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

Ans: - A probability distribution is a mathematical function that provides the probabilities of occurrence of different possible outcomes in an experiment. In more technical terms, it describes how the values of a random variable are distributed. Even though individual outcomes may be random and unpredictable, probability distributions can provide insight into the overall behavior of a large number of trials.

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

Ans: - True random numbers are generated by a fundamentally random physical process, such as radioactive decay. Pseudo-random numbers, on the other hand, are generated by deterministic algorithms and are not truly random3. However, they are considered "good enough" for many purposes because they can mimic the properties of true random numbers to a large extent.

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

Ans: - The behavior of a normal probability distribution is primarily influenced by two factors: the mean and the standard deviation. The mean determines the center of the distribution, while the standard deviation controls the spread or width of the distribution.

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

Ans: - A real-life example of a normal distribution is the distribution of heights of people. Most 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.

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?

Ans: - In the short term, a probability distribution might not perfectly reflect the theoretical probabilities due to random variation. However, as the number of trials grows, the observed distribution should increasingly approximate the theoretical probability distribution. This is known as the law of large numbers.

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

Ans: - In Python, the random.shuffle function can be used to shuffle mutable sequences, like lists

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

Ans: - The Python math package provides a wide range of mathematical functions. These can be broadly categorized into: * Number functions * Power and logarithmic functions * Trigonometric functions * Angular conversion functions * Hyperbolic functions * Special functions.

Q8. What is the relationship between exponentiation and logarithms?

Ans: - Sure, let's delve deeper into the relationship between exponentiation and logarithms.

Exponentiation and logarithms are mathematical operations that are inversely related to each other1234. This means that they can undo each other's operations.
Exponentiation is the process of raising a number (the base) to a power (the exponent). For example, if you raise 2 to the third power (2^3), the result is 8.

Logarithms, on the other hand, reverse this process. The logarithm of a number is equal to the exponent that was used to generate it. For instance, the logarithm of 8 with base 2, which is written as $\log_2 8$, is equal to 3. This is because 2 raised to the power of 3 equals 8.
We can express this relationship between logarithmic form and its corresponding exponential form as follows: If we have an exponential equation: $y=b^x$

The equivalent logarithmic form of this equation would be: $\log_b(y)=x$

This means that the logarithm base b
of y
is x
. In other words, if you raise b
to the power of x
, you get y.

This relationship allows us to switch between exponential and logarithmic forms depending on what is more convenient for the problem at hand.

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

Ans:- Python supports three logarithmic functions: math.log (natural logarithm), math.log10 (base 10 logarithm), and math.log2 (base 2 logarithm).