List of tasks 3. (MATHEMATICAL STATISTICS)

1. Give the examples populations and samples.
2. Give the differences between parameter end estimator.
3. For vector $\mathbf{X} = (3, 7, 1, 9, 4, 3, 6, 2, 5, 5, 5, 3, 2, 3, 1, 5)$ calculate mean, variance, standard deviation and median.
4. The file *file1.txt* contains information about the number of points gained by 100 students at the test in statistics. In based on these data:
   (a) calculate the mean
   (b) calculate the median
   (c) calculate the standard deviation; how to interpret this result?
   (d) how many students got the lowest/highest number of points?
   (e) plot the histogram and boxplot and interpret them
   (f) change three of randomly chosen values on 30, 40 and 50. How it influence on boxplot?
5. Calculate estimators of mean and the standard deviation for the height of students form file *file2.txt*:
   (a) for a few randomly chosen subsamples.
   (b) for whole sample
6. The standard deviation of measured heights is 9.53 cm. Determine the standard error of the mean in a sample of size 50.
7. The 99% confidence interval is $[5,02,\ 6,98]$. The assumption is that the trait is normally distributed? What is the value of the mean?
8. From normally distributed population with unknown mean and know standard deviation equal to 0.5, representing the percentage of given component in fertilizer, chosen the sample: 2.8, 2.9, 3.2, 3.0, 3.0, 3.1. Determine the confidence interval for mean on the confidence level 0.99. How we can interpret the results.
9. A random sample of 100 students was surveyed, and the mean number of books that they had rented in the past month was 6.4 with standard deviation equal to 5. Calculate the 95% confidence interval for the mean.

10. Suppose we would like to estimate the mean amount of money spent on books by students in a semester. We have the following data from 10 randomly selected students: $\bar{X} = 249$ and $S = 30$. Assume that the amount spent on books by students is normally distributed. Compute a 95% confidence for mean.