

Exam

Applied Statistics

Problem 1	20 Points
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U.S. Bureau of Census wants to estimate the mean family size of all U.S. families at a 99% level. It is known that the standard deviation for the sizes of all families in the United States is 0.6.

How large a sample should the Bureau select if it wants its estimate to be within a margin of error of 0.01?

Problem 2	20 Points
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A company randomly selected nine office employees and secretly monitored their computers for one month. The times (in hours) spent by these employees using their computers for non-job-related activities during this month are given below:

7 12 9 8 11 4 14 1 6

Assuming that such times for all employees are normally distributed, make a 95% confidence interval for the corresponding population mean for all employees of this company.

Problem 3	30 Points
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Suppose that the average household in a city spends 90 € per week with a standard deviation of 14.50 €. You recently took a random sample of 30 households and the results revealed a mean of 84.50 €.

Using a 0.05 level of significance, can it be concluded that the average amount spent per week by a household has decreased?

Problem 4**30 Points**

A farmer wanted to find the relationship between the amount of fertilizer used and the yield of corn. He selected seven acres of his land on which he used different amounts of fertilizer to grow corn. The following table gives the amount (in pounds) of fertilizer and the yield (in bushels) of corn for each of the seven acres:

Fertilizer Used	Yield of Corn
120	142
80	112
100	132
70	96
88	119
75	104
110	136

1. Find the least square regression equation by choosing the fertilizer as an independent variable and yield of corn as a dependent variable.
2. Calculate the coefficients of correlation and determination and explain what they mean.
3. Compute SST , SSR , and SSE .
4. Using the 5% level of significance, perform a t-test to check whether the slope of the regression line on GPA and starting salary is different from zero. Assume that the populations of both variables are normally distributed.
5. Construct a 1% confidence interval for β_1 .