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?

A1. A probability distribution is a function that describes the likelihood of obtaining different outcomes from a random experiment. It maps every possible outcome to a probability value between 0 and 1. Even though the values are random, probability theory allows us to make predictions about the likelihood of different outcomes based on the distribution of probabilities.

A2. True random numbers are generated from natural sources of randomness, such as radioactive decay or atmospheric noise. Pseudo-random numbers, on the other hand, are generated algorithmically and appear random, but are actually deterministic. They are considered "good enough" for most applications because they are difficult to predict and appear random in most contexts.

A3. The two main factors that influence the behavior of a normal probability distribution are the mean (average) and standard deviation (a measure of how spread out the data is). The mean determines the location of the peak of the distribution, while the standard deviation determines the width of the curve.

A4. A real-life example of a normal distribution is human height. In most populations, the distribution of heights follows a bell-shaped curve, with the majority of people being of average height and fewer people being either very tall or very short.

A5. In the short term, a probability distribution may exhibit random fluctuations, but over a large number of trials, the distribution will tend to converge to a stable shape. This is known as the law of large numbers. As the number of trials grows, the distribution will become more predictable and closer to its expected value.

A6. The random.shuffle function can be used to shuffle any sequence object in Python, such as a list or a tuple.

A7. The math package's general categories of functions include mathematical constants (such as pi and e), arithmetic functions (such as square roots and exponentiation), trigonometric functions (such as sine and cosine), logarithmic functions (such as logarithm and natural logarithm), and miscellaneous functions (such as factorial and gamma function).

A8. Exponentiation and logarithms are inverse operations. Exponentiation is the process of raising a base number to a given power, while logarithms are the inverse operation that tells us what power we need to raise the base number to in order to obtain a given value.

A9. Python supports three logarithmic functions: math.log(x, base) computes the logarithm of x with respect to the given base (default is e); math.log10(x) computes the logarithm of x with base 10; and math.log2(x) computes the logarithm of x with base 2.