Title: The Collegiate Study of Heights for students enrolled in Math 171 and Math 301 for Spring 2020.

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Introduction: In this study I have analyzed two sample groups of Sophomores and Juniors. The goal of this study was to determine if this is enough evidence to show a difference between the heights of Juniors and Sophomores. This was done by using two random samples of Juniors and Sophomores in Math 171 and Math 301. I made a hypothesis test and compare the sample means to each other. I used histograms, statistic test, and the P-value to help analyze the distributions. Overall, my results showed that there is not enough statistically significant evidence to suggest any differences in the average heights between Sophomores and Juniors in Math 171 and Math 301 enrolled in Spring 2020.

Data Collection: The population in this study are students registered in Math 171 and Math 301 courses at Longwood University for Spring 2020. The variable investigated in this study are heights are juniors and seniors in math class for the Spring 2020. The height variable is numerical. I obtained my random sample for each population by using my TI-84 Plus calculator. First, I had to "seed" my calculator. This is done by typing a five-digit random number, hitting the store button, then the math button, next you go over to probability and hit number one and enter. Now, for the random sample you hit the math button. Next, you go over to probability and hit the number five. Lastly, in the parentheses you enter the number you want to start with (Lower bound) and then add a comma, then you put the number you want to end with (Upper bound) and then add a comma, then you put in how many random numbers you want and close the parentheses. I used the excel table with my calculator so for sophomores I entered (187, 300, 20) and for the Juniors I entered (74, 156, 20). This is how I got my random sample by using the TI-84 Plus calculator.

Data Description: The Sophomore height is more spread out than the Juniors Height. The Sophomores and the Junior class both fall in similar ranges in reference to their means and standard deviation. The Sophomore class had a taller person with the maximum being 77 whereas the maximum of the Junior class was 76. The Sophomore class also had the shortest person in this sample at 58 versus the juniors 63. Furth more, both classes heights fell into a similar range. The Sophomore heights varied more which is why their data is more spread out. The Juniors data fell closely together which is why their data is more packed together. The average height of the Sophomore fell in the center of the graph making it unimodal. However,

the Juniors graph is left skewed. Overall, the Sophomore and Junior class were very similar with their average heights.

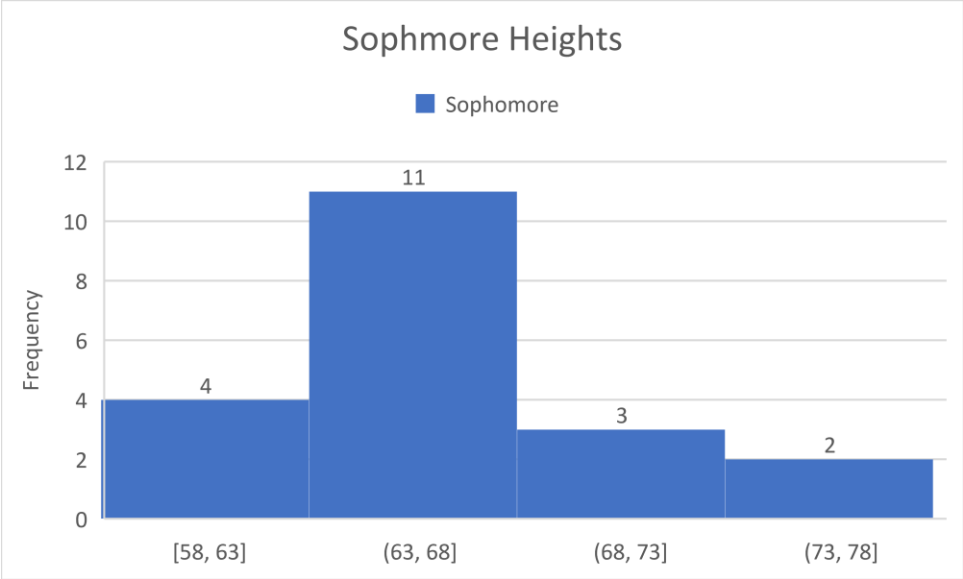**Sophomore Heights**   **Juniors Heights**

Mean: 66.8	**Mean:** 68.7
Standard Deviation: 4.64	**Standard Deviation:** 4.18
N: 20	**N:** 20
Median: 66	**Median:** 68
Minimum: 58	**Minimum:** 63
Maximum: 77	**Maximum:** 76
Q1: 64.5	**Q1:** 65.5
Q3: 69	**Q3:** 70.5

Data Analysis:

1. In a hypothesis test you would normally want your sample size to be larger that 30. However, you can look at the original population to determine if the data is normally distributed. If you have the full population look at it to see if it is approximately normally distributed. The Central limit Theorem allows for the hypothesis test to proceed although the sample sizes are not over 30. If you look back at the original population the sophomore has a size of 114 and the Juniors had a size of 83 making both original populations normally distributed since they are larger than 30. Furthermore, since the original population is normally distributed than the samples are normally distributed.

2. Ho: M1 = M2
    Ha: M1 > M2

3. This is a two-sample means T test statistic. The T statistic is T = -1.36025. The degrees of freedom are DF = 19.

4. The P-value = .90907.

5. Since the P-value (.90907) is greater than the alpha level (.05) we fail to reject the null hypothesis. There is NOT statistically significant evidence to suggest the difference in average heights between sophomore and junior statistics students at Longwood University.

Appendix:

Graph 1:

Sophmore Heights

Frequency vs height intervals for Sophomore:
- [58, 63]: 4
- (63, 68]: 11
- (68, 73]: 3
- (73, 78]: 2

Graph 2:

Junior Heights

Frequency vs height intervals for Junior:
- [63, 68]: 11
- (68, 73]: 5
- (73, 78]: 4