1) What are the Probability Mass Function (PMF) and Probability Density Function (PDF)? Explain with

an example.

Ans- A probability mass function (pmf) is a function over the sample space of a discrete random variable X which gives the probability that X is equal to a certain value. Let X be a discrete random variable on a sample space S . Then the probability mass function f(x) is defined as. f(x)=P[X=x].

Probability density function (PDF), in statistics, a function whose integral is calculated to find probabilities associated with a continuous random variable (see continuity; probability theory). Its graph is a curve above the horizontal axis that defines a total area, between itself and the axis, of 1.

2) What is Cumulative Density Function (CDF)? Explain with an example. Why CDF is used?

Ans- The Cumulative Distribution Function (CDF) of a real-valued random variable X, evaluated at x, is the probability function that X will take a value less than or equal to x. It is used to describe the probability distribution of random variables in a table.

Note that the CDF is flat between the points in RX and jumps at each value in the range. The size of the jump at each point is equal to the probability at that point. For, example, at point x=1, the CDF jumps from 14 to 34. The size of the jump here is 34−14=12 which is equal to PX(1)

The cumulative distribution function is used to describe the probability distribution of random variables. It can be used to describe the probability for a discrete, continuous or mixed variable. It is obtained by summing up the probability density function and getting the cumulative probability for a random variable.

3) What are some examples of situations where the normal distribution might be used as a model?Explain how the parameters of the normal distribution relate to the shape of the distribution.

Ans- Height, birth weight, reading ability, job satisfaction, or SAT scores are just a few examples of such variables. Because normally distributed variables are so common, many statistical tests are designed for normally distributed populations.

4) Explain the importance of Normal Distribution. Give a few real-life examples of Normal

Distribution.

Ans- A normal distribution is a type of continuous probability distribution in which most data points cluster toward the middle of the range, while the rest taper off symmetrically toward either extreme. The middle of the range is also known as the mean of the distribution.

The height of people is an example of normal distribution. Most of the people in a specific population are of average height. The number of people taller and shorter than the average height people is almost equal, and a very small number of people are either extremely tall or extremely short. Several genetic and environmental factors influence height. Therefore, it follows the normal distribution.

A fair rolling of dice is also a good example of normal distribution. In an experiment, it has been found that when a dice is rolled 100 times, chances to get ‘1’ are 15-18% and if we roll the dice 1000 times, the chances to get ‘1’ is, again, the same, which averages to 16.7% (1/6). If we roll two dice simultaneously, there are 36 possible combinations. The probability of rolling ‘1’ (with six possible combinations) again averages to around 16.7%, i.e., (6/36). More the number of dice more elaborate will be the normal distribution graph

Flipping a coin is one of the oldest methods for settling disputes. We all have flipped a coin before a match or game. The perceived fairness in flipping a coin lies in the fact that it has equal chances to come up with either result. The chances of getting a head are 1/2, and the same is for tails. When we add both, it equals one. If we toss coins multiple times, the sum of the probability of getting heads and tails will always remain 1.

5) What is Bernaulli Distribution? Give an Example. What is the difference between Bernoulli Distribution and Binomial Distribution?

Ans- Bernoulli distribution is a discrete probability distribution where the Bernoulli trial will have only 0 (failure) or 1 (success) as its outcome.

Bernoulli distribution is a case of binomial distribution when only 1 trial has been conducted. A binomial distribution is given by X ∼∼ Binomial (n, p). When n = 1, it becomes a Bernoulli distribution

7) Explain uniform Distribution with an example.

Ans- Uniform distribution, in statistics, distribution function in which every possible result is equally likely; that is, the probability of each occurring is the same.

A good example of a discrete uniform distribution would be the possible outcomes of rolling a 6-sided die. The possible values would be 1, 2, 3, 4, 5, or 6. In this case, each of the six numbers has an equal chance of appearing. Therefore, each time the 6-sided die is thrown, each side has a chance of 1/6

8) What is the z score? State the importance of the z score.

Ans- A z-score is an example of a standardized score. A z-score measures how many standard deviations a data point is from the mean in a distribution

Z-scores are often used in medical settings to assess how an individual's blood pressure compares to the mean population blood pressure. For example, the distribution of diastolic blood pressure for men is normally distributed with a mean of about 80 and a standard deviation of 20

9) What is Central Limit Theorem? State the significance of the Central Limit Theorem.

Ans- The central limit theorem states that whenever a random sample of size n is taken from any distribution with mean and variance, then the sample mean will be approximately normally distributed with mean and variance. The larger the value of the sample size, the better the approximation to the normal.

The CLT performs a significant part in statistical inference. It depicts precisely how much an increase in sample size diminishes sampling error, which tells us about the precision or margin of error for estimates of statistics, for example, percentages, from samples.

10) State the assumptions of the Central Limit Theorem.

Ans- The data must adhere to the randomization rule. It needs to be sampled at random. The samples should be unrelated to one another. One sample should not impact the others.