Question

1. A discrete random variable can be described by the Binomial distribution if it satisfies four conditions. List each of these conditions.

Solution

The number of experiments n is fixed.
Each experiment is independent.
Each experiment represents one of two outcomes ("success" or "failure").
The probability of "success" p is the same for each outcome.

Question

2. Statistics show that 40% of Zimbabweans adults drink beer. If six Zimbabweans adults are randomly selected, calculate the probability that four drink beer.

Solution

Using Binomial distribution:

$$P(x = 4) = \frac{6!}{2!\,4!} \cdot 0.4^4 \cdot 0.6^{6-4} = 0.13824$$

Question

3. The average mark (in percentage) for an Economics test comprising of 300 students is 54%. If the marks are normally distributed with a standard deviation of 8%, determine the number of students with a mark over 70%.

Solution

$$P(x > 70) = 1 - P\left(z < \frac{70 - 54}{8/\sqrt{300}}\right) = 1 - P(z < 34.64) = 1 - 0.9999 = 0.0001$$

4. Differentiate between the following terms as used in statistics:

Question

a. Ordinal Scaled data and Nominal-scaled data

Solution

Nominal scales are used for labeling variables, without any quantitative value; with ordinal scales, it is the order of the values is what's important and significant, but the differences between each one is not really known

Question

b. Discrete Data and Continuous data

Solution

Discrete Data can only take certain values; Continuous Data can take any value (within a range)

Question

c. Observation and experimentation

Solution

In experiments, the researcher will undertake some experiment and not just make observations; in observational study, the researcher simply makes an observation and arrives at a conclusion.