Search Test Lab Report

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1. Linear Search

We know from class that the theoretical time complexity of linear search over *unordered lists* is:

Best Case	**Worst Case**	**Average Case**
1	*N*	*N/2*

Q1: Increasing the number of trials and the value of N

A. Run experiments with an increasing value of N (from 1000 to 10,000). Does increasing N affect how many trials you have to run to get accurate results? Explain.

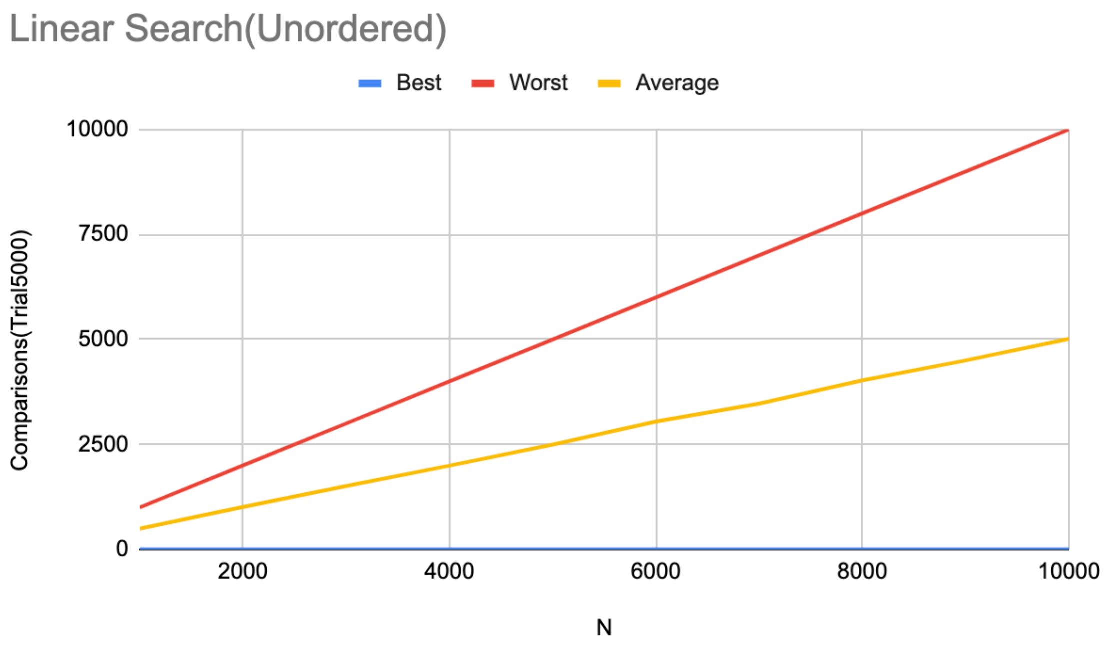
   Yes. As we can see from the plot, as N increases, we have to run more trials to get the accurate result. There is a positive relationship between N and number of trials required. When searching for a key element, there is a possibility for searching the same key element again and again. Therefore, increasing trial number can improve accuracy.

B. Write down the number of trials that seem to have worked well for N=10,000.

Number of Trials
5000

Q2: Linear Search Time Complexity Plot (Unordered List)

