Course Name- EDA and Statistics

Course Code- INT 351

Continuous Assessment-II

LOVELY PROFESSIONAL UNIVERSITY

General Guidelines for Assignment Submission

1. Students are required to make handwritten assignments in his or her own handwriting.
2. Students are required to make assignments on their own. Direct copying of assignment from another student(s)/ SLM/ Internet/ or any other resource material is not allowed. If found guilty, zero marks will be awarded to the student(s).
3. Assignments and Submission Dates will be provided to the student through their LPU/UMS as per the schedule given in Academic Calendar.
4. Late submission of assignments will not be accepted in any case and the student(s) who fail to submit the assignments will be awarded zero marks.
5. For the coding-based question use the python compiler and paste the working screen shot/ code with respective output in your assignment.
6. For the numerical based question students are advised to take the help reference book/Study material /Internet.
7. There are 12 sets in the respective file. Look for the student table given in the last of the assignment.
8. There are six questions in each assignment each contains 5 Marks each.

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Set-1

1. Using Permutation and Combinations, calculate the following
   a) Using all the letters of the word GIFT how many distinct words can be formed?
   b) In how many different ways can five friends sit for a photograph of five chairs in a row?
   c) Define Permutation and Combination. Discuss it with an example [5 Marks]
2. Solve the following problems step-by-step
   a) A dice is rolled, find the probability that an even number is obtained
   b) Two coins are tossed, find the probability that two heads are obtained. **Note:** Each coin has two possible outcomes H (heads) and T (Tails)
   c) Two dice are rolled, find the probability that the sum is
      I. equal to 1
      II. equal to 4
      III. less than 13 [5 Marks]
3. Explain elaborately the concepts of Probability Density Functions (PDF) with examples. [5 Marks]
4. Discuss Normal and Standard Normal Distribution. [5 Marks]
5. What is Central Limit Theorem? Discuss the Mean Estimation using CTM. [5 Marks]
6. The record of weights of the male population follows the normal distribution. Its mean and standard deviations are 70 kg and 15 kg respectively. If a researcher considers the records of 50 males, then what would be the mean and standard deviation of the chosen sample? [5 Marks]

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Set-2

1a) What is permutation and combination explain with example. Interpret the formula.

b) Find the number of permutations of the letters of the word ALLAHABAD

c)Find all possible ways in which the final league standings of the eight teams can be in an Indian Premier League (IPL) tournament [5 Marks]

2. a) A card is drawn at random from a deck of cards. Find the probability of getting a queen

Tickets numbered 1 to 20 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 3 or 5?

b) In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither Red nor Green?

c) Three unbiased coins are tossed. What is the probability of getting at most two heads? [5 Marks]

3. Differentiate Discrete Probability Distributions and Continuous Probability Distributions. Explain with examples. [5 Marks]

4. Interpret Normal and Standard Normal Distribution with diagrams [5 Marks]

5. What do you mean by sampling distribution. Discuss its properties [5 Marks]

6. An unknown distribution has a mean of 90 and a standard deviation of 15. Samples of size n = 25 are drawn randomly from the population. Problem 1 Find the probability that the sample mean is between 85 and 92 [5 Marks]

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Set-3

1. Explain the difference between permutations and combinations. Provide an example of each and calculate the number of possibilities in each case. [5 Marks]

2. Define sampling distributions and list some properties of sampling distributions. How does sample size affect the shape of a sampling distribution? [5 Marks]

3. How is sampling related to estimation in statistics? Discuss the process of estimating population parameters using sample data. [5 Marks]

4. Calculate probabilities using the standard normal distribution table. Provide step-by-step instructions on how to find probabilities for a given Z-score. [5 Marks]

5. Describe the process of selecting a random sample from a finite population using systematic sampling. What are the advantages and limitations of this method? [5 Marks]

6. (a)What is the significance of the joint probability of two events? How can joint probability be calculated and interpreted in practical situations?

(b) The heights of adult men in a population follow a normal distribution with a mean (μ) of 175 cm and a standard deviation (σ) of 7 cm. What is the probability that a randomly selected adult male is shorter than 160 cm? [5 Marks]

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Set-4

1. Describe the importance of expected value in statistics. Calculate the expected value of a random variable in a given scenario, and explain its practical interpretation. [5 Marks]

2. How can the normal distribution be applied in quality control processes? Provide an example of how it can be used to monitor product quality. [5 Marks]

3. Define probability density functions (PDFs) and explain their role in continuous probability distributions. Provide an example of a continuous random variable and its PDF. [5 Marks]

4. What is the standardized normal distribution, and how is it related to the Z-score? How can Z-scores be used in statistical analysis? [5 Marks]

5. Discuss the various applications of sampling in different fields, such as market research, market campaigns, pilot testing, and quality control. Provide specific examples for each application. [5 Marks]

6.(a) Briefly describe random variables and probability distributions. What is the expected value of a random variable?

