Major Assignment 1

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BANA 6350 040 Quantitative Methods

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June 19, 2024

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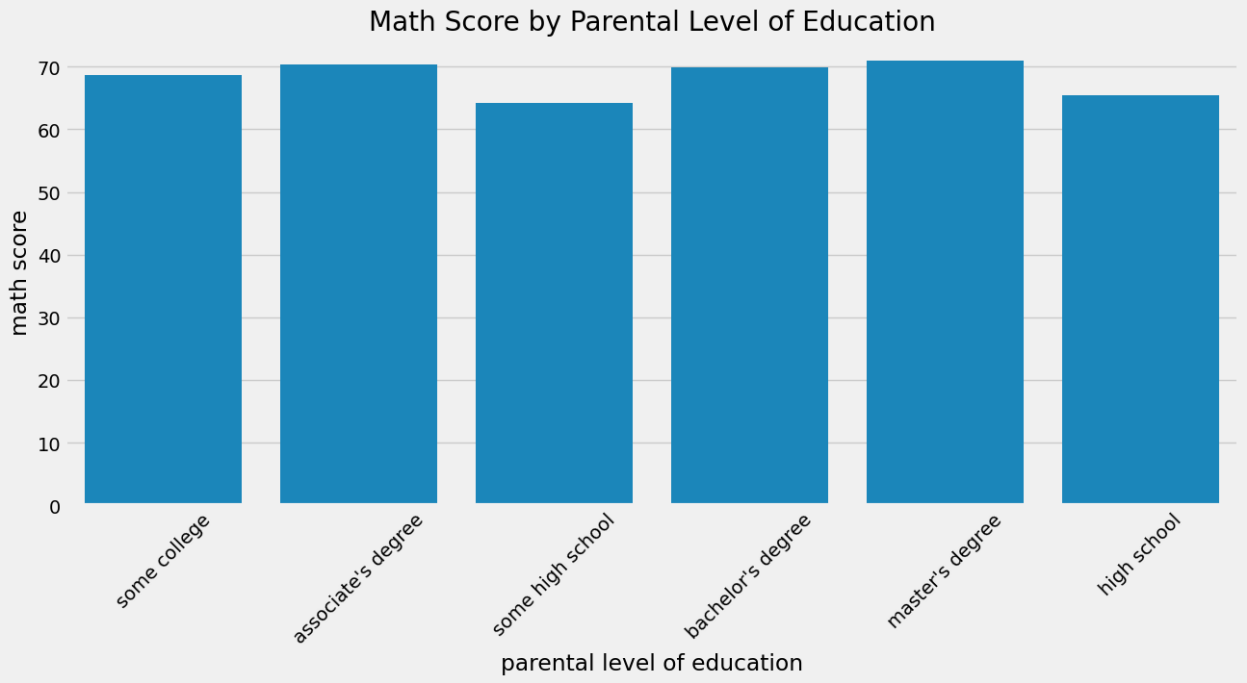
1.

This dataset from Kaggle looks at the grades of a group of high school students. Specifically, their reading score, math score and writing score. Other variables such as their parental level of education, race/ethnicity, if they took the test preparation course, lunch and gender are also included. Below is an analysis of how these variables affect their scores.

