

3. seminar

Problem 1

The given values 10,12,8,16,9 are considered to be the realization of the random sample from the distribution with the expected value μ , the variance σ^2 and the distribution function $F(x)$. Calculate the realization of sample mean, sample variance, sample standard deviation and construct a graph of the sample distribution function.

Problem 2

The test results from two subjects of 8 randomly drawn students are available:

Student's number	1	2	3	4	5	6	7	8
Score in the 1st test	80	50	36	58	42	60	56	68
Score in the 2nd test	65	60	35	39	48	44	48	61

Calculate and interpret the sample correlation coefficient. To make calculation easier use the following sums:

$$\sum_{i=1}^8 x_i = 450, \quad \sum_{i=1}^8 y_i = 400, \quad \sum_{i=1}^8 x_i^2 = 26\,684, \quad \sum_{i=1}^8 y_i^2 = 20\,836, \quad \sum_{i=1}^8 x_i y_i = 23\,214,$$

Problem 3

Let X_1, \dots, X_n be a random sample from distribution with the expected value μ and the variance σ^2 . Find the expected value and the variance of the sample mean and the expected value of the sample variance.

Problem 4

Consider a large year-class at university, taking exams from statistics. Assume, that its test score follows the normal distribution with expected value 72 and the standard deviation 9. Find the probability, that:

- the score of randomly drawn student will be greater than 80 points.
- the mean of the score of 10 randomly drawn students will be greater than 80 points.

Problem 5

Let X_1, \dots, X_n be a random sample from a distribution with a distribution function $F(x)$, $n \geq 2$. For any fixed real number x calculate the expected value and the variance of the sample distribution function $F_n(x) = \frac{1}{n} \text{card}\{i; X_i \leq x\}$.

Problem 6

Derive a joint probability function of a random sample from an alternative (Bernoulli) distribution $A(\vartheta)$.