

Z and T-Tests II

For each of the following problems, please (a) state the null and alternative hypotheses, (b) write a decision rule for rejecting the null hypothesis, (c) calculate the appropriate statistic to use in deciding whether to reject the null hypothesis, (d) state your decision as to whether or not to reject the null hypothesis, and (e) state the conclusion that the investigator is entitled to draw.

1. First graders in the state of Virginia get an average score of 20 on a reading test (higher score reflect higher levels of performance). A teacher is using a new method to teach reading. She predicts that by the end of the first grade, students getting her new method will have significantly higher scores on reading than those in the population. The mean of the 25 students in her class is 23.2 and the standard deviation of the students in the class is 4.7.
2. As part of college entrance requirements, let's say that all first year college students in Vermont are required to take an intelligence test. The mean I.Q. score for all students taking the test is 108. The mean of a sample of 45 students from the University of Vermont is 113. The standard deviation of the population is 8.6. Is the mean of college students from the University of Vermont significantly different from the mean of all first year college students in Vermont?
3. A researcher predicts that job performance by employees at large companies will be significantly lower than the mean for job performance in the entire population of employees in the U.S. The mean of this population on a measure of job performance is 48.55 (higher scores reflect higher levels of job performance). The mean of a sample of 38 employees from large companies is 51.23. The standard deviation of this sample is 8.91. Do the data provide support for the researcher's prediction?
4. The mean number of hours of sleep for adults in the population of the U.S. is 6.8. A researcher believes that the mean number of hours that college students get per night is significantly different from adults in the population. The mean number of hours sleep in a sample of 25 college students is 7.1 hours. The standard deviation of this sample is 0.87. Do the data provide support for the researcher's prediction?