

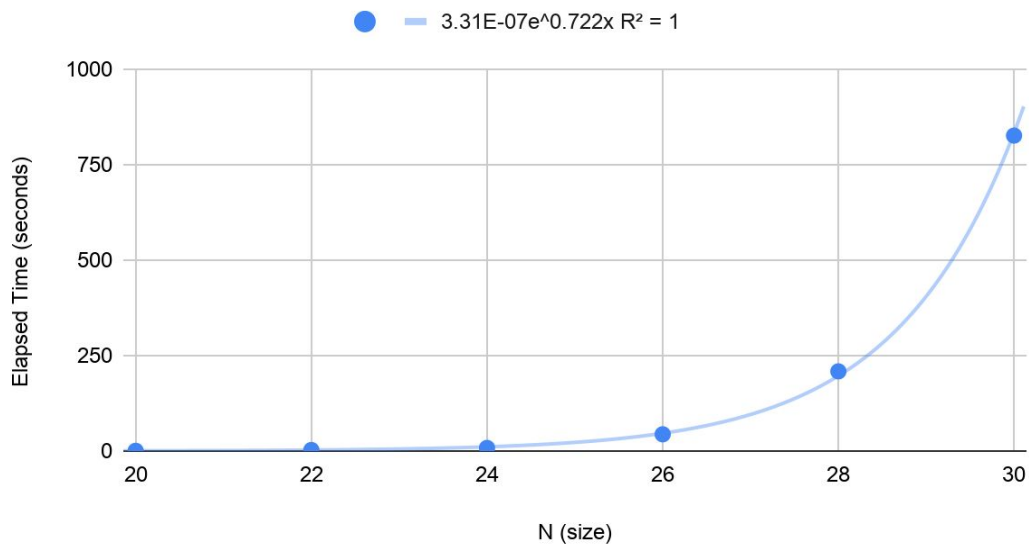
Project 4 Analysis

Group Members: Winson Gin

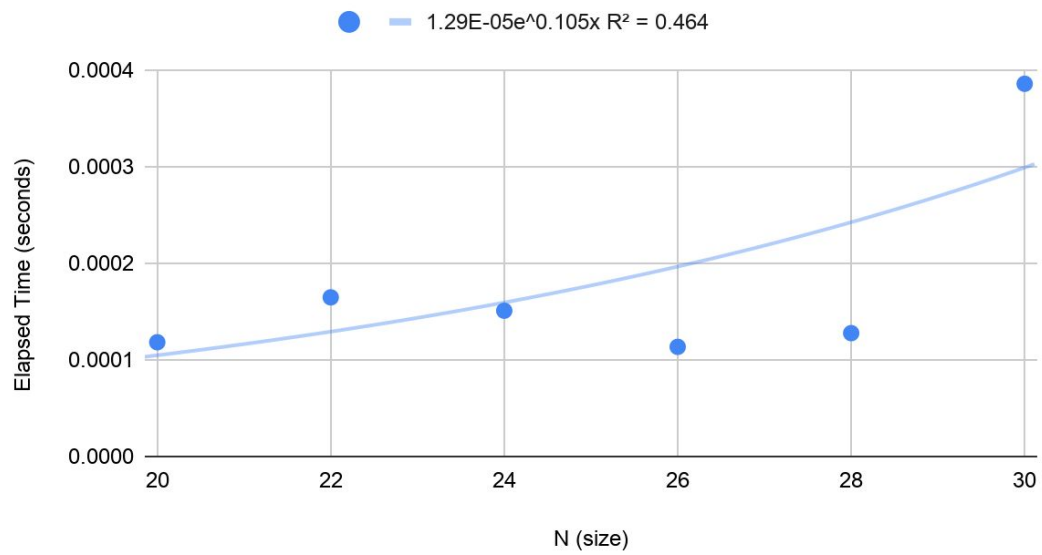
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Scatterplot:

