List 8

Excercise 1. The percentage of cellulose in wood of a certain species from two different regions of Poland was investigated. For region I, 8 wood samples were analyzed and their mean cellulose content was 29.13 and the standard deviation was 4.59, while for region II, the mean of 33.14 and standard deviation 7.44 were obtained from 21 tested wood samples. At significance level 0.02: verify the hypothesis that the average cellulose content for region I differs significantly from the average cellulose content for region II. Assume the normality of the distribution of the examined feature.

Excercise 2. We measured the distances obtained by the two pole vault jumpers. The results are as follows [in meters]:
Player I: 6.01, 5.48, 5.92, 6.12, 5.76, 5.88
Player II: 5.32, 5.66, 5.87, 5.99, 5.59
Assuming that the distribution of scores is normal, at the significance level of 0.02 verify the hypothesis about greater regularity of the first player's scores.

Excercise 3. We study the effect of a supplement on improving the amount of a certain vitamin in the human body. People were divided into two groups and given a supplement. Studies have shown that 250 out of 300 people in the first group improved the elemental composition in the body. On the other hand, in the second group, which consisted of 220 people, 135 showed an improvement in the amount of the tested vitamin. At the significance level of 0.01, verify the hypothesis about a greater percentage of people susceptible to the supplement in the first group.

Excercise 4. The assembly time of a certain detail was compared with two different tools. Time was measured 11 times for the first tool and 14 times for tool number two. The following results were obtained in seconds:

Tool I: 8.9, 9.5, 9.0, 9.4, 9.9, 8.7, 9.1, 9.1, 9.3, 8.9, 9.3

Tool II: 9.6, 8.5, 8.9, 9.4, 9.5, 9.3, 8.4, 9.0, 9.7, 9.2, 9.0, 9.1, 8.9, 9.4

The tool operator assumed that the average assembly time for the detail for the first tool is longer than for tool II. We assume that the distribution of the clamping time is normal. At the significance level of 0.1, on the basis of the above samples, can we conclude that the above assumption is true?

Excercise 5. Two different raw materials are needed to produce the necessary parts for an autonomous machine. The consumption of two raw materials per one piece of machine produced was tested and the results in kilograms were obtained:

Raw material I: 4.6, 3.9, 4.3, 4.5, 4.4

Raw material II: 5.1, 4.6, 6.5, 4.1, 4.1, 3.9

Assuming that the consumption of two raw materials is a random variable with a normal distribution, at the significance level 0.02 verify the hypothesis that the average value of raw materials used is the same.

Excercise 6. Two different age groups were surveyed to see if they would go to the elections in the upcoming vote. The first group consisted of people up to 45 years of age, and the second group consisted of people over 45 years of age. Among 450 respondents from the first group, 310 people expressed their willingness to participate in the elections. In the second group, 305 people were interviewed and 231 of them declared that they would vote in the elections. At the significance level of 0.1, verify the hypothesis about a greater percentage of people voting in the elections in the second group.

Excercise 7. The average check-in time of passengers at two different airports was examined. The following results were obtained in minutes:

Airport I: 41, 40, 34, 62, 39, 54, 28

Airport II: 30, 51, 46, 27, 31, 29, 35

Assuming the measurements are normally distributed, at a significance level of 0.01 check that the average check-in time is the same at both airports.