# MAT 243 Project Two Summary Report

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## Introduction: Problem Statement

*The coach of the Nuggets requested a data analysis be done on the team’s past performance, specifically the years 2013-2015. We will be using a large historical data set and python programming language to perform this analysis. There are four question the coach asked specifically that will be answered through this study. The first is whether the skill rating of the Nuggets in 2013 – 2015 is higher than 1342 which is a low skill level. To do this we will use a hypothesis test of the mean based on skill score. The second question is whether the mean points scored per game in the years 2013 – 2015 is less than 110 as hypothesized by the coach. To do this we will use a hypothesis test of the mean-based points scored. The third is whether the winning percentage is 50% when the team scores more than 80 points in a game. To do this we will use a proportions z test. The fourth is whether the skill level of the Nuggets 2013-2015 is equal to the skill level of the Chicago Bulls from 1996-1998. To do this we will use a T statistic to study the difference between two population means.*

## Introduction: Your Team and the Assigned Team

Table 1. Information on the Teams

|  | **Name of Team** | **Years Picked** |
| --- | --- | --- |
| 1. Yours | Nuggets | 2013 - 2015 |
| 2. Assigned | Bulls | 1996- 1998 |

## Hypothesis Test for the Population Mean (I)

In hypothesis testing we are attempting to see if the null hypothesis can be rejected or fails to be rejected by comparing data points to the hypothesized value. For conducting this hypothesis test on skill level the null hypothesis and the alternate hypothesis are:

Null Hypothesis <= 1342

The null hypothesis in this test is that our team’s skill level is 1342 or less.

Alternate Hypothesis > 1342

The alternate hypothesis in this test is that our team’s skill level is greater than 1342.

We performed a hypothesis test on the data and are given a test statistic and a p-value. The test statistic is a calculated value comparing the Nuggets skill level to the hypothesized value of 1342. Once we have the test statistic we can calculate the p-value which we can compare to the level of significance that we were set of 0.05. If the p value is less than the significance level our null hypothesis is rejected thus our original hypothesis is accepted. If the p value is more than the significance level our null hypothesis is accepted thus the original hypothesis is rejected.

Table 2: Hypothesis Test for the Population Mean (I)

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 33.59 |
| P-value | 0.0 |

Given our rounded p-value is 0 which is less than the significance level the null hypothesis is rejected thus the skill level of the Nuggets in 2013-2015 is greater than 1342. The Nuggets skill level is above 1342 statistically.

## Hypothesis Test for the Population Mean (II)

In hypothesis testing we are attempting to see if the null hypothesis can be rejected or fails to be rejected by comparing data points to the hypothesized value. For conducting this hypothesis test on skill level the null hypothesis and the alternate hypothesis are:

Null Hypothesis >= 110

The null hypothesis in this test is that our team scored greater than or equal to 110 points on average.

Alternate Hypothesis < 110

The alternate hypothesis in this test is that our team scored less than 110 points on average.

We performed a hypothesis test on the data and are given a test statistic and a p-value. The test statistic is a calculated value comparing the Nuggets points scored to the hypothesized value of 110. Once we have the test statistic we can calculate the p-value which we can compare to the level of significance that we were set of 0.01. If the p value is less than the significance level our null hypothesis is rejected thus our original hypothesis is accepted. If the p value is more than the significance level our null hypothesis is accepted thus the original hypothesis is rejected.

Table 3: Hypothesis Test for the Population Mean (II)

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -7.63 |
| P-value | 0.0 |

Given our rounded p-value is 0 which is less than the significance level the null hypothesis is rejected and the coach’s original hypothesis that the points scored by the Nuggets in 2013-2015 is less than 110 is accepted. The Nuggets points scored is statistically less than 110 for those years.

## Hypothesis Test for the Population Proportion

To test the claim that when the team scores 80 or more points there is a 50% chance that they will win. We will first need to find the number of games won when over 80 points were scored. Then we will divide this by the total number of games the team scored over 80 points. We will then use a z test to see if statistically we are equal to the 50% mark.

In hypothesis testing we are attempting to see if the null hypothesis can be rejected or fails to be rejected by comparing data points to the hypothesized value. For conducting this hypothesis test on skill level, the null hypothesis and the alternate hypothesis are:

Null Hypothesis 50%

The null hypothesis in this test is that the team wins 50% of the games when they score over 80 points.

Alternate Hypothesis 50%

The alternate hypothesis in this test is that our team doesn’t win 50% of the games when they score over 80 points.

We performed a hypothesis test on the data and are given a test statistic and a p-value. The test statistic is a calculated value comparing the Nuggets winning percentage when they scored over 80 points to the hypothesized value of 50%. Once we have the test statistic we can calculate the p-value which we can compare to the level of significance that we were set of 0.05. If the p value is greater than the significance level our null hypothesis is accepted.

Table 4: Hypothesis Test for the Population Proportion

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 0.019 |
| P-value | 0.8461 |

Given our rounded p-value is 0.8461 which is greater than the significance level the null hypothesis is accepted, and we know that the Nuggets win 50% of their games when they score over 80 points.

## Hypothesis Test for the Difference Between Two Population Means

*You were asked to compare your team’s skill level (from its years) with the assigned team’s skill level (from the assigned time frame). You tested the claim that the skill level of your team is the same as the skill level of the assigned team, using a 1% level of significance.*

The goal of hypothesis testing is to provide significance for the acceptance of the null hypothesis. This is done by testing the means of two different entity’s and comparing the data. A p-value is developed, and this number can inform if the hypothesis is accepted or rejected.

In hypothesis testing we are attempting to see if the null hypothesis can be rejected or fails to be rejected by comparing data points to the hypothesized value. For conducting this hypothesis test on skill level, the null hypothesis and the alternate hypothesis are:

Null Hypothesis:

Alternate Hypothesis:

We performed a hypothesis test on the data and are given a test statistic and a p-value. The test statistic is a calculated value comparing the skill level of the Nuggets 2013-2015 with the Bull of 1996-1998. Once we have the test statistic we can calculate the p-value which we can compare to the level of significance that we were set of 0.01. If the p value is greater than the significance level our null hypothesis is accepted.

Table 5: Hypothesis Test for the Difference Between Two Population Means

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 33.18 |
| P-value | 0.0 |

Given our rounded p-value is 0 which is less than the significance level the null hypothesis is rejected and the hypothesis that the points scored by the Nuggets in 2013-2015 is equal to the 1996-1998 Bull is rejected. The Nuggets did not have the same skill set as the Bulls.

## Conclusion

*Describe the results of your statistical analyses clearly, using proper descriptions of statistical terms and concepts.*

* *What is the practical importance of the analyses that were performed?*
* *Describe what these results mean for the scenario.*

* Answer the questions in a paragraph response. Remove all questions and this note before submitting! Do not include Python code in your report.*

## Citations

1. Berrier, J., Chan, C. and Nestler, S., 2019. *MAT 243: Applied Statistics I for Science, Technology, Engineering, and Math*. Copyright © 2016, 2019 Zyante Inc. (zyBooks.com).