Math Score by Parental Level of Education

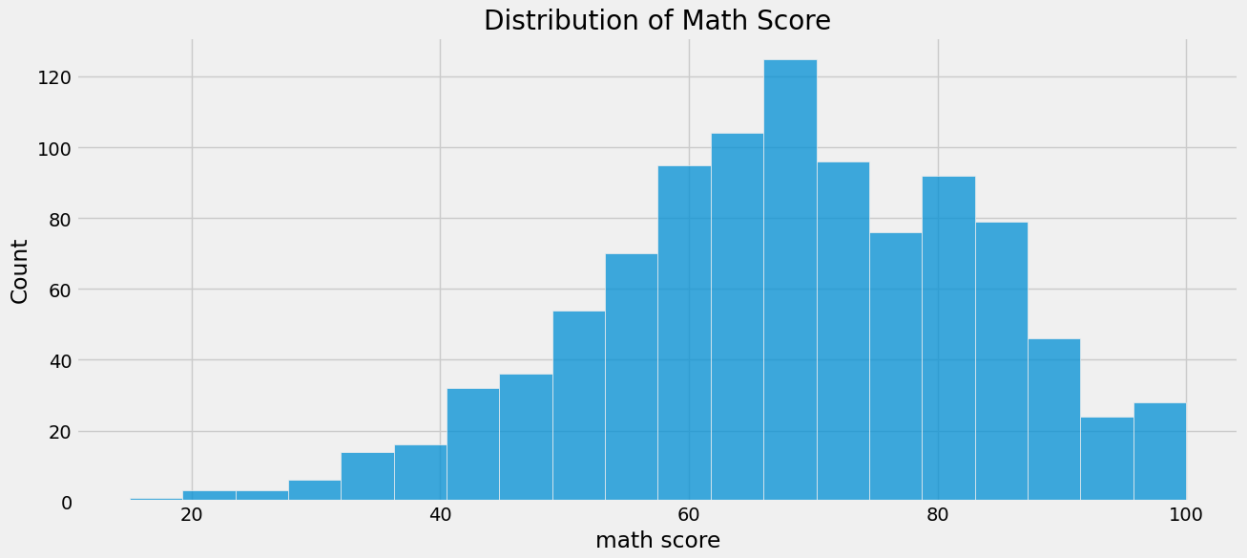
Exploring the relationship between the highest level of education attained by the student's parent(s) or guardian(s) and students Math Scores, there are no extreme differences in the average scores depending on the students Parental Level of Education. There is a slight difference in the average grades of the students whose parents have a degree versus those whose parents do not.

As shown below, the students whose parents did not go to college or finish college have lower average scores in comparison to the students whose parents have an associate's, bachelor's or master's degree. An interesting trend is that the average Math Score is slightly higher the higher the level of parental education with the highest average score being the students whose parental level of education is a master's degree.

