Problem Set 2 Report

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1. **95% confidence interval for the overall average test score.**

Using the t-test function in R, the 95% confidence interval for the overall average test score is calculated to be [59.11, 65.63]

1. **Test the null hypothesis that the overall average test scores (for both schools and for both years combined) is 63 against the alternative that the average is not 63. Use a 5% level of significance.**

Using the t-test function in R with mu (true mean) being 63, we calculated that the p-value of the test is 0.7034 > 0.05, so we failed to reject the null hypothesis. So, with 5% level of significance, the null hypothesis is true, and the overall average test score is 63.

1. **The School District, which encompasses both schools, claims that average test scores increased for both schools between 2014 and 2016. Does the data support the School District’s claim? Verify the claim one school at a time.**

* Lincoln

The result of the t-test (ran by R) has a p-value of 0.009 < 0.05, so we reject the null hypothesis that the average test score for Lincoln school for 2016 is not greater than that for 2014. In other words, the score for Lincoln school for 2016 is (statistically significantly) greater than that for 2014.

* Kennedy

The result of the t-test (ran by R) has a p-value of 0.005 < 0.05, so we reject the null hypothesis that the average test score for Kennedy school for 2016 is not greater than that for 2014. In other words, the score for Kennedy school for 2016 is (statistically significantly) greater than that for 2014.

1. **A county official claims that the performance of fourth graders does not differ between both schools. Does the data support the claim? Verify the claim for 2014 and 2016 separately.**

* 2014:

The result of the t-test (ran by R) has a p-value of 0.03 < 0.05, so we reject the null hypothesis that the performance of the two schools are different in 2014. In other words, the performance of the two schools are not statistically different in 2014

* 2016:

The result of the t-test (ran by R) has a p-value of 0.03 < 0.05, so we reject the null hypothesis that the performance of the two schools are different in 2016. In other words, the performance of the two schools are not statistically different in 2016

1. **A score of 40 is considered a pass. Test the hypothesis that the proportion of students who pass the exam is the same for both schools against the alternative that the proportions are not the same.**

For the test between the proportion of students passing the exam between the two schools, the t-test performed by R gives the p-value of 0.0003 < 0.05, so we reject the null hypothesis. In other words, the proportion of students passing the exam is statistically significantly different between the two schools.

As a piece of additional information, running the one-sided t-test with the alternative hypothesis that the Kennedy school has a larger proportion of students passing the exam gives out the p-value of 0.0001 < 0.005, which indicates that the Kennedy school had a statistically significantly greater proportion of students passing the test, compared to the Lincoln school.

1. **Write a small report (4 or 5 sentences) based on the results from the above questions and any other inference you can deduct from the data. This report is written for a local newspaper and should be non-technical.**

According to the data, both Lincoln and Kennedy Primary Schools have an overall average test score of 63. Additionally, both schools have experienced an increase in test scores from 2014 to 2016. Interestingly, despite the lack of statistical difference between the schools' scores, Kennedy has a larger proportion of students passing the test. These results suggest that while the overall average test scores are similar between the two schools, Kennedy may be more successful in ensuring that a higher proportion of their students pass the test. Overall, both schools should be commended for their efforts to improve student performance.