

Statistic

Note:

- Use a large, clearly readable Handwriting! If handwriting is not **EASILY readable** points will not be given!
- Unless explicitly mentioned otherwise, we are always interested in the 95% confidence level.
- Please show your work with the steps that yield to the result otherwise points will be subtracted.
- Please answer all questions in the written part.
- It several pages. Make sure to do the entire part.

1. The productivity of a factory's workers is normally distributed with a mean of 64 units/day and a standard deviation of 2 units.

a) What is the probability that a randomly selected worker produces more than 66 units?

b) A Random sample of four workers have been chosen. What is the probability that the sample mean productivity is greater than 66 units/day?

2. You work for the Health Department and you are supposed to estimate the number of times an adult in the U.S. visits a health care professional annually. You take a random sample of 950 people and ask them how many time they visited a health care professional in the previous year. You calculate a sample mean of 4.34 with a sample standard deviation of 4.22.

a) Estimate with 95% confidence how many times an adult in the U.S. visits a health care professional annually.

b) The newest census data shows an adult population of 307,439,000 in the United States. Estimate with 95% confidence the total number of visits to a health care professional by the adult U.S. population.

3. The sample variance of a random sample of the weekly income of 50 CSULB students was found to be $s^2=80$.

a) Can we infer at the 1% significance level that population variance σ^2 is less than 100?

b) Estimate with 95% confidence the variance of the weekly income of CSULB students (Make sure to not confuse the confidence level of part b with significance level of part a).

4. The economic situation finally improves and you want to take the opportunity and fulfill an old dream of yours: Opening a Beach bar in the San Blas Islands of Panama. Before making that investment, you want to make sure your investment is profitable. You need to make sure that the average income of the inhabitants exceeds \$300 per month.

Thus you are facing the following hypothesis:

$H_0: \mu=300$

$H_1: \mu > 300$

You know from a research study that the standard deviation of income is \$50, but the study didn't reveal the average income. So you take a sample of 81 people and ask their average income.

- a) Determine your rejection region for a **significance level of 5%**.
- b) Determine the probability of Type II error. Assume hereby that the concrete value for the alternative hypothesis is: $\mu = 310$
- c) Type 1 error would be here that you wrongly believe that the income of population is more than \$300 and open your Beach bar which will not generate enough income for you to make a living. In a few words explain what would be the type two error here (max 30 words).