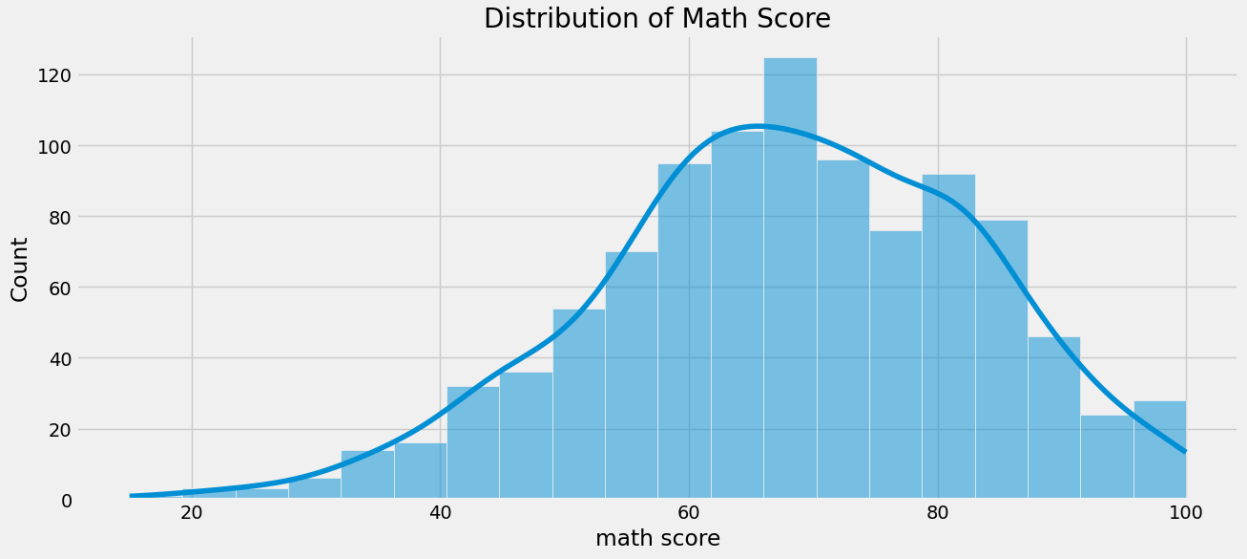


Distribution of Math Score

The majority of the students earned between a 60% - 70% math score. There are a few students (outliers) who got extremely low (below 35) and extremely high scores (above 90). The Math scores range from 20 % - 100% with more students scoring 100% than 20%

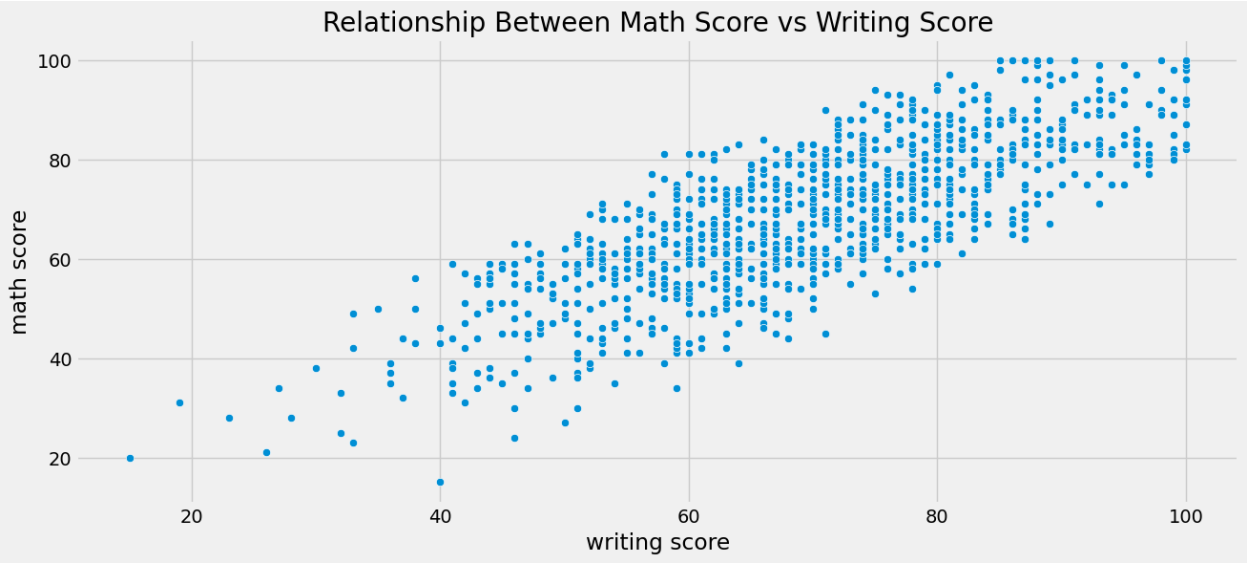


The bell-shaped curve indicates normal distribution of the Math Scores. This means most of the math scores fall within the mid-range of the scale. There is a slight skew to the left, so there are more scores towards the higher end compared to the lower end.



Correlation Between Math Score and Writing Score

The scatterplot below shows that the students who had higher math scores, also had higher writing scores. All students who got 100% in writing got above 80% in math and vice versa. This indicates that students that perform well in math, perform well in writing and those who perform well in writing perform well in math. Also, only a few students scored below 40% in math and writing.



