

UNIVERSITY OF RUHUNA
DEPARTMENT OF MATHEMATICS

BACHELOR OF SCIENCE (SPECIAL) DEGREE (LEVEL II)
MATHEMATICS
MST 4053: STATISTICS LABORATORY

Assignment No: 06

Semester I, 2010

05/03/2010

1. Psychologists wish to investigate the learning ability of schizophrenic people after they have taken a specified dose of a tranquilizer. Thirteen patients were given the drug, and one hour later they were given a standardized exam. Their scores are listed here.
15, 20, 30, 27, 24, 22, 22, 17, 21, 25, 23, 27, 25
 - a) Construct a stem-and-leaf plot and boxplot. Does it appear bell shaped?
 - b) Construct a normal probability plot. Does it rule out normality?
 - c) Form the descriptive statistics, compare the mean, median, and trimmed mean.
 - d) Find a 95% confidence interval for the mean.
 - e) Generally, patients score around 20 on the exam. Is there statistical evidence that taking the tranquilizer has affected thier scores?
2. The Eocene lake deposits of the Rocky Mountains consits of thinly laminated dolomitic oil shales hundreds of feet thick. It is generally accepted that the laminations are varves, or layered deposits caused by seasonal climatic changes in the rate lake basins. By measuring the thickness of these laminations, scientists record annual changes in the rate of deposotion throughout the lake's history. These data are the thickness (in millimeters) of a varved section of the Green River oil shale deposit near the western shore of one of the major lakes. Use *Grnriv2* data set.
 - a) Does a stem-and-leaf plot or boxplot show any unusual characteristics in the data?
 - b) Check the shape of the distribution with a normal probability plot.
 - c) Does a test of the population mean using $\bar{x}$ as the test statistic seem appropriate?
 - d) Perform a test of significance to determine whether the mean thickness of the varves is less than 8 millimeters. Be sure to state the null and alternative hypotheses and calculate the t statistic and the p -value. State your conclusion so that a geologist without much statistical training could understand it.

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3. According to a recent report, after five years on the job, American workers get an average of 24 days of paid holidays and vacation leave each year. These are the numbers of days of paid holidays and vacation leave taken by a random sample of 35 workers in the American textile industry.

23 12 10 34 25 16 27 18 28 13 14 20 8 21 23 33 13 16 14 38 19 6 11 15 21 10 39 42 25
12 17 19 26 20

- a) Construct a histogram and boxplot of the data. Are there any unusual observations in the data set?
- b) Would the t -test be appropriate for testing a hypothesis about the population mean? Explain.
- c) Test the null hypothesis that the mean vacation leave for textile workers is no different from the mean for all American workers.

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4. A psychologist measures the threshold reaction time (in seconds) for persons subjected to emotional stress and obtains these results.

14.3 13.7 15.4 14.7 12.4 13.1 9.2 14.2 14.4 15.8 11.3 15.0

Is there evidence that the median threshold reaction time is less than 15 seconds?

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5. An experimental lethal drug is injected into mice, and the survival times (in seconds) are recorded. The researcher suspects that the median survival time is less than 45 seconds. From these data, see whether there is evidence to support her theory.

32 37 44 41 65 27 35 29 54 42 38 57 40 24 39
43 82 52 74 25 34 25 47 34 24 38 91 30 35 31

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6. An instructor believes that students who score below 80 on their first test most likely will fail developmental mathematics. In order to determine whether this is a valid predictor, she records the following scores on the first test for all students who failed developmental mathematics in the fall semester of 1995.

84 88 96 87 65 98 41 92 78 70 93 77 39 73 62 74 51 88 100 89
100 79 69 74 69 84 49 65 77 48 61 86 68 90 68 76 67 40 84 77

Is there statistical evidence that the mean score for the students who failed developmental mathematics is less than 80?
