

Fundamentals

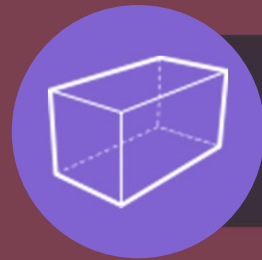
Statistical and Geostatistical Data Analysis

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Fundamentals

Summary

Concept summary

- **Inferential statistics:** is the process to obtain generalizations on the total (called the population) by examining only a part (called the sample).
- **Random variable:** This is a function, denoted by X , that takes values over a sample space Ω associated with a random experiment.
- **Examples:**
 1. Heads or tails
 2. Dice throwing
 3. Lotto
 4. Element grade

Concept summary

- Expectation

$$\mu = E(X) = \int xp(x)dx \quad \mu = E(X) = \sum_{n \in N} np(n)$$

- Variance

$$\sigma^2 = var(X) = E\{(X - \mu)^2\} = E(X^2) - \mu$$

- Standard deviation

$$\sqrt{\sigma^2}$$

Concept summary

- Experimental Mean

$$\bar{X} = \frac{1}{n} \sum_{i=1}^n X_i$$

- Experimental Variance

$$S^2 = \frac{1}{n-1} \sum_{i=1}^n (X_i - \bar{X})^2$$

Properties

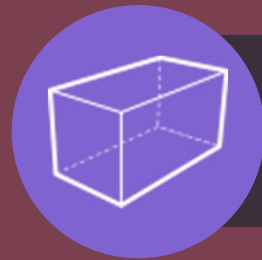
$$E(\bar{X}) = \mu$$

$$\text{var}(\bar{X}) = \frac{\sigma^2}{n}$$

$$E(S^2) = \sigma^2$$

- Parameters of the population and sample are different

Population	Sample
μ	$\bar{x}$
σ^2	s^2



Problems



Problem 1:

- The copper grade has been measured on 20 samples taken in a stock pile.
- It is of interest to know how many samples are necessary in order to estimate the average copper grade of the stock pile with a typical error less than 0.01%Cu.



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Problem 2:

- Let X be a Normal random variable $N(m,s)$ and $Y=e^X$ a lognormal random variable.
- Calculate the expectation and median of Y . Determine the expectation of geometric mean of a sample of Y of size n .