Q1. What is a probability distribution, exactly? If the values are meant to be random, how can you predict them at all?

A probability distribution is a list of all of the possible outcomes of a random variable, along with its corresponding probability values. A probability distribution links each outcome of a random variable or process with its probability of occurrence.

Q2. Is there a distinction between true random numbers and pseudo-random numbers, if there is one? Why are the latter considered “good enough”?

They differ in the level of predictability they exhibit. Truly random numbers are not predictable. All pseudo-random numbers are predictable if the seed can be determined or guessed.

Q3. What are the two main factors that influence the behaviour of a "normal" probability distribution?

The normal distribution is also referred to as Gaussian or Gauss distribution. The distribution is widely used in natural and social sciences. It is made relevant by the Central Limit Theorem, which states that the averages obtained from independent, identically distributed random variables tend to form normal distributions, regardless of the type of distributions they are sampled from.

The mean is used by researchers as a measure of central tendency. It can be used to describe the distribution of variables measured as ratios or intervals. In a normal distribution graph, the mean defines the location of the peak, and most of the data points are clustered around the mean. Any changes made to the value of the mean move the curve either to the left or right along the X-axis.

The standard deviation measures the dispersion of the data points relative to the mean. It determines how far away from the mean the data points are positioned and represents the distance between the mean and the observations.

On the graph, the standard deviation determines the width of the curve, and it tightens or expands the width of the distribution along the x-axis. Typically, a small standard deviation relative to the mean produces a steep curve, while a large standard deviation relative to the mean produces a flatter curve.

Q4. Provide a real-life example of a normal 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.

Q5. In the short term, how can you expect a probability distribution to behave? What do you think will happen as the number of trials grows?

In a probability distribution , the weighted average of possible values of a random variable, with weights given by their respective theoretical probabilities, is known as the expected value , usually represented by E(x)

The expected value informs about what to expect in an experiment "in the long run", after many trials. In most of the cases, there could be no such value in the sample space.

Q6. What kind of object can be shuffled by using random.shuffle?

Using random.

The shuffle() method in the random module is used to shuffle a list. It takes a sequence, such as a list, and reorganizes the order of the items. This shuffle() method changes the original list, it does not return a new list.

Q7. Describe the math package's general categories of functions.

Python provides the math module to deal with such calculations. Math module provides functions to deal with both basic operations such as addition(+), subtraction(-), multiplication(\*), division(/) and advance operations like trigonometric, logarithmic, exponential functions.

Q8. What is the relationship between exponentiation and logarithms?

The logarithmic function can be understood as the inverse of exponentiation, and can be defined when the power of certain numbers is raised in order to get another number. For example: log28 = 3. Ans. The standard form of exponential is ax = N which can be written in logarithmic function form as logaN = x .

Q9. What are the three logarithmic functions that Python supports?

Logarithms are used to depict and represent large numbers. The log is an inverse of the exponent. This article will dive into the Python log() functions. The logarithmic functions of Python help the users to find the log of numbers in a much easier and efficient manner.