

**UNIVERSITY OF RUHUNA**  
**DEPARTMENT OF MATHEMATICS**  
BACHELOR OF SCIENCE (SPECIAL) DEGREE (LEVEL II)  
MATHEMATICS  
MST 4053: STATISTICS LABORATORY

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**Assignment No: 07**

**Semester I, 2010**

**26/03/2010**

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1. A math achievement test is given to a random sample of 25 high school students. The scores and gender (coded as 1 for girls and 2 for boys) are given in the data set *Achieve*. Is there a significant in the scores for boys and girls?

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  2. A study was undertaken to determine whether taking a particular drug influences one's acquisition of a response. The dependent measurement is the number of trials required to master a given task. A group of 28 subjects are randomly assigned to the experimental and control groups. Those assigned to the experimental group are given the drug, and those assigned to the control group are given a placebo. After a certain period of time, the number of trails to master the task are recorded in the data set *Drug*. Test the hypothesis to see whether the drug has an effect on the dependent measurement.

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  3. These are social adjustment scores for a rural group and a city group of children. Test to see whether there is a significant difference in the social adjustment scores for the two groups of children. Use the data set *Rural*.

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  4. A group of 24 low-ability students of the same age were tested for readings skills and then paired according to ability. One member of each pair was assigned to an experimental reading group and the other to a control group. The experimental group was taught using a new method of reading instruction, and the controal group was taught using the standard method that normally is used with low-ability students . After the period of instruction, all students were given a reading achievement test with these results. Perform a test of significance to determine whether the experimental group performed significantly better than the control group. Use data set *Lowabil*.
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5. A group of women in a large city were given instructions on self-defense. Prior to the course, they were tested to determine their self-confidence. After the course they were given the same test. A high score on the test indicates a high degree of self-confidence. Do these self-confidence scores indicate that the course significantly increased the women's self-confidence? Use the data set *Selfdefe*.
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6. As a test of learning ability, nine randomly selected eighth-graders were given a spelling test. After a 2-week course of instruction, they were given a similar test. Use the data set *Spelling*.

- a) In what way are the two samples matched?
  - b) Is the difference scores are normally distributed?
  - c) With so few scores it may be difficult to verify the normality assumption. Assume that it is met and complete the matched-pairs t-test to determine whether there was improvement in the spelling scores.
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7. In an experiment to evaluate a new variety of corn, 12 plots of land were divided in half, with the new variety planted on one half and a standard variety planted on the other half. The yields obtained on the 12 plots of land are given in the data set *Corn*.

- a) The difference between the yields for the new variety and the standard variety are shown in the boxplot. Does it appear that the assumptions for an inference based on the  $t$  distribution are violated?
  - b) To test the hypothesis that the new variety has a significantly higher yield per acre than the standard variety, what testing procedure do you recommend?
  - c) State the null and alternative hypotheses necessary to conduct the test of significance suggested in part b.
  - d) Apply appropriate test and write your conclusion.
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8. A fourth-grade teacher thinks that his students are on the whole better spellers than his colleague's students. Ten students were randomly selected from each teacher's class and given a standardized spelling test. Use the following results and a computer to determine whether the fourth-grade teacher is justified in his claim. Use data set *Spellers*.

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