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February 2020
HTW Berlin

Exam
Applied Statistics
Part 1

Choose <u>exactly</u> <u>two</u> of the following four problems. <u>Strike out</u> the one that you have not chosen. Combinations are <u>not</u> allowed

Problem 1 **35 Points**

Suppose we take a sample of seven households from a low- to moderate-income neighbourhood and collect information on their incomes and food expenditures for the past month. The information obtained (in hundreds of dollars) is given in the following table:

Income	Food Expenditure
35	9
49	15
21	7
39	11
15	5
28	8
25	9

1. Find the least squares regression equation by choosing income as an independent variable and food expenditure 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 1% level of significance, perform a t-test to check whether the slope of the regression line on incomes and food expenditure is positive. Assume that the populations of both variables are normally distributed.
5. Construct a 1% confidence interval for β_1.

Problem 2	**35 Points**

A company manufactures computer facilities at three plants located in three different cities. To measure how much employees at these plants know about quality management, a random sample of six employees was selected from each plant and given a quality awareness examination. The examination scores obtained for these 18 employees are listed in the following table:

Observation	Plant 1	Plant 2	Plant 3
1	85	71	59
2	75	75	64
3	82	73	62
4	76	74	69
5	71	69	75
6	85	82	67

1. Conduct a thorough ANOVA at 5% level of significance, supposing that the assumptions required to perform a one-way analysis of variance have been tested positively.
2. Is there enough evidence that the mean number of scores on the exam problem differ between Plant 1 and Plant 3?
3. Construct confidence intervals for each of the population means.

Problem 3	**35 Points**

A computer company introduced recently a new software product. The following data give the times taken (in hours) by people who are somewhat familiar with computers to learn how to use this somewhere:

1.75	2.25	2.40	1.90	1.50	2.75
2.15	2.25	1.80	2.20	3.25	2.60

Assume that the times taken by <u>all</u> persons who are somewhat familiar with computers to learn how to use this software are approximately normally distributed.

1. Construct a 1% confidence interval for the corresponding population mean.
2. The company claims that the mean time it takes how to use this software is not more than 2 hours. Test at the 1% significance level whether the company's claim is true.