(b)The distribution of IQ scores in a population follows a normal distribution with a mean IQ of 100 and a standard deviation of 15. If a psychologist selects a random sample of 30 individuals, what would be the mean and standard deviation of the sample's IQ scores? [5 Marks]

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Set-5

1. Define probability and discuss its basic properties. How is probability calculated for an event? [5 Marks]

2. How can the central limit theorem be used to estimate the population mean? Provide a step-by-step example of how to construct a confidence interval for the population mean. [5 Marks]

3. Define joint probability and conditional probability. How are these concepts used in probability theory? [5 Marks]

4. Discuss the importance of random sampling in the quality control process. How can random sampling help detect defects in a manufacturing process? [5 Marks]

5. Discuss the concept of standardization in statistics. How is the Z-score related to standardization, and what information does it convey? [5 Marks]

6. (a)How can cumulative probabilities be useful in decision-making processes? Provide an example where cumulative probability is applied.

(b) The weight of apples in a shipment follows a normal distribution with a mean (μ) of 150 grams and a standard deviation (σ) of 20 grams. What is the probability that a randomly selected apple weighs between 140 grams and 160 grams? [5 Marks]

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Set-6

1. Enumerate and explain the rules of probability for addition and multiplication. Provide examples illustrating each rule. [5 Marks]

2. Define the concept of conditional probability and provide a real-world example where conditional probability is used. [5 Marks]

3. Discuss the characteristics of the normal distribution. How is the normal distribution used in various statistical applications? [5 Marks]

4. Explain Bayes' theorem and its practical applications. Provide an example to demonstrate how Bayes' theorem can be used to update probabilities. [5 Marks]

5. Demonstrate the central limit theorem with an example. Suppose you have a population with a known mean and standard deviation. Calculate the sampling distribution of the sample mean for different sample sizes. [5 Marks]

6. (a) What is the binomial distribution, and under what conditions is it applicable? Provide an example of a real-life situation where the binomial distribution can be used.

(b) The scores on a standardized test follow a normal distribution with a mean score of 500 and a standard deviation of 100. What is the probability that a randomly selected student scored between 450 and 600 on the test? [5 Marks]

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Set-7

1. What are the rules of probability for addition and multiplication? Provide examples to illustrate each rule. [5 Marks]

2. Explain the different types of sampling methods, such as random sampling, stratified sampling, and cluster sampling. [5 Marks]

3. Compare and contrast probability density functions and cumulative distribution functions. Provide examples of probability density functions and calculate probabilities associated with them. [5 Marks]

4. Explain the concept of a confidence interval and its significance in statistical inference. Provide an example of constructing a confidence interval for a population parameter. [5 Marks]

5. Discuss the role of pilot testing in product development and research. How can sampling be employed in pilot testing to ensure the success of a project? [5 Marks]

6. (a) Discuss the properties of the binomial distribution and provide an example of a binomial experiment. Calculate the probabilities associated with this example. [5 Marks]

(b) Suppose you have a population of 500 students, and you want to know the average height of the students. You randomly select 36 students from the population and find their heights. If the population mean height is 160 cm and the population standard deviation is 10 cm, what is the mean and standard deviation of the sample mean height of these 36 students? [5 Marks]

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Set-8

1. Define and explain the concept of a probability density function (PDF). Provide a real-world example of a continuous random variable and its PDF. [5 Marks]

2. Explain the concept of the probability distribution of a discrete random variable. Provide an example of a discrete random variable and its probability distribution. [5 Marks]

3. Compare and contrast discrete and continuous probability distributions. Give examples of situations where each type of distribution is applicable. [5 Marks]

4. Describe various sampling methods, such as simple random sampling, systematic sampling, and convenience sampling. Discuss the advantages and disadvantages of each method. [5 Marks]

5. Describe the central limit theorem and its significance in inferential statistics. What does it state about the sampling distribution of the sample mean? [5 Marks]

6. (a) Explain the concept of a discrete probability distribution. Give an example of a discrete probability distribution, and calculate its expected value. [5 Marks]

(b) Sarah has a bag containing 10 red balls, 5 green balls, and 7 blue balls. She randomly selects 3 balls from the bag, one after the other, without replacement. On each draw, the selected ball is not put back into the bag. What is the probability that all 3 balls she selects are green? [5 Marks]

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Set-9

1. Discuss the concept related to the distribution of sample means, particularly in the context of the Central Limit Theorem (CLT). Furthermore, explain why this distribution often exhibits a normal or bell-shaped pattern as per the CLT. [5 Marks]

2. Discuss the principle behind a sampling technique used to ensure representative samples, especially when dealing with diverse populations. Additionally, highlight its significance in practical applications. [5 Marks]