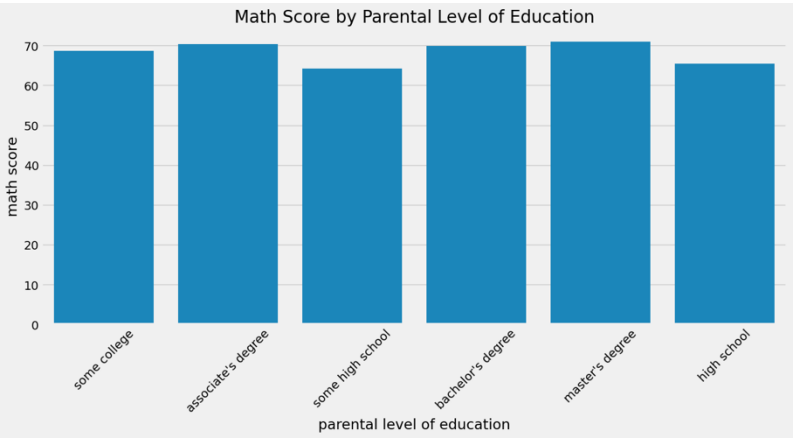
Correlation of Scores

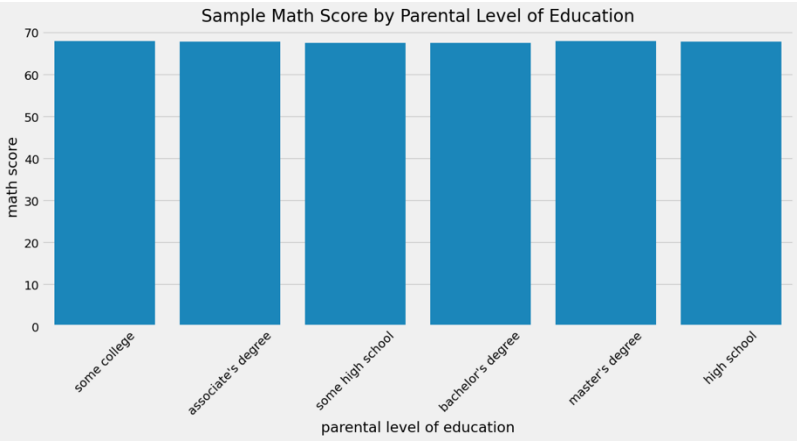
This shows the importance of taking the Test Preparation Course to achieve a higher Math score. Students that took the test preparation course have a higher average of math scores compared to those who did not. When the test preperation course is not taken, there is less likelihood for the students to score more than 80% and more liklihood to score below 50%. With completion of the course, the average Math scores range between approximately 65% - 85%. On the other hand when the course is not taken, the average Math scores range from approximately 55% - 75%

Sampled vs Actual Data

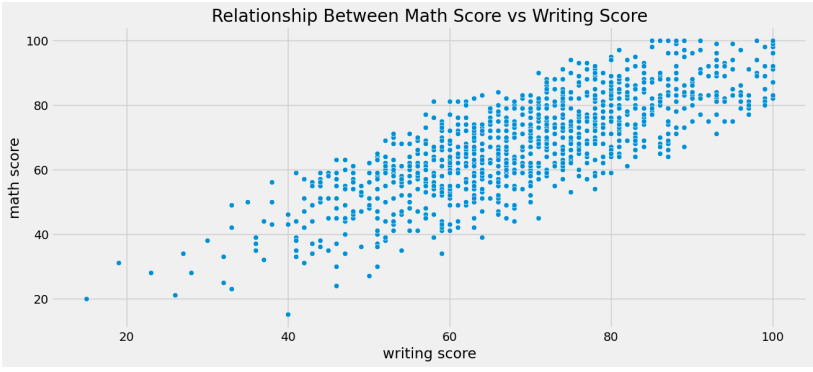
The original data values for the math score were randomly sampled 20 rows at a time, a mean value was calculated, and this process was then repeated 100 times to create the sampled data pool. Below are the results of the sampled data in comparison to the original data to give a more accurate depiction of how the students math scores are affected by various variables.

