ASSIGNMENT 3- BENCHMARK

Task: Implement a main program to actually run the following benchmarks: measure the running times of this sort, using four different initial array ordering situations: random, ordered, partially-ordered and reverse-ordered. I suggest that your arrays to be sorted are of type *Integer*. Use the doubling method for choosing *n* and test for at least five values of *n.* Draw any conclusions from your observations regarding the order of growth.

Conclusion:
From the observations made by running the Insertion sort algorithm and getting the execution time using the Benchmark-Timer class it's clear that randomly sorted array takes more time compared to the other Benchmarks. Following is that the most time is taken by the reverse-ordered array and then comes the partially ordered array. Last in the list is the fully ordered array, insertion sort takes the least time to sort a fully ordered array.

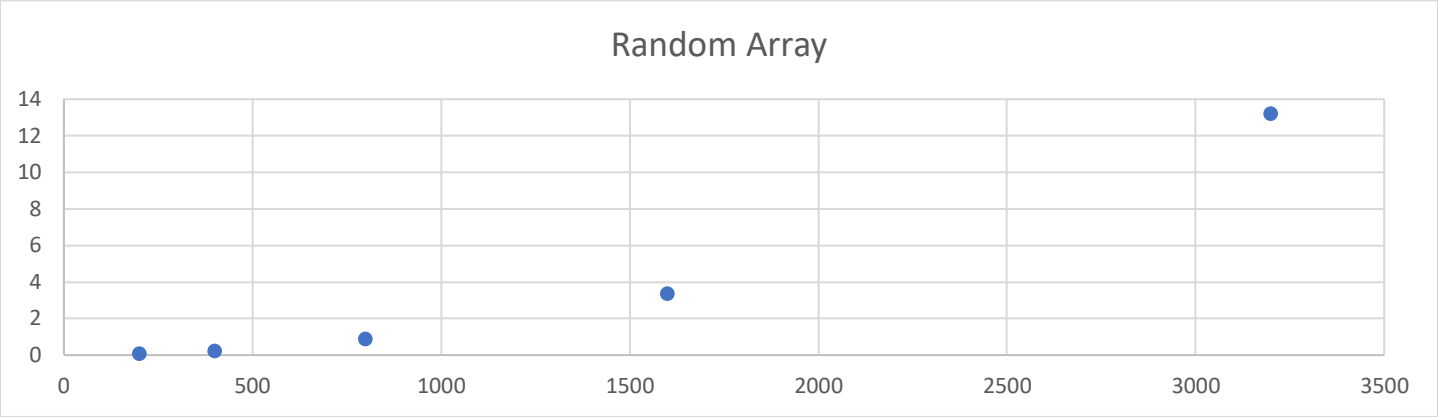
Evidence to Support Conclusion:
After running the Bench Mark Timer code for different type of arrays generated using the arrayGenerator() (This method is available in Assignment3_Benchmark class inside util folder), a table with the array length and execution time is noted.

Array Type	N	T
Random Array	200	0.058
	400	0.218
	800	0.851
	1600	3.346
	3200	13.201
Partially Ordered	200	0.041
	400	0.09
	800	0.36
	1600	1.467
	3200	5.811
Reverse Ordered	200	0.036
	400	0.143
	800	0.557
	1600	2.253
	3200	8.972
Ordered	200	0.001
	400	0.002
	800	0.004
	3200	0.005