3. Elaborate on binomial distribution by taking account of any two real world scenarios. Also find the probability for the same. [5 Marks]

4. Provide an explanation of the Central Limit Theorem (CLT) and its relevance in shaping the distribution of sample means, possibly with an example, without directly asking for a description. [5 Marks]

5. Discuss a practical scenario in which confidence intervals play a pivotal role in aiding decision-making processes or conducting research without directly requesting an example. [5 Marks]

6. John randomly picks 4 cards from a deck of 52-cards and places them back into the deck (Any set of 4 cards is equally likely). Then, Jacob randomly chooses 8 cards out of the same deck (Any set of 8 cards is equally likely). Assume that the choice of 4 cards by John and the choice of 8 cards by Jacob are independent. What is the probability that all 4 cards chosen by John are in the set of 8 cards chosen by Jacob? [5 Marks]

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Set-10

1. Provide an explanation of the formulas used to compute permutations, both when repetition is allowed and when it is not, and support your explanation with a practical example for each case. [5 Marks]

2. Define the concept involving the likelihood of events known as 'probability'. Elaborate on the three different approaches to understanding probability, including examples for each: classical, empirical, and subjective? [5 Marks]

3. Elaborate on how normal distribution is different from standard normal distribution. Derive the probability of normal distribution. Also state the properties on standard normal distribution. [5 Marks]

4. Elaborate on the practical applications of sampling. Explain these applications using a specific real-life example to illustrate its utility. [5 Marks]

5. Provide an explanation of how the Central Limit Theorem (CLT) is utilized to estimate the population mean. Also illustrate this process using suitable examples. [5 Marks]

6. The record of weights of the male population follows the normal distribution. Its mean and standard deviations are 70 kg and 15 kg respectively. If a researcher considers the records of 50 males, then what would be the mean and standard deviation of the chosen sample? [5 Marks]

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Set-11

1. Offer an explanation of the formulas for calculating combinations, both with and without repetition, and provide a practical example to illustrate each case.

2. Discuss a fundamental principle in probability that allows us to find the probability of multiple events occurring. Explain the principal using examples.

3. Explain the mathematical function that describes the probability distribution of a continuous random variable. Give its properties and explain its use in real life scenario.

4. Explain how to calculate cumulative property for a discrete random variable with an example. Also explain the concept of discrete probability distribution involved with tossing a coin.

5. Elaborate on the role of sampling in managing and mitigating variation within manufacturing processes, particularly in terms of its significance. Provide examples for the same.

6. The length of alike metals produced by a hardware store is approximated by a normal distribution model having a mean of 7 cm and a standard deviation of 0.35 cm. Find the probability that the length of a randomly chosen metal is between 5.36 and 6.14 cm?

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Set-12

1. Provide an explanation of systematic sampling along with an illustrative example. Highlight the distinctions between systematic sampling and simple random sampling.

2. Discuss continuous probability distributions, outlining the features of one specific type and listing its properties. Also provide an example for the same.

3. Provide information about the properties of sampling distributions and offer real-world illustrations where sampling is applied.

4. What does the confidence level (90%, 95%, 99%) describe in a confidence interval? Also explain margin of error in the context of a confidence interval?

5. Give a brief description of the characteristics linked to the normal distribution. Also derive the probability of normal distribution.

6. Let X be a discrete random variable with the following PMF

$$P_X(x) = \begin{cases} 0.1 & \text{for } x = 0.2 \\ 0.2 & \text{for } x = 0.4 \\ 0.2 & \text{for } x = 0.5 \\ 0.3 & \text{for } x = 0.8 \\ 0.2 & \text{for } x = 1 \\ 0 & \text{otherwise} \end{cases}$$

- Find R(X) the range of the random variable X
- Find $P(X \leq 0.5)$
- Find $P(0.25 < X < 0.75)$
- Find $P(X = 0.2 | X < 0.6)$

Student list:

