ASSIGNMENT - 21

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

Ans: It's a mathematical function that describes the likelihood of possible outcomes in a given scenario. While individual values might seem random, the distribution defines the probabilities associated with these values occurring. Even though the outcomes are not predictable on an individual basis, the distribution characterizes the likelihood of various outcomes occurring.

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 vs. Pseudo-Random Numbers:

* True Random Numbers: Generated from physical phenomena (like radioactive decay) and are considered truly unpredictable.
* Pseudo-Random Numbers: Generated algorithmically using deterministic processes and a seed value. While not truly random, they exhibit statistical randomness and are often used in applications since they're computationally efficient and statistically "good enough" for many purposes.

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

Ans: The two main factors are the mean (average) and standard deviation. The mean determines the central tendency, while the standard deviation determines the spread or dispersion of the data around the mean in a bell-shaped curve.

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

Ans: Heights of people in a population often follow a normal distribution. For instance, if you were to measure the heights of many individuals from a specific region and plot them, it's likely that the distribution would resemble a bell-shaped curve, with most heights clustered around the average height.

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 its theoretical probabilities due to randomness. However, as the number of trials increases, the observed distribution is more likely to resemble the expected distribution defined by the probabilities.

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

Ans: Lists are commonly shuffled using random.shuffle() in Python. This method randomly reorders the elements within a list.

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

Ans: The math package in Python includes functions related to mathematical operations (like trigonometry, logarithms, exponentiation, etc.) and constants (such as pi, e, etc.).

Q8. What is the relationship between exponentiation and logarithms?

Ans: Logarithms and exponentiation are inverse operations of each other. If b is the base and x is the exponent, b^x = y corresponds to log\_base\_b(y) = x.

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

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