In



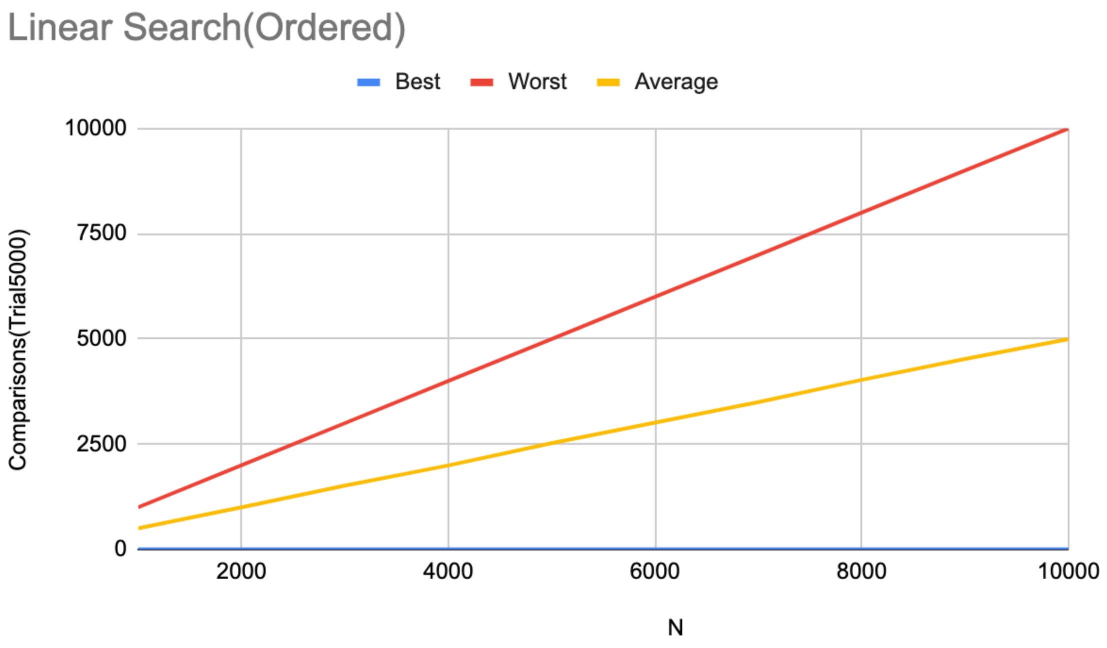
sert plot here

Q3: Does the order of the data in the list affect the number of comparisons? In the table below, guess the time complexity of Linear Search on an *Ordered List.*

If input is N

Best Case	Worst Case	Average Case
1	N	N/2

Linear Search Time Complexity Plot (Ordered List)



Insert plot here

Conclusion:

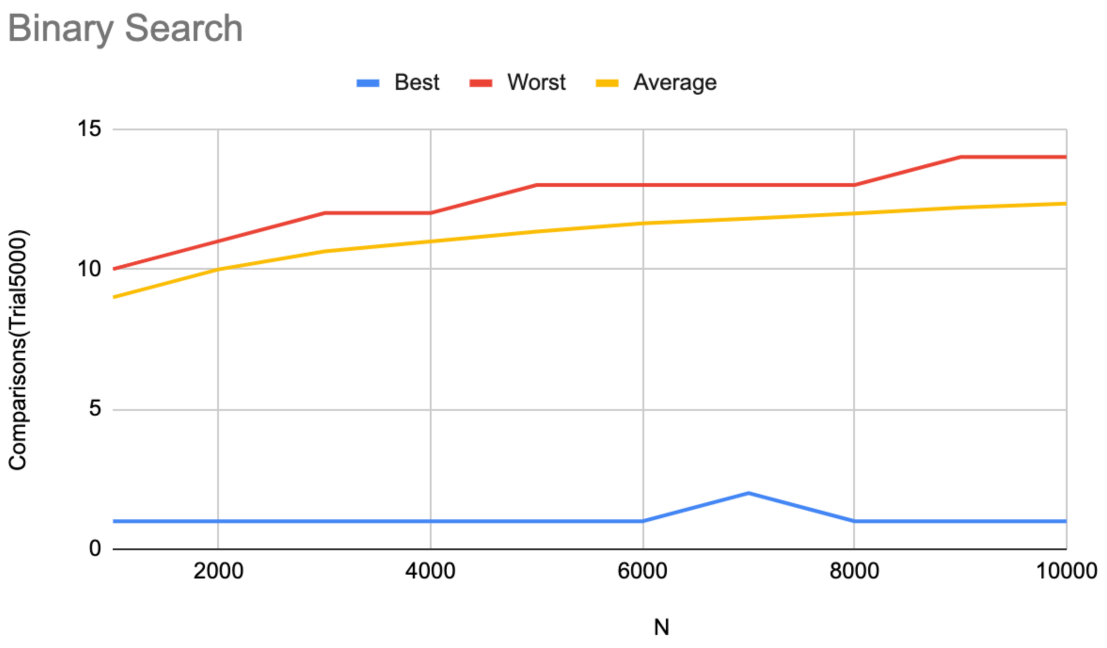
The order of the data in the list does NOT affect the number of comparisons. The result for ordered list is the same as unordered as expected.