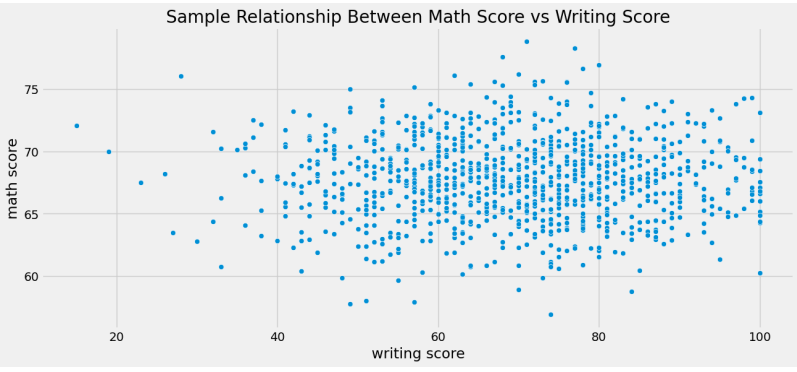
There is less variation in the sampled bar chart showing the relationship between the highest level of education attained by the student's parent(s) or guardian(s) and students math scores. This shows that the parental level of education does not have as much of an impact on the average math scores.



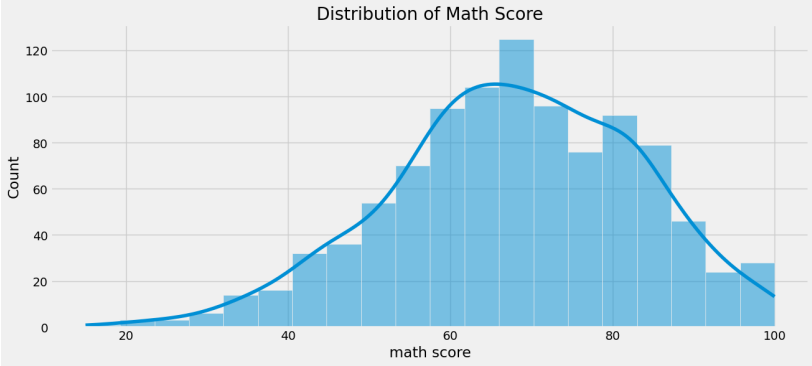


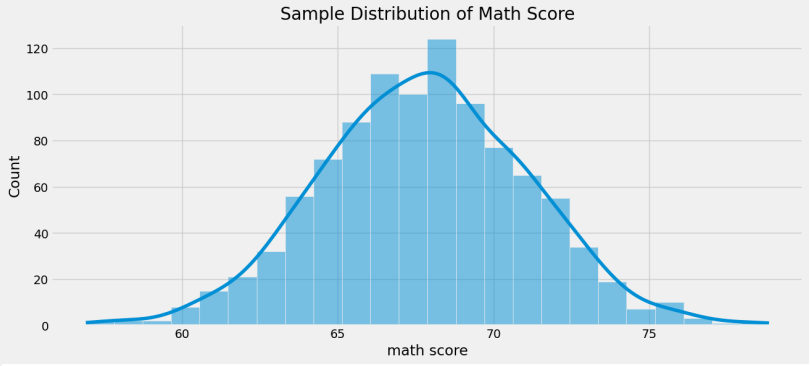
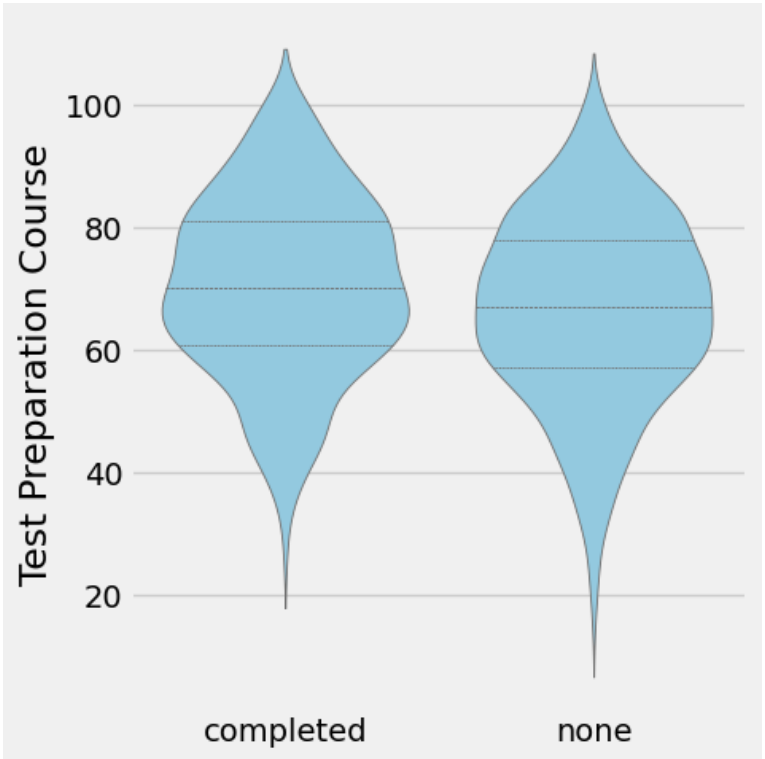
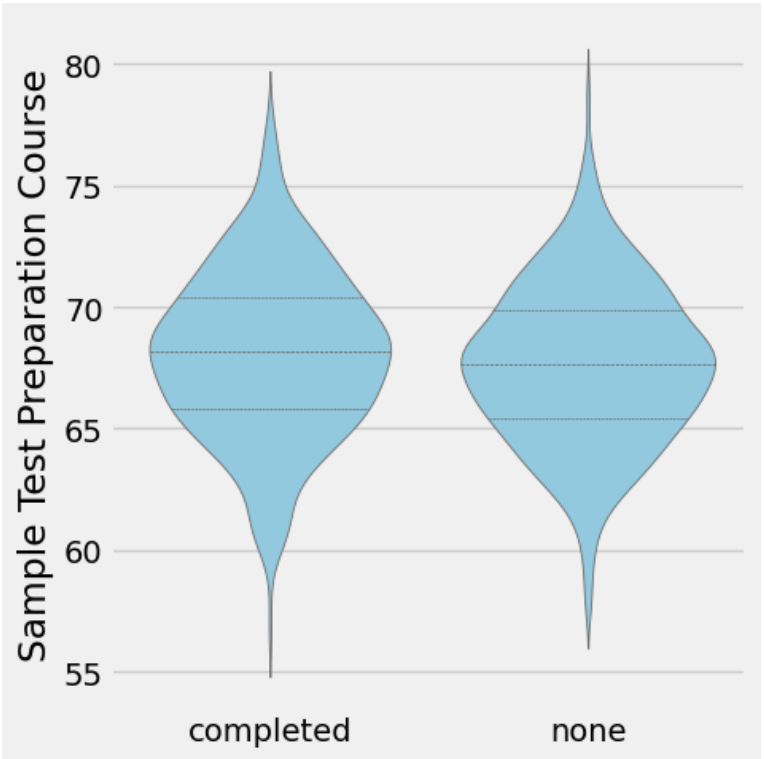
With the sampled data, the average math scores fall between 55% and 80%. There is still a strong linear relationship between the math score and writing score with the majority of students having a similar score for writing and math.





The math score distribution is more normally distributed with the sampled math score data meaning, 68% of the students math scores are between 65% and 70% while 16% are lower than 65% and the other 16% are higher than 70%.





In the sampled data math scores range from approximately 55% to 80% compared to approximately 20% to 100% in the actual data. The average score of students who take the preparation course is still slightly higher and fewer students score below approximately 58% compared to those who do not take the course who have less students scoring higher than approximately 77%. Concluding that taking the test preparation course does improve the students math scores.