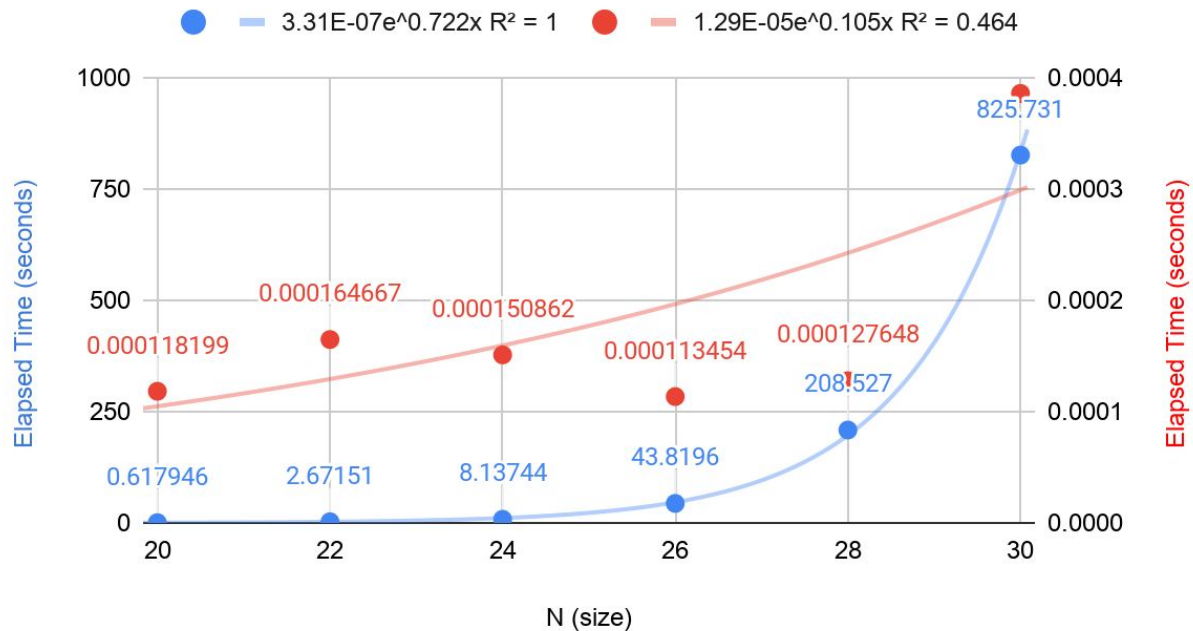
Exhaustive Optimization Algorithm



Dynamic Programming Algorithm



Exhaustive Optimization vs. Dynamic Programming



Answer to Questions:

a.) The fit lines from the scatter plots are consistent with the efficiency classes of the algorithms because it is obvious that the Exhaustive Optimization Algorithm has a slower run time than the Dynamic Programming Algorithm. The fit lines show that the Exhaustive Optimization Algorithm has a much steeper curve along with much higher elapsed time than the Dynamic Programming Algorithm. From $N = 26$ to $N = 28$, it is evident that the Exhaustive Optimization has more of a curve and the Dynamic Programming looks more like a straight line.

b.) The evidence is consistent with the hypothesis stated on the first page and this is shown by the third scatterplot. The differences between the Exhaustive Optimization (blue data points) and Dynamic Programming (red data points) shows a major difference between the efficiency of the two algorithms. When $N = 30$, the Exhaustive Optimization is already at 825.731 seconds which is the equivalent to around 13.76 minutes. However, the Dynamic Programming is only at around 0.0004 seconds.

c.) For the Exhaustive Optimization Algorithm, I had to make sure I understood the classes and its methods that would be used in the implementation. In addition, the part that was the most difficult was understanding where you should be performing the step validation to make sure that the step is valid before being added to the path. The Dynamic Programming relied less on the class methods. Therefore, it was easier to understand the missing piece which was basically to

avoid the base case because it was already set. Overall, I found the Dynamic Programming to be easier to implement and to understand what was happening in each line of code.