1)What is the Probability density function?

Ans- 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 are the types of Probability distribution?

Ans- There are two types of probability distributions:

Discrete probability distributions.

Continuous probability distributions.

3) Write a Python function to calculate the probability density function of a normal distribution with

given mean and standard deviation at a given point.

Ans- from scipy.stats import norm

import numpy as np

data\_start = -5

data\_end = 5

data\_points = 11

data = np.linspace(data\_start, data\_end, data\_points)

mean = np.mean(data)

std = np.std(data)

probability\_pdf = norm.pdf(3, loc=mean, scale=std)

print(probability\_pdf)

4) What are the properties of Binomial distribution? Give two examples of events where binomialdistribution can be applied.

Ans- The binomial distribution is the probability distribution of a binomial random variable. A random variable is a real-valued function whose domain is the [sample space](https://www.cuemath.com/data/sample-space/) of a random experiment. Let us consider an example to understand this better.

For example, if we toss a coin, there could be only two possible outcomes: heads or tails, and if any test is taken, then there could be only two results: pass or fail. This distribution is also called a binomial probability distribution. There are two parameters n and p used here in a binomial distribution.

5) Generate a random sample of size 1000 from a binomial distribution with probability of success 0.4 and plot a histogram of the results using matplotlib..

Ans- import matplotlib.pyplot as plt

def plot\_data(df,feature):

plt.figure(figsize=(1000,0.4))

plt.subplot(1,2,1)

sns.histplot(df[feature],kde=True)

plt.subplot(1,2,2)

stat.probplot(df[feature],dist='norm',plot=pylab)

plt.show()

6) Write a Python function to calculate the cumulative distribution function of a Poisson distributionwith given mean at a given point.

Ans- rom scipy.stats import poisson

import matplotlib.pyplot as plt

#

# Random variable representing number of restaurants

# Mean number of occurences of restaurants in 10 KM is 2

#

X = [0, 1, 2, 3, 4, 5]

lmbda = 2

#

# Probability values

#

poisson\_pd = poisson.pmf(X, lmbda)

#

# Plot the probability distribution

#

fig, ax = plt.subplots(1, 1, figsize=(8, 6))

ax.plot(X, poisson\_pd, 'bo', ms=8, label='poisson pmf')

plt.ylabel("Probability", fontsize="18")

plt.xlabel("X - No. of Restaurants", fontsize="18")

plt.title("Poisson Distribution - No. of Restaurants Vs Probability", fontsize="18")

ax.vlines(X, 0, poisson\_pd, colors='b', lw=5, alpha=0.5)

7) How Binomial distribution different from Poisson distribution?

Ans- Binomial distribution describes the distribution of binary data from a finite sample. Thus it gives the probability of getting r events out of n trials. Poisson distribution describes the distribution of binary data from an infinite sample. Thus it gives the probability of getting r events in a population.

8) Generate a random sample of size 1000 from a Poisson distribution with mean 5 and calculate the sample mean and variance.

Ans- def plot\_data(df,feature):

plt.figure(figsize=(10,6))

plt.subplot(1,2,1)

sns.histplot(df[feature],kde=True)

plt.subplot(1,2,2)

stat.probplot(df[feature],dist='norm',plot=pylab)

plt.show()

9) How mean and variance are related in Binomial distribution and Poisson distribution?

Ans- Are the mean and variance of the Poisson distribution the same? The mean and the variance of the Poisson distribution are the same, which is equal to the average number of successes that occur in the given interval of time.

10) In normal distribution with respect to mean position, where does the least frequent data appear?

Ans- zero. It has zero skew and a kurtosis of 3