

6. seminar

Problem 1

6 equally-old piglets were drawn randomly from a population of a particular race and they had been served superalimentation (fattening diet) for a half year. For any piglet the mean daily increases in weight were recorded (in Dg.): 62, 54, 55, 60, 53, 58. We know from previous experiments that weight increases follow the normal distribution. At the significance level $\alpha = 0.05$ find

- a) the lower estimate for the unknown expected value μ
- b) the interval estimate for the standard deviation σ .

Problem 2

A dairy wishes to keep up an upper bound for a variance of a fat content in its milk (in percentages). If the assumed fat content is $\mu\%$ then the fat content in a particular milk bottle should not deviate from this value too much. For the dairy the standard deviation at most $\sigma = 0.1\%$ of the fat content is acceptable. 20 milk bottles were drawn randomly and we have measured out the following percentage values of the fat content:

1.83; 2.22; 1.98; 1.88; 1.95; 1.78; 2.03; 2.23; 1.63; 1.84; 2.00; 2.07; 2.02; 2.05; 2.12; 1.91; 2.06; 2.15; 1.89; 1.91. We assume the milk fat content to be normally distributed.

- a) At $\alpha = 0.05$ run a test $H_0 : \sigma \leq 0.1$ versus $H_1 : \sigma > 0.1$. Use a classical method.
- b) Run the same test using an interval method.
- c) If X denotes the milk fat content find the probability:
 $P(|X - \mu| > \sigma)$
 $P(|X - \mu| > 3\sigma)$

Problem 3

It is known that the tallness of boys in age 9,5 to 10 years follows the normal distribution. A pediatrician drawn randomly 15 boys of considered age and calculated the sample mean value $m = 139,13cm$ and the sample standard deviation value $s^2 = 39,2cm^2$. According to his opinion the tallness should not exceed 142 cm. Can we accept the pediatrician's assertion? (At $\alpha = 0.05$.) Use both classical testing method and interval testing method.

Problem 4

6 new cars of particular brand were drawn randomly and after some period the differences between front left tyre and front right tyre abrasion were recorded: 0.3, -0.1, 0.2, -0.2, 0.1, 0.2. We assume that the both random variables giving the attrition of the left or the right tyre are normally distributed. At the confidence level 90% decide if the abrasions of the front tyres are equal.