

Middle East Technical University

Department of Economics

Econ 206: Statistics for Economists-II

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Question 1

A vice president in charge of sales for a large corporation claims that salespeople are averaging no more than 15 sales contacts per week. As a check on his claim, $n = 36$ people are selected at random and the number of contacts made by each salesperson is recorded for a single randomly selected week. The mean and the variance of the 36 measurements from this random sample were 17 and 9 respectively.

1. Write down the null and alternative hypothesis. Is this a one-sided or two-sided test?
2. Construct a 95% confidence interval for the mean sales contacts per week for the whole population.
3. Does the evidence contradict the vice president's claim? Use a test with level $\alpha = 0.05$.

Question 2

541 customers were asked about their satisfaction with a store and were asked to evaluate it on a scale from 5 (very bad) to 1 (very good). The sample mean was found to be $\bar{x} = 3.68$. From historical data, it is known that the standard deviation of the customer population is $\sigma = 1.21$. Assuming that an evaluation average of 3.75 or higher implies a store with positive customer satisfaction, test the null hypothesis that this year's population mean is 3.75 or higher against the alternative hypothesis that it is less than 3.75.

Question 3

It is known from a fast food chain's sales that sales made in December are on average 20% higher than sales made in November. For the current year, 6 sales points were selected, and the percentage sales increases for December at these points are as follows:

19.2, 18.4, 19.8, 20.2, 20.4, 19.0

Assuming the population is normally distributed, test the null hypothesis that the mean sales increase is 20% against the two-sided alternative hypothesis at a 10% significance level.

Question 4

It is required that the variance of the percentage of unwanted chemical substances in a detergent should not exceed 4%. When 20 random detergent boxes were selected, the sample variance was observed to be $s^2 = 5.62$. Test the null hypothesis that the population variance is not more than 4% at a 10% significance level.

Question 5

In a study investigating the effects of planning on the financial performance of banks, a random sample of 6 "professional planners" showed a mean annual percentage increase in revenue of 9.972 with a standard deviation of 7.470. In another independent random sample of 9 "non-professional planners," the mean percentage increase was observed to be 2.098 with a standard deviation of 10.834. Assuming both populations are normally distributed and have equal variances, find the 90% confidence interval for the difference between the means of these populations.

Question 6

A market research company would like to estimate the average earnings of people with an MBA degree. The earnings are normally distributed. A random sample of 400 people with an MBA degree were selected at random and it was calculated that their mean monthly earnings are 5067 TL with a standard deviation of 985 TL.

1. Establish a 99% confidence interval for the mean earnings of all individuals with an MBA degree.
2. Suppose that Turkstat claims that the average earnings are 4961 TL in 2018 but the market research company believes that the earnings are higher. Formulate the hypothesis and test whether there is evidence supporting Turkstat's claim at a 10% significance level.