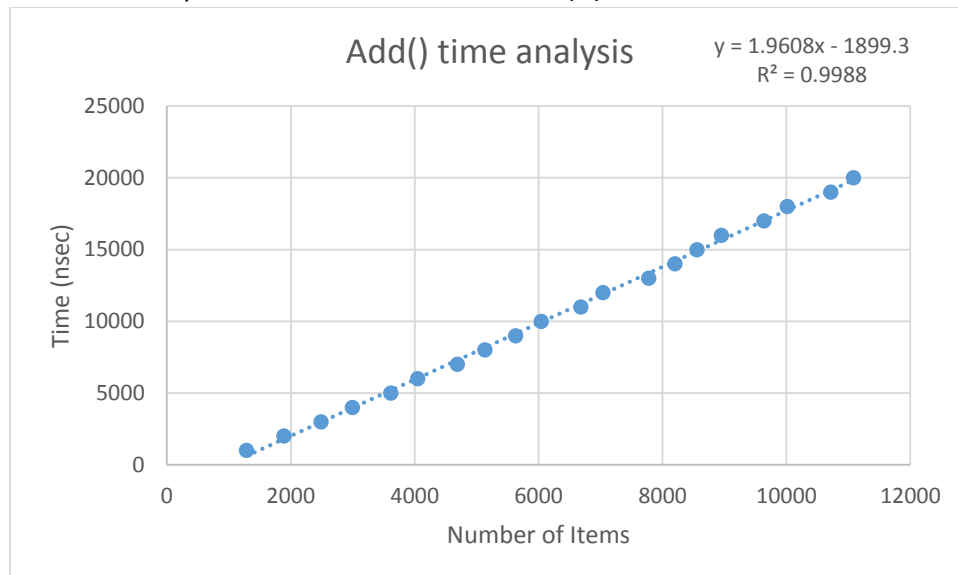CS 2420 – Assignment 3 – Analysis

1. My Programming Partner is Ugo Obi and I am submitting the source code.
2. My programming partner and I switched roles fairly often based on the situation at hand. I was happy with the frequency of switching that happened. I think the switching frequency was pretty good for optimum efficiency.
3. My programming partner was pretty good. I would still like to find a partner that has more java experience as both my partner and I are coming from the class that used C++.
4. If a Java List was used instead of a basic array the overall code would have been simplified significantly. If we used a Java List we would not have had to implement a search and would not have had to worry much about adding or removing items. The only main functionality we would have had to add to a Java List would have been eliminating and not allowing duplicates. I think the development time would have dropped significantly as most of what was needed would have already been implemented. I also think that the run time would probably go down because the Java List has likely been optimized multiple times and likely does a better job than the code we wrote.
5. The contains method should be order log(N) because this method calls a binary search method we wrote. The binary search splits the list in half and determines which half the element being searched for is on. This halving is continued until the item is found. The halving causes the order to be log(N). This can be proven by doubling the list size being searched through. In this case the search only has to do one more operation to find the element instead of two times as many operations.
6. The upper plot shows what was asked for in this question. The trend line is a log base 2 fit to the data.

Time vs. Number of Items $y = 1.7658\ln(x) + 5.5664$
$R^2 = 0.8118$

Average Time to Complete (nsec)
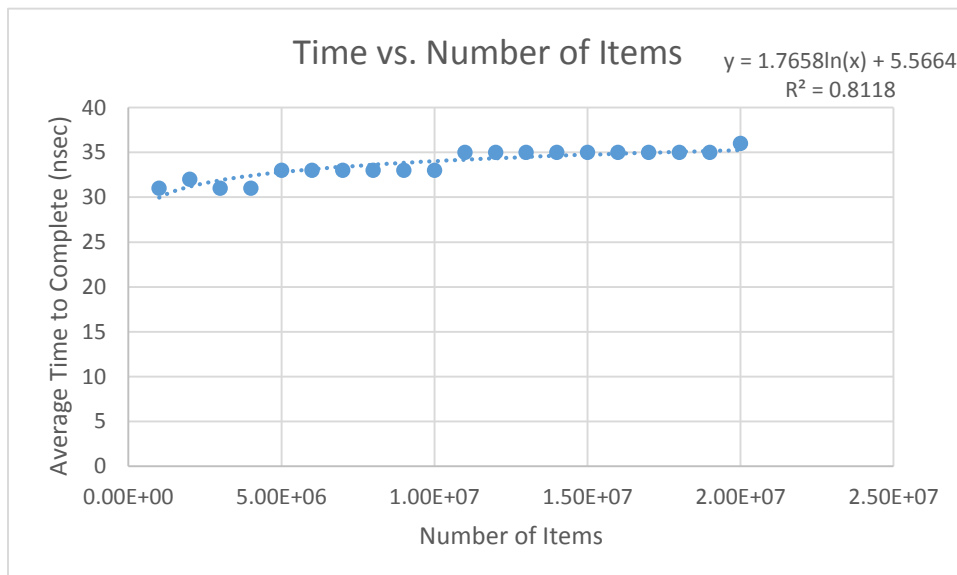
Number of Items

This plot contains more data at the low end of number of items. It was difficult to tell if the above data was actually following a log() curve however the following is plotted on a log scale with a log base 2 trend line. It is very apparent in this second plot that our contains method is O(log(N)) which matches what was predicted in question 5. (I would also like to run these tests on a slower computer to see if it is easier to see the results on the plot that was asked for)

Contains() time analysis $y = 1.8561\ln(x) + 4.5271$
$R^2 = 0.9597$

Time to Complete (nsec) vs Number of Items
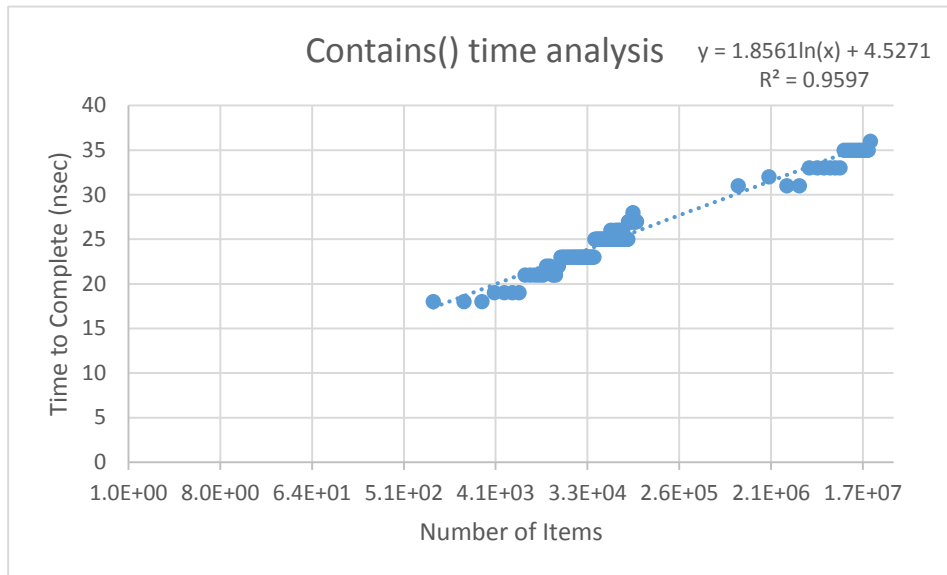
7. As seen in the plot below the add function is O(N)

Add() time analysis $y = 1.9608x - 1899.3$
$R^2 = 0.9988$

Time (nsec) vs Number of Items

8. I have spent about 11 hours on this assignment this week.