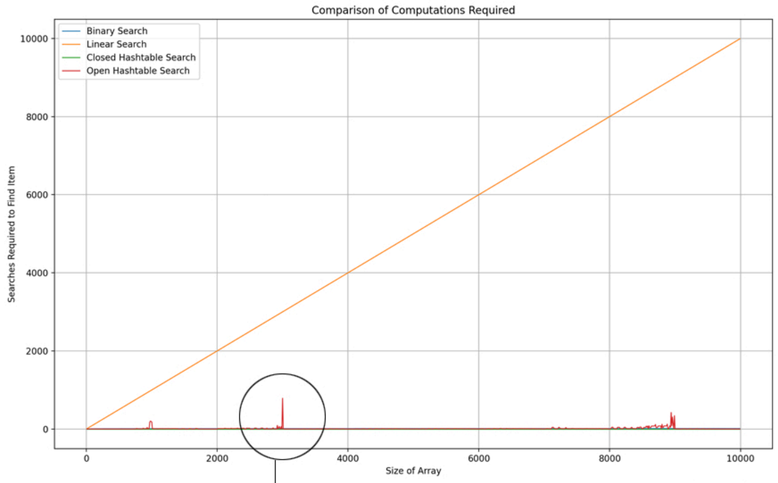

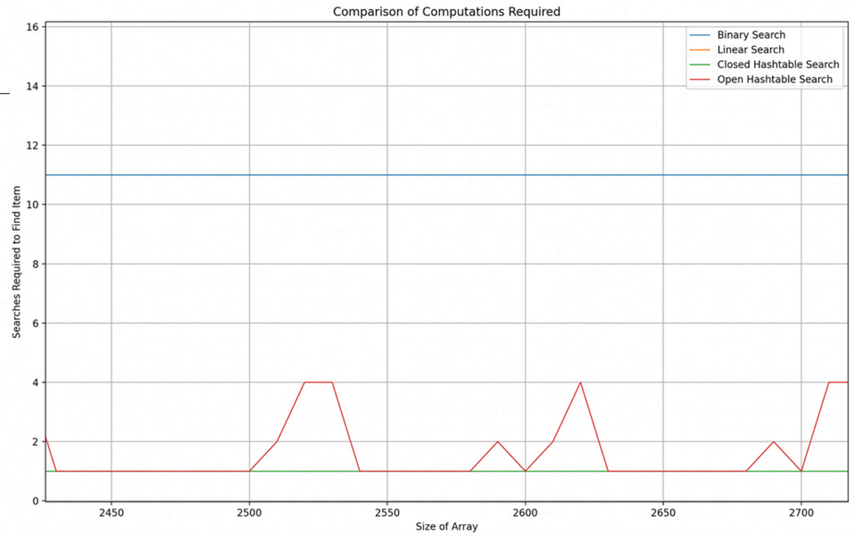

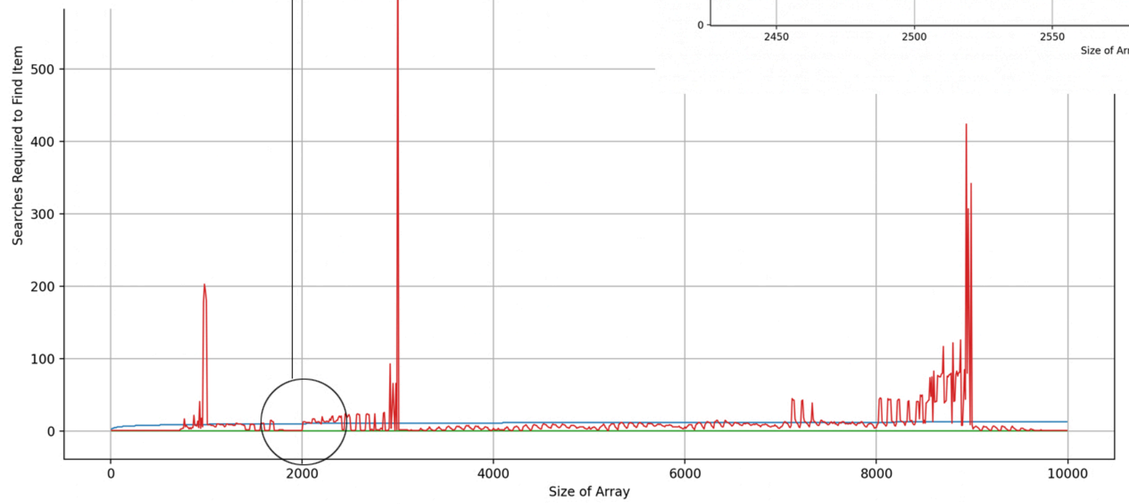


```
Benchmarking with problem size of 4990
Linear search time: 0.000022
Linear Search Comparisons: 4990

Binary search time: 0.000000
Binary Search Comparisons: 12

Open Hash search time: 0.000001
Open Hash Search Comparisons: 4

Closed Hash search time: 0.000001
Closed Hash Search Comparisons: 1
```

Item at end

When searching for an item at the end of an array, the linear search algorithm will always perform its worst at O(N) time, traversing the entirety of a list before finding its item. Binary search will perform at its average case, O(log(N)), as shown by its logarithmic curve here. Ideally, both maps will perform near O(1). Unfortunately, my open map's algorithm (red) seems to sometimes cluster particular sets of larger valued keys, in terms of hashing strings of digits that are longer. As shown in this graph, the open map has clusters around certain key values, degrading its search time to O(N) in those areas (though clearly still outperforming linear, even at its worst. The closed map continues to perform at near constant time.