SerialNo	RegisterationNumber	Name	RollNumber	SET
1	12113501	Shubham Kumar	RK21UTA01	SET-1
2	12112282	Palli Sai Kiran	RK21UTA02	SET-2
3	12112093	Khurram Shahin	RK21UTA03	SET-3
4	12111724	Shahriar Mumin Khan	RK21UTA04	SET-4
5	12113102	Annamdevula Ravi	RK21UTA05	SET-5
6	12113229	Gummudu Kishore Kumar	RK21UTA06	SET-6
7	12109994	Priyanshu Singh	RK21UTA07	SET-7
8	12110145	Prathipati Venkatesh	RK21UTA08	SET-8
9	12110626	Marlakunta Kedhareswer Naidu	RK21UTA09	SET-9
10	12111396	Darsi Venkat Charan	RK21UTA10	SET-10
11	12100915	Nived Suresan A	RK21UTA11	SET-11
12	12100863	C S Charithartha Sai	RK21UTA12	SET-12
13	12109514	Nikhil Singh	RK21UTA13	SET-1
14	12109665	T Tanusree	RK21UTA14	SET-2
15	12109211	Karri John Pradeep Reddy	RK21UTA15	SET-3
16	12108024	Anushka Kashyap	RK21UTA16	SET-4
17	12108472	Gopidesi Vinod Kumar	RK21UTA17	SET-5
18	12108725	Dharani K S	RK21UTA18	SET-6
19	12106386	Pentyala Kumar Govindu	RK21UTA19	SET-7
20	12106729	Kriti Mishra	RK21UTA20	SET-8
21	12106692	Garvit Joshi	RK21UTA21	SET-9
22	12107057	Yaswanth Subrahmanyam Jonnadula	RK21UTA22	SET-10
23	12107367	Shivansh Ranjan	RK21UTA23	SET-11
24	12107544	Shaik Latheef	RK21UTA24	SET-12
25	12107776	Lakshya Sharma	RK21UTA25	SET-1
26	12107627	Medam Sai Shashank	RK21UTA26	SET-2
27	12104754	Achanagari Hanu Tejesh	RK21UTA27	SET-3
28	12104652	Alexander Peter Maliyakkal	RK21UTA28	SET-4
29	12106234	Vulli B M S Pruthvi	RK21UTA29	SET-5
30	12105798	Utkrist Ark	RK21UTA30	SET-6
31	12103929	Velagalapalli Sai Kishore Chandra	RK21UTA31	SET-7
32	12115897	Kunal Yadav	RK21UTA32	SET-8
33	12115161	Mahrishi Rathore	RK21UTA33	SET-9
34	12115398	Rohan Patel	RK21UTA34	SET-10

35	12116486	Madhan Sai Thupakula	RK21UTA35	SET-11
36	12019170	K S Namritha	RK21UTA71	SET-12
37	12013404	Shivansh Thakur	RK21UTA73	SET-1
38	12102845	Ankur Banerjee	RK21UTB36	SET-2
39	12102585	Nikhil Pathak	RK21UTB37	SET-3
40	12102610	S Surjith Subash	RK21UTB38	SET-4
41	12101918	Indukuri Satya Sudheer Varma	RK21UTB39	SET-5
42	12101692	Gurram Karthik	RK21UTB40	SET-6
43	12104702	K Somanath Sai Teja Srinivas	RK21UTB41	SET-7
44	12104879	Jarugu Mukesh Sai	RK21UTB42	SET-8
45	12107747	Mahamad Suhail	RK21UTB43	SET-9
46	12107884	Vaspari Murari	RK21UTB44	SET-10
47	12107890	Sanjana Umrao	RK21UTB45	SET-11
48	12107896	Prabhu Varun Puppala	RK21UTB46	SET-12
49	12107901	Madireddy Bharath Kumar Reddy	RK21UTB47	SET-1
50	12107624	Kanigelupula Surya Venkata Phanindra	RK21UTB48	SET-2
51	12107183	Rahul Rajput	RK21UTB49	SET-3
52	12108436	Saksham Parasher	RK21UTB50	SET-4
53	12108310	Mohammed Aasif	RK21UTB51	SET-5
54	12107941	Peyyala Akshay Mathew	RK21UTB52	SET-6
55	12109517	Adigopula Varun Kumar	RK21UTB53	SET-7
56	12109549	Pallanti Asrith Vatsal	RK21UTB54	SET-8
57	12100859	Abhinav Kumar	RK21UTB55	SET-9
58	12100568	Mandeep Singh Gill	RK21UTB56	SET-10
59	12100583	Sunkari Vedavyas	RK21UTB57	SET-11
60	12100403	Poothi Chandrasekhar Reddy	RK21UTB58	SET-12
61	12110965	Anindita Pandit	RK21UTB59	SET-1
62	12110943	Shristi Sehwag	RK21UTB60	SET-2
63	12113036	Siddharth Prahasith Bathula	RK21UTB61	SET-3
64	12112410	Nikhil Kaundal	RK21UTB62	SET-4
65	12111711	Kunal Kumar Pandit	RK21UTB63	SET-5
66	12111702	manish choudhury	RK21UTB64	SET-6
67	12112264	Bevara Hemanth Kumar	RK21UTB65	SET-7
68	12113773	Vidhya Bhusan Rath	RK21UTB66	SET-8
69	12115210	Rohan Stanislaus R	RK21UTB67	SET-9
70	12115853	Syed Faiq Husain	RK21UTB68	SET-10
71	12114879	Debasish Chandra Dey	RK21UTB69	SET-11
72	12114325	Aman Verma	RK21UTB70	SET-12