

Sem2 Statistics2

Section Id :	64065339028
Section Number :	8
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 :	64065382317
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 163 Question Id : 640653576961 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: 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 :

6406531926950.  YES

6406531926951.  NO

Question Number : 164 Question Id : 640653576962 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 ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
Uniform(A) $A = \{a, a+1, \dots, b\}$	$\frac{1}{n}, \quad x = k$ $n = b - a + 1$ $k = a, a+1, \dots, b$	$\begin{cases} 0 & x < 0 \\ \frac{k-a+1}{n} & k \leq x < k+1 \\ & k = a, a+1, \dots, b-1, b \\ 1 & x \geq n \end{cases}$	$\frac{a+b}{2}$	$\frac{n^2-1}{12}$
Bernoulli(p)	$\begin{cases} p & x = 1 \\ 1-p & x = 0 \end{cases}$	$\begin{cases} 0 & x < 0 \\ 1-p & 0 \leq x < 1 \\ 1 & x \geq 1 \end{cases}$	p	$p(1-p)$
Binomial(n, p)	${}^nC_k p^k (1-p)^{n-k},$ $k = 0, 1, \dots, n$	$\begin{cases} 0 & x < 0 \\ \sum_{i=0}^k {}^nC_i p^i (1-p)^{n-i} & k \leq x < k+1 \\ & k = 0, 1, \dots, n \\ 1 & x \geq n \end{cases}$	np	$np(1-p)$
Geometric(p)	$(1-p)^{k-1} p,$ $k = 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ 1 - (1-p)^k & k \leq x < k+1 \\ & k = 1, \dots, \infty \end{cases}$	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson(λ)	$\frac{e^{-\lambda} \lambda^k}{k!},$ $k = 0, 1, \dots, \infty$	$\begin{cases} 0 & x < 0 \\ e^{-\lambda} \sum_{i=0}^k \frac{\lambda^i}{i!} & k \leq x < k+1 \\ & k = 0, 1, \dots, \infty \end{cases}$	λ	λ

Continuous random variables:

Distribution	PDF ($f_X(k)$)	CDF ($F_X(x)$)	$E[X]$	$\text{Var}(X)$
Uniform $[a, b]$	$\frac{1}{b-a}, a \leq x \leq b$	$\begin{cases} 0 & x \leq a \\ \frac{x-a}{b-a} & a < x < b \\ 1 & x \geq b \end{cases}$	$\frac{a+b}{2}$	$\frac{(b-a)^2}{12}$
Exp(λ)	$\lambda e^{-\lambda x}, x > 0$	$\begin{cases} 0 & x \leq 0 \\ 1 - e^{-\lambda x} & x > 0 \end{cases}$	$\frac{1}{\lambda}$	$\frac{1}{\lambda^2}$
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,

$$P(X \geq c) \leq \frac{\mu}{c}$$

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

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

Options :

6406531926952.  Useful Data has been mentioned above.

6406531926953.  This data attachment is just for a reference & not for an evaluation.

Sub-Section Number :

2

Sub-Section Id :

64065382318

Question Shuffling Allowed :

Yes

Is Section Default? :

null

Question Number : 165 Question Id : 640653576963 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 joint PMF of two discrete random variables X and Y is given in the following table:

$Y \backslash X$	0	1	2	$f_Y(y)$
0	$\frac{1}{6}$	a	b	$\frac{1}{3}$
1	c	d	$\frac{1}{9}$	$\frac{2}{3}$
$f_X(x)$	$\frac{1}{2}$	$\frac{1}{3}$	$\frac{1}{6}$	1

Joint PMF of X and Y

Which of the following options is correct?

Options :

6406531926954. ✖ $2a = b = 6c = 4d$

6406531926955. ✖ $2a = b = 4c = 6d$

6406531926956. ✔ $6a = 12b = 2c = 3d$

6406531926957. ✖ $9a = 18b = 3c = 2d$

Question Number : 166 Question Id : 640653576968 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 $X \sim \text{Binomial}(n, p)$. If the expected value and variance of X are 2 and $\frac{3}{2}$, respectively, find the value of $P(X = 2)$.

Options :

6406531926967. ✓ $\frac{7 \times 3^6}{4^7}$

6406531926968. ✖ $\frac{7 \times 3^6}{4^8}$

6406531926969. ✖ ${}^8C_2 \left(\frac{3^2}{4^8} \right)$

6406531926970. ✖ ${}^4C_2 \left(\frac{3^2}{4^4} \right)$

Sub-Section Number :	3
Sub-Section Id :	64065382319
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653576964 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 : (167 to 168)

Question Label : Comprehension

Suppose two fair dice are rolled. Let a random variable X denote the number obtained on the first die and let a random variable Y denote the number obtained on the second die. Define a new random variable $U = X + Y - 1$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 167 Question Id : 640653576965 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 U .

Options :

6406531926958. ✖ $T_U = \{0, 1, 2, \dots, 12\}$

6406531926959. ✖ $T_U = \{1, 2, \dots, 12\}$

6406531926960. ✖ $T_U = \{0, 1, 2, \dots, 11\}$

6406531926961. ✔ $T_U = \{1, 2, \dots, 11\}$

Question Number : 168 Question Id : 640653576966 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 value of $P(X = 4, U = 8)$.

Options :

6406531926962. ✖ $\frac{1}{6}$

6406531926963. ✖ $\frac{2}{3}$

6406531926964. ✔

$$\frac{1}{36}$$

$$6406531926965. \times \frac{1}{3}$$

Sub-Section Number : 4
Sub-Section Id : 64065382320
Question Shuffling Allowed : Yes
Is Section Default? : null

Question Number : 169 Question Id : 640653576967 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 mass function of a random variable X is given as

x	-3	6	9
$P(X = x)$	$1/6$	$1/2$	$1/3$

Define $Y = (2X + 1)^2$. Find the expected value of Y .

