Quiz

1. Probability distribution formula (PDF) of a random variable can be obtained from the cumulative distribution function (CDF) by

      I.   Integrating CDF   II.   Differentiating CDF

      III.   By inverting CDF   IV.   PDF cannot be obtained from CDF

2. If a probability distribution has positive skewness then

      I.   Mean of the data equals median   II.   Mean is greater than median

      III.   Mean is smaller than median   IV.   Any of these conditions may exist

3. When the sample size is large, parameters estimated by the maximum likelihood method are

      I.   Biased   II.   Unbiased

      III.   Biased irrespective of sample size   IV.   None of the above.

4. In statistical test, a significance level of 0.05 implies that

      I.   The decision of statistical test may be in error 5 times.

      II.   The decision of statistical test may be in error one time out of 20.

      III.   The results are significant only if the test carried out 5 times.

      IV.   None of the above.

Tutorial

1. Annual rainfall for a city for 10 years from 1980 to 1989 is given below.

Year	Annual Rainfall (mm)
1980	840
1981	940
1982	1120
1983	985
1984	1070
1985	901
1986	1187
1987	884
1988	993
1989	1065

Compute the coefficient of variation and the coefficient of skewness of the data ?

2. In a goodness of fit test, the data were divided into 11 classes and the value of chi-square turned out to be 11.95. If two parameters of the distribution were determined from the data, test whether the chosen distribution is suitable at 5% significance level. Some values of chi-square

which may be useful are: $\chi^2_{5,5} = 11.07$, $\chi^2_{5,8} = 14.07$, $\chi^2_{5,10} = 18.31$.

3. The mean annual flood of a river is 32,000 cumec and the standard deviation of flood peaks is 6000 cumec. Assume that the peaks follow the Gumbel distribution. What is the probability of a flood of magnitude of 45,000 cumec occurring in the river within the next 5 years?

4. The peak discharge (m^3/s) at a given gauging site are given as

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989
Peak Discharge	4530	2750	1695	4015	3122	1984	2271	5909	3542

Assuming that the data fallows log normal distribution, find:
   a) The discharge for a 40-year return period flood, and
   b) The return period for a discharge of 4500 m^3/s.

Case Study

Write a short note on hypothesis testing, clearly bringing out the need for it and briefly describing two commonly used tests in the field of hydrology.

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