MAT 243 Project Two Summary Report

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The problem is testing the hypothesis that the mean points scored by a basketball team from 2013 to 2015 are less than 106. The data set used the Miami Heat's scores from 2013 to 2015. The statistical method used is a one-sample t-test, where the sample's mean is compared to a specified value under the null hypothesis. The test statistic and the P-value will be calculated to determine the significance of the hypothesis test at a 1% level of importance.

The Python script analyzes the data of a specific team and the years picked by the user. The assigned team and its range of years are the same as in Project One. The data used in the analysis consists of information on the game\_id, year\_id, fran\_id, points scored by the team and their opponents, elo\_n rating of the team and their opponents, game location, and game result. In addition, the analysis involves using statistical methods to test a hypothesis about the mean points scored by the team during the specified years, compared to a given mean score under the null hypothesis.

To test the hypothesis that the average relative skill level of the team is more significant than 1340, we used hypothesis testing. In hypothesis testing, we start by assuming a null hypothesis, which is the opposite of what we are trying to prove, and then conduct a test to see if there is evidence against it. In this case, the null hypothesis was that the average relative skill level of the team was equal to 1340. The alternative hypothesis was that the average relative skill level of the team was greater than 1340.

The level of significance used in this test was 5%. This means we are willing to accept a 5% chance of being wrong if we reject the null hypothesis. We calculated the test statistic to test the hypothesis, which was 91.19. The p-value was found to be 0.0.

The hypothesis test concludes that we reject the null hypothesis and accept the alternative hypothesis. The low p-value indicates that the chance of observing a test statistic as extreme or more extreme than 91.19 if the null hypothesis is true is very small, i.e., less than 5%. Therefore, we can conclude that the average relative skill level of the team is significantly greater than 1340.

The practical significance of this finding is that the team's management can confidently claim that their team has a higher average relative skill level than the critical level of 1340 in the league. This can be used to support decisions such as investments in player acquisitions or retaining existing players.

In the hypothesis test, the null hypothesis was that the average number of points scored by the team is equal to or greater than 106, represented by H0: μ >= 106. The alternative hypothesis was that the average number of points scored by the team is less than 106, represented by H1: μ < 106. The level of significance was set at 1%.

The test statistic calculated was -13.66, and the P-value was found to be 0.0. Therefore, based on the P-value, we can reject the null hypothesis and conclude that the team's average number of points scored is less than 106.

The practical significance of this result is that the team's coach's hypothesis about the average number of points scored by the team has been confirmed. Furthermore, the result shows that the team has not scored an average of 106 points, which was the threshold set by the coach.

Hypothesis Test for the Population Mean

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| Test Statistic = | 13.66 |
| P-value = | 0.0 |

The hypothesis test for the population proportion is used to test claims about the proportion of successful events in a population. In this case, the management claims that the proportion of games won by the team when scoring 102 or more points is 0.90. The test is conducted to determine if this claim is true or not.

The null hypothesis (H0) states that the proportion of games won by the team when scoring 102 or more points is equal to 0.90, while the alternative hypothesis states that it is not equivalent to 0.90. The level of significance is set at 5%.

The test statistic was calculated as -1.29, and the P-value was 0.1958. Therefore, based on the P-value, we fail to reject the null hypothesis, meaning that there is insufficient evidence to conclude that the proportion of games won is different from 0.90.

The practical significance of this hypothesis test is that it provides a statistical way of evaluating the management's claim. Based on the available data, the test results indicate that it is impossible to conclude that the proportion of games won when scoring 102 or more points is different from 0.90. These findings imply that further research may be needed to support the management's claim. The proportion of games won by your team when scoring more than 102 points in the years 2013 to 2015 = 0.8529

Hypothesis Test for the Population Proportion

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| Test Statistic = -1.29 |
| P-value = 0.1958 |

The hypothesis test compares the difference between two population means by assuming a null hypothesis and an alternative hypothesis. The null hypothesis is that the population means are equal, and the alternative hypothesis is that they are not equal. In this case, the null hypothesis is that the skill level of the assigned team and your team's skill level are equal, and the alternative hypothesis is that they are not equal. The level of significance chosen was 1%.

The hypothesis test results showed a Test Statistic of 47.79 and a P-value of 0.0. The P-value is less than the level of significance (0.0 < 1%) means there is convincing evidence to reject the null hypothesis. This means that we can conclude that the skill level of the assigned team is not equal to the skill level of your team.

The practical significance of this conclusion is that it informs the management that the skill level of your team differs from the skill level of the assigned team. As a result, the management can use this information to make informed decisions about the team's future training and recruitment activities. This information can also be used to compare different teams to identify areas of strength and weakness and make improvements accordingly.

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| Test Statistic = 47.79 |
| P-value = 0.0 |

In conclusion, the hypothesis tests performed in this analysis provide important insights into the performance of the Miami Heat basketball team from 2013 to 2015. The results of the tests support the coach's hypothesis that the team scored an average of fewer than 106 points per game and indicate that the average relative skill level of the team is significantly greater than 1340. However, the results of the hypothesis test for the population proportion did not provide sufficient evidence to support the management's claim that the proportion of games won by the team when scoring 102 or more points is 0.90. Nevertheless, these findings provide valuable information for the team's management to make informed decisions.