

### Independent-samples t-test practice problems

1. An investigator thinks that people under the age of forty have vocabularies that are different than those of people over sixty years of age. The investigator administers a vocabulary test to a group of 31 younger subjects and to a group of 31 older subjects. Higher scores reflect better performance. The mean score for younger subjects was 14.0 and the standard deviation of younger subject's scores was 5.0. The mean score for older subjects was 20.0 and the standard deviation of older subject's scores was 6.0. Does this experiment provide evidence for the investigator's theory?

As part of your answer:

- a. Please provide, in words, the null and alternative hypotheses.
- b. Provide the decision rule for rejecting the null hypothesis, including the critical value(s) for the appropriate statistic.
- c. Using an alpha level of .05, test the null hypothesis. As part of this test, please compare the actual value for the appropriate statistic against the critical value(s) for the appropriate statistic.
- d. State your conclusion regarding the results from this test in language that a friend of yours with no knowledge of statistics could understand.

2. An investigator predicts that dog owners in the country spend more time walking their dogs than do dog owners in the city. The investigator gets a sample of 21 country owners and 23 city owners. The mean number of hours per week that city owners spend walking their dogs is 10.0. The standard deviation of hours spent walking the dog by city owners is 3.0. The mean number of hours country owners spent walking their dogs per week was 15.0. The standard deviation of the number of hours spent walking the dog by owners in the country was 4.0. Do dog owners in the country spend more time walking their dogs than do dog owners in the city?

As part of your answer...

- a. Please state the null and alternative hypotheses.
- b. Provide the decision rule for rejecting the null hypothesis. Include the critical value of the appropriate statistical test as part of your answer.
- c. Using an alpha level of .05, please test the null hypothesis.
- d. State the conclusion you are entitled to draw as a result of this test.

3. An investigator theorizes that people who participate in a regular program of exercise will have levels of systolic blood pressure that are significantly different from that of people who do not participate in a regular program of exercise. To test this idea the investigator randomly assigns 21 subjects to an exercise program for 10 weeks and 21 subjects to a non-exercise comparison group. After ten weeks the mean systolic blood pressure of subjects in the exercise group is 137 and the standard deviation of blood pressure values in the exercise group is 10. After ten weeks, the mean systolic blood pressure of subjects in the non-exercise group is 127 and the standard deviation on subjects in the non-exercise group is 9.0. Please test the investigator's theory using an alpha level of .05. As part of your answer please...

- a. state both the null and alternative hypotheses in words.
- b. include the critical value of the appropriate statistic as part of a decision rule for rejecting the null hypothesis.
- c. show all of your work involved in reaching a decision as to whether the investigator should reject the null hypothesis or not.
- d. state the conclusion the investigator is entitled to draw on the basis of these results.