2. Binary Search

We know from class that the theoretical time complexity of binary search over *ordered lists* are:

Best Case	**Worst Case**	**Average Case**
1	*log_2(N)*	*???*

Q4: Binary Search Time Complexity Plot



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Conclusion: What do your results tell you about the average-case complexity of Binary Search?

The trend of average line is close to the worst-case line, which indicates that we normally would do the “worst” number of comparisons for binary search to get the accurate result.

3. Median

Q5: We hypothesize that the time complexity of find_median is:

Best Case	**Worst Case**	**Average Case**
N	N^2	N^2/2

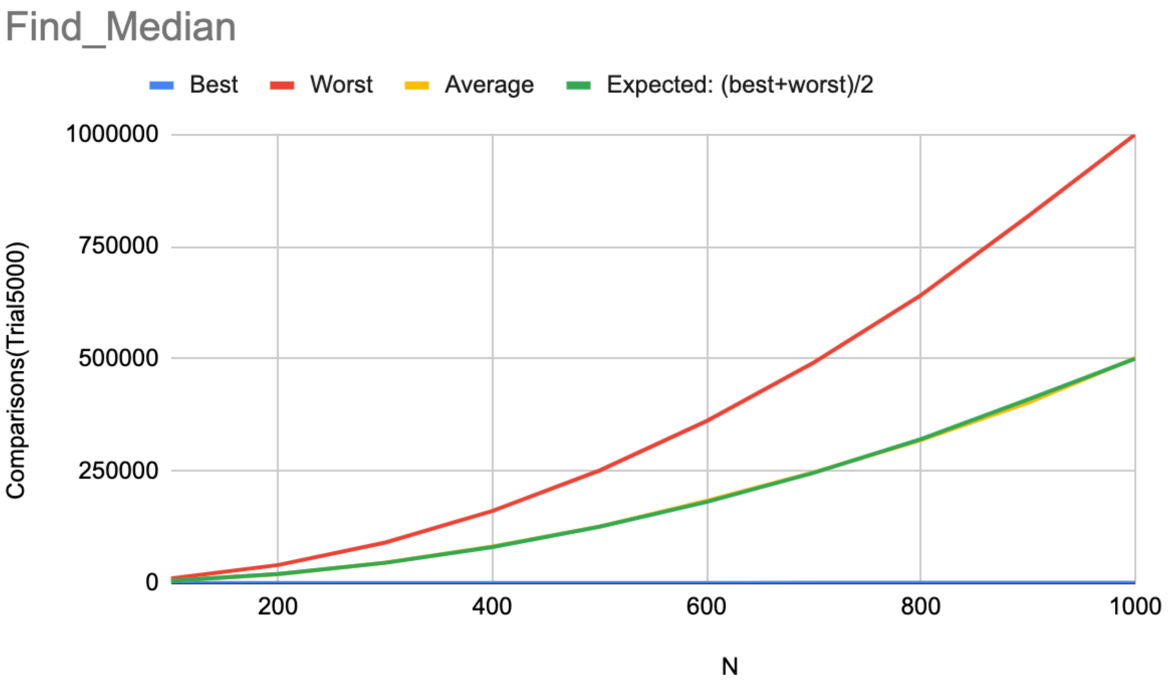
Justification:

A. Best case scenario:
Happens when the first number you looked at is exactly the median number.

B. Worst case scenario:
Happens when the last number you looked at is the median number.

C. Average case scenario:
The median number appears when you finished half of your search for the list.

Find_median Time Complexity Plot



Insert plot here

Conclusion: Did your results support your hypothesis? If not, why not, and how does it change your original hypothesis?

Yes. My results support my hypothesis.