# MAT 243 Project Two Summary Report

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**Notes:**

* Replace the bracketed text on page one (the cover page) with your personal information.
* You will use your selected team for all three projects

## Introduction: Problem Statement

In this project, I will use hypothesis testing to analyze some claims made about my team. Using evidence provided, I will attempt to validate these critical claims. Then the management can use these statistically valid findings to help make important decisions to make the team even better. The dataset I will be using is the FiveThirtyEight NBA Elo dataset from Kaggle. And the statistical methods I am using are mean and hypothesis testing.

## Introduction: Your Team and the Assigned Team

The team I chose is the Detroit Pistons for the years 2013 through 2015. And I was assigned the Chicago Bulls for the years 1996 through 1998.

Table 1. Information on the Teams

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

## Hypothesis Test for the Population Mean (I)

The management claims that my chosen team has an average relative skill higher than 1340. Hypothesis testing will test if we can safely assume that hypothesis to be true, by assuming a null hypothesis that my team’s average relative skill is at 1340 at a 5% level of significance, and if the result of that test rejects our null hypothesis then we can safely assume that the alternative hypothesis that the Pistons has an average relative skill higher than 1340 is true.

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 24.96 |
| P-value | 0.0000 |

In conclusion, our hypothesis test found that our test statistic is 24.96. And the probability of getting a result that extreme is less than 1 in 10,000 percent probability. Our p-value is so small, when we round it to four decimal places, it is 0.0000. Therefore, the probability of getting 1340 average relative skill is extremely low and we can reject the null hypothesis and accept the alternative hypothesis that my team has an average relative skill higher than 1340.

## Hypothesis Test for the Population Mean (II)

For this hypothesis test, our null hypothesis is that the average number of points score by the Pistons is 106 points with 1% level of significance. The alternate hypothesis is that they score less than an average of 106 points.

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -11.54 |
| P-value | 0.0000 |

In conclusion, my hypothesis test found our test statistic to be -11.54 and there is less than 1 in 10,000 percent probability of getting that result when using the null hypothesis. Therefore, it is safe to reject the null hypothesis and accept the alternate hypothesis that the Pistons scored an average of less than 106 points.

## Hypothesis Test for the Population Proportion

For this hypothesis test, our null hypothesis states that the proportion of games that the Pistons won when scoring 102 or more points is 0.90, with a 5% level of significance. The alternate hypothesis says that proportion is not 0.90.

Table 4: Hypothesis Test for the Population Proportion

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -7.85 |
| P-value | 0.0000 |

In conclusion, my hypothesis test found that our test statistic is -7.85 and there is less than 1 in 10,000 percent probability of getting that result when we test the null hypothesis. Therefore, it is safe to reject the null hypothesis and accept the alternate hypothesis that the proportion of games that the Pistons won when scoring 102 or more points is not 0.90.

## Hypothesis Test for the Difference Between Two Population Means

For this hypothesis test, I tested the null hypothesis that the skill level of the Pistons is the same as the skill level of the Bulls, using a 1% level of significance. The alternate hypothesis is that the two teams do not have the same skill level.

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 78.72 |
| P-value | 0.0000 |

In conclusion, the test statistic is approximately 78.72 and there is less than 1 in 10,000 percent probability of getting that result when we test the null hypothesis. Therefore, we reject the null hypothesis and accept the alternate hypothesis that the two teams are not at the same skill level.

## Conclusion

Using hypothesis testing, I was able to use data collected to test the claims by management and conclude which claims were true and which ones were not true with high levels of confidence.

## Citations

FiveThirtyEight. (April 26, 2019). FiveThirtyEight NBA Elo dataset. Kaggle. Retrieved from https://www.kaggle.com/fivethirtyeight/fivethirtyeight-nba-elo-dataset/

Bevans, R. (2022, November 18). *Understanding P values | Definition and Examples*. Scribbr. https://www.scribbr.com/statistics/p-value/