

2. seminar

Problem 1

$\vartheta = 0.9$ is the probability of manufacturing the first quality product. The absolute difference of the relative frequencies of the first quality product and the probability ϑ should be less than 0.03 with the probability at least 0.99. How many products have to be tested so that the stated conditions hold? Use the Bernoulli theorem and Moivre-Laplace theorem and compare the results. (Why do they differ?)

Problem 2

The number of misprints on one text page is a random variable with the mean value 8 and a standard deviation 2. Find the probability that there will be at most 750 misprints on 100 pages. (We assume the numbers of misprints on particular pages to be mutually independent.)

Problem 3

Assume that the insurance company has 10 000 clients, all of them are of similar age and social status. According to the statistical data the probability of client's death in this group during given year is 0.006. Any insured has to pay 120 Kč at the beginning of the year; in case of his death the relatives obtain 10 000 Kč. Find out the probability that a) the profit of the company will be within limits of 400 000 and 800 000 Kč. b) the company will be in loss during the given year.

Problem 4

Consider a sequence of 100 independent trials, where the probability of the success in each trial is 0.3. What is the probability, that the number of successes will be within the limits of 20 and 40?

Problem 5

We would like to test the water-finding ability of a person who claims he is a water-finder. Thus we design an experiment in this way: 100 pairs of covered buckets are put to the tested person. In each pair one bucket is empty and the other one is water filled. Let Y_n be a random variable giving the number of successfully identified bucket pairs if the person does not have any water-finding ability. Find the probability that Y_n exceed the natural number y ? (Calculate for $y = 55, 60, 65$)

Problem 6

Sitting for an exam a student has to tick one correct answer of three possible answers for each of 41 questions. Find the probability that the unprepared student will nick at least 31 right answers.

Problem 7

The supplier provides a production line and the customer is going to accept it if the number of defective products among the first 10000 products does not exceed 9 wasters. The manufacturer should force down the probability ϑ of defective products so that the production line would be accepted with the probability at least 0.99. Find out ϑ which meets stated conditions.