List of tasks 4. (Mathematical statistics)

1. In the given factory, seniority (in years) of employees has a normal distribution with an unknown average and a variance equal to 11. A sample of 15 workers were selected from all employees and their seniority was recorded, receiving: $8, 3, 5, 10, 15, 12, 13, 2,\ 1, 8,\ 9, 10, 14, 6, 11$. At the significance level of 0.05, can we tell that seniority of employees is greater than 9 years?

2. From a population of dairy cows, was chosen a sample consisting of 350 individuals. The mean milk yield of selected cows amounted to 4350 kg and standard deviation - 305 kg. It is known that the average milk yield in the country at that time was equal to 4200 kg. Check on the significance level $\alpha = 0.01$ whether the mean milk yield in the among the selected animals differ significantly from the national average.

3. In a certain population, the increase of a randomly selected person has a normal distribution with an unknown average and with a variance equal to 15. It is assumed that the average growth of a person from this population is 175 cm. For 20 randomly selected people the average increase was 170 cm. On the significance level 0.01 verify the validity of those assumption.

4. In a study of a new variant of cauliflower, based on observations 60 vegetables, a mean weight equal to 1.2 kg and estimator for variance 0.4 were obtained. At the significance level $\alpha = 0.05$ verify that the new variety gives bigger cauliflowers, seeing that so far those vegetables had average weight equal to 1 kg.

5. An outbreak of Salmonella-related illness was attributed to ice cream produced at a certain factory. Scientists measured the level of Salmonella in 9 randomly sampled batches of ice cream. The levels (in MPN/g) were: 0.5930.1420.3290.6910.2310.7930.5190.3920.418 Is there evidence that the mean level of Salmonella in the ice cream is greater than 0.3 MPN/g?