 to 0.38

Question Id : 640653445498 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 : (61 to 62)

Question Label : Comprehension

In a telecom system, each data file consists of 400 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 : 61 Question Id : 640653445499 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 :

6406531484430. ✖ $Y \sim \text{Bernoulli}(0.9)$

6406531484431. ✖ $Y \sim \text{Bernoulli}(0.1)$

6406531484432. ✔ $Y \sim \text{Binomial}(400, 0.9)$

6406531484433. ✖ $Y \sim \text{Binomial}(400, 0.1)$

Question Number : 62 Question Id : 640653445500 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 45 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 :

0.18 to 0.22

Question Id : 640653445501 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 : (63 to 64)

Question Label : Comprehension

Suppose $X_1, X_2, X_3, X_4 \sim$ iid Bernoulli$\left(\frac{1}{3}\right)$. Let Y be a random variable defined as

$$Y = \begin{cases} 5 & , \text{ if } X_1 = X_2 = X_3 = X_4 = 0 \\ \text{Min}\{i : X_i = 1\} & , \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 63 Question Id : 640653445502 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 moment generating function of the random variable Y .

Options :

6406531484435. ✖ $M_Y(\lambda) = \frac{2}{3}e^{\lambda} + \frac{2}{9}e^{2\lambda} + \frac{2}{27}e^{3\lambda} + \frac{2}{81}e^{4\lambda} + \frac{1}{81}e^{5\lambda}$

6406531484436. ✖ $M_Y(\lambda) = \frac{1}{3}e^{\lambda} + \frac{2}{9}e^{2\lambda} + \frac{5}{27}e^{3\lambda} + \frac{7}{81}e^{4\lambda} + \frac{16}{81}e^{5\lambda}$

6406531484437. ✖ $M_Y(\lambda) = \frac{1}{3}e^{\lambda} + \frac{2}{9}e^{2\lambda} + \frac{4}{27}e^{3\lambda} + \frac{16}{81}e^{4\lambda} + \frac{8}{81}e^{5\lambda}$

6406531484438. ✔ $M_Y(\lambda) = \frac{1}{3}e^{\lambda} + \frac{2}{9}e^{2\lambda} + \frac{4}{27}e^{3\lambda} + \frac{8}{81}e^{4\lambda} + \frac{16}{81}e^{5\lambda}$

Question Number : 64 Question Id : 640653445503 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 expected value of Y . 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 :

2.55 to 2.65

Question Id : 640653445504 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 : (65 to 66)

Question Label : Comprehension

Let *X* denote the stock price (in units of hundred rupees) of a company *A* and let *Y* denote the stock price (in units of hundred rupees) of company *B*. The joint density function of *X* and *Y* is given below:

$$f_{XY}(x,y) = \begin{cases} cy & \text{for } 0 < x, y < 2 \\ 0 & \text{otherwise} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 65 Question Id : 640653445505 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 8*c*.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

2

Question Number : 66 Question Id : 640653445506 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 probability that the stock price of *A* will be higher than that of *B*. 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 :

0.31 to 0.35

Sub-Section Number :	6
Sub-Section Id :	64065363292
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 67 Question Id : 640653445497 Question Type : SA Calculator : None

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

Correct Marks : 5

Question Label : Short Answer Question

A company manufactures square shaped chess boards. The length of the chess board is normally distributed with mean equal to 40 *cm* with standard deviation of 5 *cm*. Find the probability that the area of the chess board is less than 2500 cm^2. 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 :

0.970 to 0.984

CT

Section Id :	64065328978
Section Number :	4
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
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 :	64065363293
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 68 Question Id : 640653445507 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