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :

209

Question Number : 170 Question Id : 640653576969 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 be a continuous random variable with the following PDF:

$$f_X(x) = \begin{cases} \frac{k}{(1+x)^2}, & 0 \leq x \leq 4, \\ 0, & \text{otherwise.} \end{cases}$$

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

Hint: $\int \frac{1}{(a+bx)^2} dx = \frac{-1}{b(a+bx)}$

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

1.23 to 1.27

Sub-Section Number :

5

Sub-Section Id :

64065382321

Question Shuffling Allowed :

No

Is Section Default? :

null

Question Id : 640653576970 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 : (171 to 172)

Question Label : Comprehension

The joint PMF of two discrete random variables X and Y is

$$f_{XY}(x, y) = \begin{cases} \frac{1}{32}(x^2 + y), & x \in \{0, 1, 2, 3\}, y \in \{0, 1\}, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 171 Question Id : 640653576971 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

Identify the correct joint PMF table of X and Y :

Options :

6406531926972. ✓

$Y \backslash X$	0	1	2	3
0	0	$\frac{1}{32}$	$\frac{4}{32}$	$\frac{9}{32}$
1	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{5}{32}$	$\frac{10}{32}$

6406531926973. ✖

$Y \backslash X$	0	1	2	3
0	0	$\frac{1}{32}$	$\frac{4}{32}$	$\frac{10}{32}$
1	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{4}{32}$	$\frac{10}{32}$

6406531926974. ✖

$Y \backslash X$	0	1	2	3
0	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{5}{32}$	$\frac{10}{32}$
1	0	$\frac{1}{32}$	$\frac{4}{32}$	$\frac{9}{32}$

6406531926975. ✖

$X \backslash Y$	0	1	2	3
0	0	$\frac{1}{32}$	$\frac{4}{32}$	$\frac{9}{32}$
1	$\frac{1}{32}$	$\frac{2}{32}$	$\frac{5}{32}$	$\frac{10}{32}$

Question Number : 172 Question Id : 640653576972 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 $P\left(\frac{1}{2} < X < \frac{5}{2} \mid X > 1\right)$. Enter

the answer correct to 2 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 0.34

Question Id : 640653576973 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 : (173 to 174)

Question Label : Comprehension

Ten students from classes 9 and 10 have been nominated to form the school committee.

The table below provides the number of boys and girls selected from each class:

	class 9	class 10
Boys	1	5
Girls	3	1

The committee will consist of four students, with two students selected from each class uniformly at random.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 173 Question Id : 640653576974 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

Let a random variable G represent the number of girls selected for the committee. Find the range of G .

Options :

6406531926977. ✖ $T_G = \{0, 1, 2, 3\}$

6406531926978. ✔ $T_G = \{1, 2, 3\}$

6406531926979. ✖ $T_G = \{1, 2, 3, 4\}$

6406531926980. ✖ $T_G = \{0, 1, 2, 3, 4\}$

Question Number : 174 Question Id : 640653576975 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 expected number of girls selected for the committee. 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 :

1.81 to 1.85

Question Id : 640653576976 **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 : (175 to 176)

Question Label : Comprehension

In a bookstore, there are two book types: Type 1 and Type 2. Let X and Y be independent random variables representing the number of Type 1 and Type 2 books sold in a week, respectively. Suppose X and Y follow the Poisson distribution with averages of 2 and 3, respectively. Define a new random variable $Z = X + Y$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 175 **Question Id :** 640653576977 **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 $Z = 5$, then which of the following options are true?

Options :

6406531926982. ✖ $(Y|Z) \sim \text{Binomial}(5, \frac{2}{5})$.

6406531926983. ✔ $(X|Z) \sim \text{Binomial}(5, \frac{2}{5})$.

6406531926984. ✖ $(X|Z) \sim \text{Binomial}(5, \frac{3}{5})$.

6406531926985. ✔ $(Y|Z) \sim \text{Binomial}(5, \frac{3}{5})$.

Question Number : 176 Question Id : 640653576978 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 $P(X = 1|Z = 5)$.

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 :

0.24 to 0.28

Question Id : 640653576979 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 : (177 to 178)

Question Label : Comprehension

Suppose $X \sim \text{Binomial} \left(n, \frac{1}{2} \right)$.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 177 Question Id : 640653576980 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 n for which

$$\frac{1}{30}P(X = 3) = P(X = 2).$$

Options :

6406531926987. ✖ 90

6406531926988. ✔ 92

6406531926989. ✖ 30

6406531926990. ✖ 32

Question Number : 178 Question Id : 640653576981 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

Using the Chebyshev's inequality, find a lower bound for $P(-2\sigma \leq X - \mu \leq 2\sigma)$, where μ and σ^2 are mean and variance of X . Enter the answer correct to 2 decimal places

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.75

Question Id : 640653576982 **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 : (179 to 180)

Question Label : Comprehension

Sruthi throws a dart onto a circular board. Let a random variable X denote the distance from the center to the point where the dart hits the board. Suppose the PDF of X is

$$f_X(x) = \begin{cases} kx(1 - x^2), & 0 \leq x \leq 1, \\ 0, & \text{otherwise.} \end{cases}$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 179 **Question Id :** 640653576983 **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 .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

4

Question Number : 180 Question Id : 640653576984 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 $P\left(\frac{1}{4} \leq X \leq \frac{3}{4}\right)$. 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 :

0.66 to 0.72

DBMS

Section Id :	64065339029
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	18
Number of Questions to be attempted :	18
Section Marks :	50
Display Number Panel :	Yes
Group All Questions :	No