Assignment 21 Solutions

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 statistical function that describes all the possible values and likelihoods that a random variable can take within a given range. These factors include the distribution's mean (average), standard deviation, skewness, and kurtosis.

If the values are meant to be random, we can predict them using following steps:

Step 1: List all simple events in sample space.

Step 2: Find probability for each simple event.

Step 3: List possible values for random variable X and identify the value for each simple event.

Step 4: Find all simple events for which X = k, for each possible value k.

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: : The difference between True Random Numbers are true physical values while pseudo-random numbers are generated internally by a program . Latter is considered good enough as they have sort of uniform distribution. Pseudo random numbers are generated by computers using an algorithm (there are many) and a seed (either chosen by the user or, sometimes, clock time). They are not strictly random as, if you start with the same seed and same algorithm. A truly random number, on the other hand, is completely unpredictable. There is no way to generate a series of truly random numbers via computer; the usual ways are flipping coins, throwing darts, rolling dice and other physical processes.

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

Ans: Normal Probability Distribution are influenced by two factors: Mean and Variance.

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

Ans: Rolling A Dice

A fair rolling of dice is also a good example of normal distribution. In an experiment, it has been found that when a dice is rolled 100 times, chances to get '1' are 15-18% and if we roll the dice 1000 times, the chances to get '1' is, again, the same, which averages to 16.7% (1/6).

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: Depends on the data for the distribution. it initially wil be rising and after a certain threshold achieving it it will go down.

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

Ans: lists (`list`), strings (`str`) and tuples (`tuple`) objects can be shuffled by using `random.shuffle` .

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

Ans: The Math package's general categories of functions are:

1. Trigonometric functions
2. Quadratic functions
3. Exponential functions
4. Hyperbolic functions
5. Periodic functions
6. Arithmetic functions
7. Logarithimic functions
8. Conversions to Integer

Q8. What is the relationship between exponentiation and logarithms?

Ans: Logarithmic functions are the inverses of exponential functions. The inverse of the exponential function y = a^x is x = a^y. The logarithmic function y = log_a^x is defined to be equivalent to the exponential equation x = a^y.

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

Ans: The Three Logarithmic Functions that Python supports are:

1. `log2(x)` - logarithmic value of x to base 2
2. `log10(x)` - logarithmic value of x to base 10
3. `log1p(a)` - This function is used to compute logarithm(1+a) .