# MAT 243 Project Two Summary Report

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Note: Replace the bracketed text on page one (the cover page) with your personal information.

## Introduction: Problem Statement

*Discuss the statement of the problem in terms of the statistical analyses that are being performed. In your response, you should address the following questions:*

* *The relative skill of each team (assigned and my team) based on games won and lost during a specified time.*
* *The data set is the mean relative skill of each team*
* *z-tests and t-tests*

## Introduction: Your Team and the Assigned Team

*In the Python script, you picked the same team and years that you picked for Project One. The assigned team and its range of years will be the same as in Project One as well.*

*See Steps 1 and 2 in the Python script to address the following items in the table below:*

* *Pistons, 2013-2015*
* *Bulls, 1996-1998*

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)

*Suppose a relative skill level of 1420 represents a critically low skill level in the league. The management of your team has hypothesized that the average relative skill level of your team is greater than 1420. You tested this claim using a 5% level of significance. For this test, you assumed that the population standard deviation for relative skill level is unknown. Explain the steps you took to test this problem and interpret your results.*

*See Step 3 in the Python script to address the following items:*

* *The mean is found, then a hypothesis test is run using a z-test or t-test depending on whether the population standard deviation is known or unknown. Based on the results, we are able to determine if we should reject the null hypothesis or not.*
* *Summarize all important steps of the hypothesis test. This includes:*
  1. *. The null hypothesis is the claim that my teams average relative skill is more than 1420 using a 5% level of significance.*
  2. *. The alternative hypothesis would be the converse of the claim. Since the claim is that the mean relative skill of my team is more than 1420, my alternative hypothesis is that it is less than 1420.*
  3. *5% or 0.05*
  4. *Report the Test Statistic and the P-value in a formatted table as shown below:*

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | *-4.99* |
| P-value | 0.0 |

* 1. *The p-value, rounded, is 0.0 which is less than my alpha value of 0.05 so I would reject the null hypothesis.*
* *The implications of this are that the null hypothesis is rejected, which means that my teams average relative skill is not greater than 1420. Since it is stated that 1420 is a critically low average relative skill, this tells me that my team did not do well at all during the specified years.*

## Hypothesis Test for the Population Mean (II)

*Your team’s coach has hypothesized that average number of points scored by your team in the team’s years is less than 110 points. For this test, you assumed that the population standard deviation for points scored is unknown. You tested the claim using a 1% level of significance. Explain the steps you took to test this problem and interpret your results.*

*See Step 4 in the Python script to address the following items:*

* *Summarize all important steps of the hypothesis test. This includes:*
  1. *The null hypothesis is the claim that the average number of points scored by my team is less than 110 during the specified years.*
  2. *The alternative hypothesis would be that the average number of points scored by my team is greater than 110 during the specified years.*
  3. *1% or 0.01*
  4. *Report the Test Statistic and the P-value in a formatted table as shown below:*

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | -17.41 |
| P-value | 0.0 |

* 1. *The p-value is 0.0, which is less than our alpha value of 0.01*
* *The implications of this test are that the p-value is less than the alpha of 0.01 which means that we should reject the null hypothesis. I am confused about this one, since the calculated mean number of points is less than 110. This would imply that the null hypothesis is correct, but the outputs give a p-value that contradicts that. So I am honestly unsure what I have wrong that makes it not make sense.*

## Hypothesis Test for the Population Proportion

*Suppose the management claims that the proportion of games that your team wins when scoring 80 or more points is 0.50. You tested this claim using a 5% level of significance. Explain the steps you took to test this problem and interpret your results.*

*See Step 5 in the Python script to address the following items:*

* *In general, a hypothesis test for population proportion can tell us whether the population proportion matches what the null hypothesis states or if it should be rejected.*
* *Summarize all important steps of the hypothesis test. This includes:*
  1. *The null hypothesis is that the proportion of games my team wins when scoring 80 points or more is 0.50*
  2. *The alternative hypothesis is that the proportion of games my team wins when scoring 80 points or more is not 0.50*
  3. *5% or 0.05*
  4. *Report the Test Statistic and the P-value in a formatted table as shown below:*

Table 4: Hypothesis Test for the Population Proportion

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | *-2481.17* |
| P-value | 0.0 |

* 1. *The p-value is 0.0 which is less than the level of significance of 0.05. So the null hypothesis is rejected.*
* *The calculations match the rest of the information given. The proportion given is 0.3896 which is less than 0.50 so the null hypothesis that they would be equal is not correct and rejecting it is supporting by the p-value. The practical significance is that the team wins games where they score 80 points or more by a proportion of 0.3896, less than the claimed proportion of 0.50*

## 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.*

*See Step 6 in the Python script to address the following items:*

* *Hypothesis testing is used to test claims regarding the differences between two population means using, in this case, a t-test since the population standard deviation is unknown.*
* *Summarize all important steps of the hypothesis test. This includes:*
  1. *The null hypothesis is that the mean skill level of my team is the same as the assigned team.*
  2. *The alternative hypothesis is that the mean skill level of my team is not the same as the mean skill level of the assigned team.*
  3. *1% or 0.01*
  4. *Report the Test Statistic and the P-value in a formatted table as shown below:*

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

| **Statistic** | **Value** |
| --- | --- |
| Test Statistic | *78.72* |
| P-value | *0.0* |

* 1. *The p-value of 0.0 is less than the alpha value of 0.01. This rejects the null hypothesis.*
* *These calculations show that the mean skill level of my team is not equal to the mean skill level of the assigned team. The practical significance of this would be the conclusion that one team has a mean skill level higher than the other, and is therefore the better team. This is shown by the fact that they do not have the same mean skill level, this would imply that one team or the other has a skill level higher than the other, with the other team’s skill level being lower. Looking at the actual calculations for this, we find that the assigned teams mean skill level is the one that is higher. Their mean skill level is 1739.8 and my team’s is 1406.66*

## Conclusion

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

* *The practical importance of the calculations we did is to show the average points scored by two teams during a given time, their mean relative skill level and the proportion of games they each won when they score 80 points or more during a game.*
* *All of this information helps us determine which team performed better, as well as whether either or both teams performed at or above an expected level. We compared them not only to each other but to a predetermined set of parameters. One of these was the predetermined parameter that a team that scores an average of 110 points a game would do well during the regular season. Comparing each team to this parameter as well as to each other gives us information as to how the team will do in regular season overall based on this given average as well as how well they will perform against the other team.*

## Citations

## *Zybooks (2019). MAT 243: Applied Statistics I for Science, Technology, Engineering, and Math*