University of Central Punjab

Faculty of Information Technology and Computer Science

Course Title: Probability and Statistics Course Code: SESS-2733

Assignment 4

Peer Assignment

Total marks: 50 Obtained marks:\_\_\_

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| Name | Roll number |
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| **CLO #** | **Course Learning Outcome (CLO)** | **Taxonomy Level** | **Mapping to PLO** |
| CLO 1 | Apply fundamental concepts of probability rules and Bayes' theorem to solve problems in engineering and computing. | **C3** | **PLO 2** |

**Instructions:**

1. **Attempt all questions.**
2. **Write your answer showing all steps required to perform the task.**
3. **Assignment should be Hand Written. Computerized assignment is not accepted**
4. **Assignment should be submitted on A4 sheets or Assignment sheets only. Violation will result to deduction of 5 mark from the scored marks.**
5. **It is mandatory to submit soft and hard both forms**
6. **Each student will have attached this front page with his/her assignment. Violation will result to deduction of 3 mark from the scored marks.**
7. **Due Date for Assignment on portal is July 01, 2025. Till 12:00 pm**
8. **No Late submission accepted**

## **Problem 1 Probability Distribution Question ( 20 marks)**

In a game, a player rolls a **fair six-sided die** once. Let the random variable X represent the **amount of money (in rupees)** the player **wins** based on the following rule:

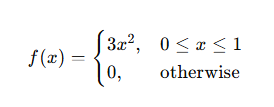
* If the die shows **1 or 2**, the player wins **Rs. 0**
* If the die shows **3 or 4**, the player wins **Rs. 10**
* If the die shows **5**, the player wins **Rs. 20**
* If the die shows **6**, the player wins **Rs. 50**

**Solve:**

1. Define the **probability distribution table** for the random variable X **(4 marks)**
2. **Verify** that the distribution is valid (i.e., total probability = 1). **(4 marks)**
3. Calculate the **expected value** E(X) — average winning per game. **(4 marks)**
4. **Find the variance** and **standard deviation** of the distribution. **(4 marks)**
5. Based on E(X), decide whether this is a **favorable game** for the **(4 marks)**  player or not.

## **Problem 2 Probability Density Function ( 15 marks)**

Let a continuous random variable X have the probability density function:

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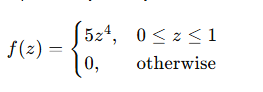
* The random variable X can only take values between 0 and 1.
* The probability density at each point x is 3x2.
* Outside this range, the probability density is zero.

**Task:**

1. Verify that the function is a valid function
2. Find the probability that the value of X lies between 0.2 and 0.5.
3. Find the probability that X is less than 0.6
4. Find the probability that X is greater than 0.8.
5. Find the probability that X is 0.5

## **Problem 3 Cumulative Density Function ( 15 marks)**

The cumulative distribution function (CDF) of a random variable X is given by:

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1. Verify that the function is a valid function
2. Find the cumulative distribution function (CDF), F(z), of Z.
3. Find the probability that Z is less than or equal to 0.7, i.e., P(Z<=0.7)
4. Find the probability that Z is greater than or equal to 0.7, i.e., P(Z>=0.7).
5. Find the probability that Z is between 0.2 and 0.7 i-e. (0.2<=X<=0.7