# MAT 243 Project Two Summary Report

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## Introduction: Problem Statement

Using the NBA teams chosen from Project One, perform hypothesis tests to find statistical significance of claims made about your team. Each data set will undergo a hypothesis test separately and will then do a hypothesis test together.

## Introduction: Your Team and the Assigned Team

Table 1. Information on the Teams

|  | **Name of Team** | **Years Picked** |
| --- | --- | --- |
| 1. Yours | Los Angeles Lakers | 2013 - 2015 |
| 2. Assigned | Chicago Bulls | 1996- 1998 |

## Hypothesis Test for the Population Mean (I)

Hypothesis testing for a claim about a population uses a threshold mean value and will determine the probability of equivalence to that threshold via the calculated test statistic. Once probability is calculated it is compared to a level of significance (α) to conclude the null’s validity. We will use a t-test function for computation since the standard deviation is unknown.

This test uses two hypotheses: null hypothesis (population mean equal to threshold mean value) and alternative hypotheses (population mean not equal to threshold mean value):

H0: µ = µ0 (null)

Ha: µ > µ0 (right-tailed) Ha: µ < µ0 (left-tailed) Ha: µ ≠ µ0 (two-tailed)

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

H0: µ = 1342 (null) Ha: µ > 1342 (right-tailed) α = 0.05

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 19.4 |
| P-value | *0.0* |

The statistical function used yields a two-tailed probability, so a right-tailed p-value is half. Since, the test statistic is positive we know that the population mean is greater than the null. And with the p-value less than the level of significance, we can reject the null hypothesis in favor of the alternative.

## Hypothesis Test for the Population Mean (II)

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

H0: µ = 110 (null) Ha: µ < 110 (left-tailed) α = 0.01

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -12.68 |
| P-value | 0.0 |

This test has a left-tailed alternative hypothesis that we can also accept, rejecting the null, because the test statistic is negative and the right-tailed p-value is less than the level of significance.

## Hypothesis Test for the Population Proportion

Hypothesis testing for the population proportion involves using the hypothesis proportion, p0, to evaluate the null hypothesis by finding the test statistic and the corresponding p-value. We will then draw conclusions on the null based on the direction of the test statistic and comparison of the p-value with the level of significance.

H0 : p = p0 (null)

Ha : p > p0 (right-tailed) Ha : p < p0 (left-tailed) Ha : p ≠ p0 (two-tailed)

Table 4: Hypothesis Test for the Population Proportion

H0 : p = 0.50 (null) Ha : p ≠ 0.50 (two-tailed) α = 0.05

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -3.27 |
| P-value | 0.0011 |

The alternative hypothesis for this test is two-tailed because the claim focuses only on inequality because teams can either score 80 or more points, or less. Since Ha is two-tailed, the direction of the test statistic is negligible and the p-value is less than the level of significance. This means that we reject the null in favor of the alternative.

## Hypothesis Test for the Difference Between Two Population Means

Testing the hypothesis between two population means compares the relationship between those means. Since the standard deviation is unknown and the populations are unrelated, we will use an unpaired t-test. Using an unpaired t-test function, we will get the test statistic and p-value to compare with the level of significance.

H0 : µ1 = µ2 (null)

Ha : µ1 > µ2 (right-tailed) Ha : µ1 < µ2 (left-tailed) Ha : µ1 ≠ µ2 (two-tailed)

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

H0 : µ1 = µ2 (null) Ha : µ1 ≠ µ2 (two-tailed) α = 0.01

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | 49.51 |
| P-value | 0.0 |

The claim for this test is actually the null hypothesis, so we will assume the alternative is two-tailed. For this test, we must reject the null hypothesis in favor of the alternative because the test-statistic is not or near zero. In the event where the means were similar, the test statistic would be closer to zero. Another verification is that the p-value is less than the significance level.

## Conclusion

The major takeaway here is that the ’96-’98 Bulls are still historically one of the greatest NBA teams (my opinion, supported by partial statistics). Stated in Project One, this study further proves how great the Bulls really were.