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

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

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

Q4. Provide a real-life example of a 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?

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

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

Q8. What is the relationship between exponentiation and logarithms?

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

Answer:

Q1. A probability distribution is a function that describes the likelihood of obtaining different values in a random variable. It tells us how probable different outcomes are in a random experiment. While the values themselves are random, we can predict the likelihood of getting those values based on the probability distribution.

Q2. True random numbers are generated from a truly unpredictable source, while pseudo-random numbers are generated through a deterministic algorithm. While the latter are not truly random, they are considered "good enough" because they are sufficiently unpredictable and can emulate random behavior for many practical purposes.

Q3. The two main factors that influence the behavior of a normal distribution are the mean (average) and standard deviation. The mean specifies the center of the distribution, while the standard deviation determines the spread or dispersion of the data.

Q4. An example of a normal distribution in real life is the distribution of heights or weights of a population. The distribution is bell-shaped, with most people clustered around the mean and fewer people at the extreme ends of the range.

Q5. In the short term, the behavior of a probability distribution can be unpredictable due to random variation. However, as the number of trials grows, the distribution is likely to converge to its expected values and become more predictable. This is known as the law of large numbers.

Q6. The random.shuffle function can be used to shuffle a mutable sequence object, such as a list or an array.

Q7. The math package in Python contains functions related to mathematical operations, such as trigonometric functions, exponential and logarithmic functions, rounding and absolute value functions, and constants like pi and e.

Q8. Exponentiation and logarithms are inverse operations. If a^b = c, then log\_a(c) = b. In other words, exponentiation finds the result of raising a to the power of b, while logarithms find the power to which a must be raised to obtain c.

Q9. The three logarithmic functions that Python supports are natural logarithm (math.log), base-10 logarithm (math.log10), and custom base logarithm (math.log(x, base)).