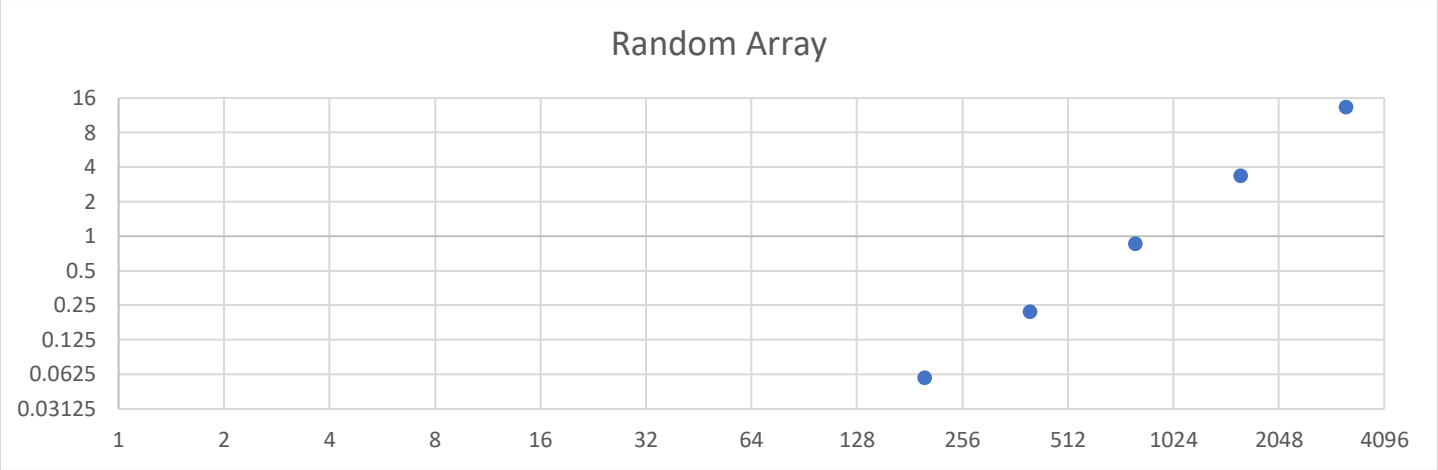
Graphical Representation:

Following graphs have been plotted using the above tabulated values.

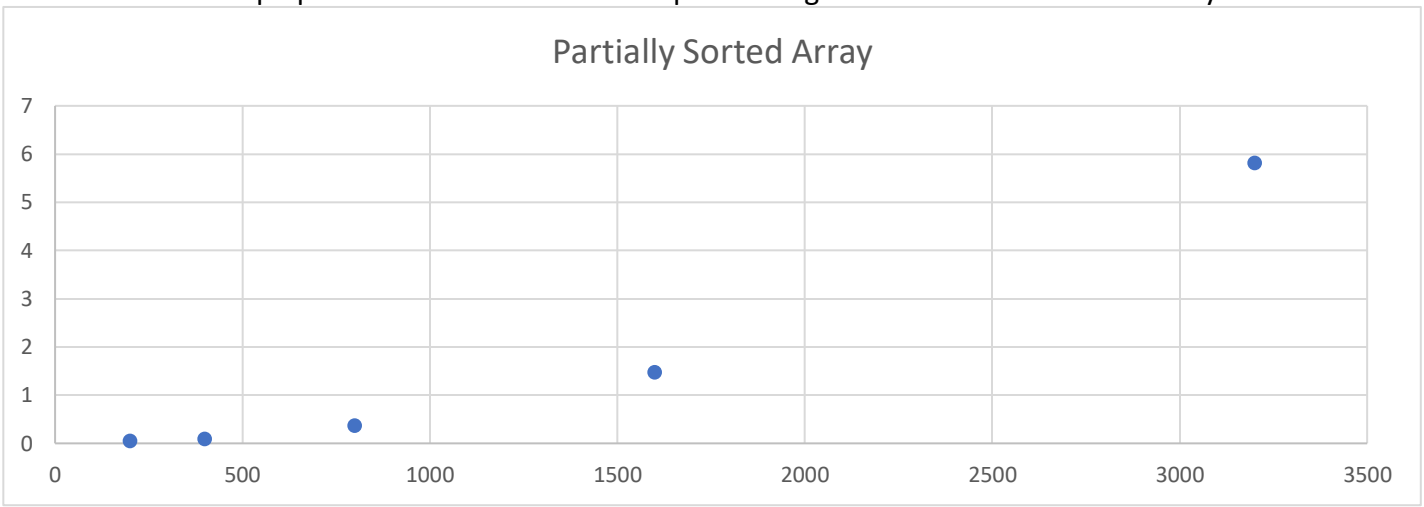
Graph plotted between N and T for performing insertion sort for Random Array



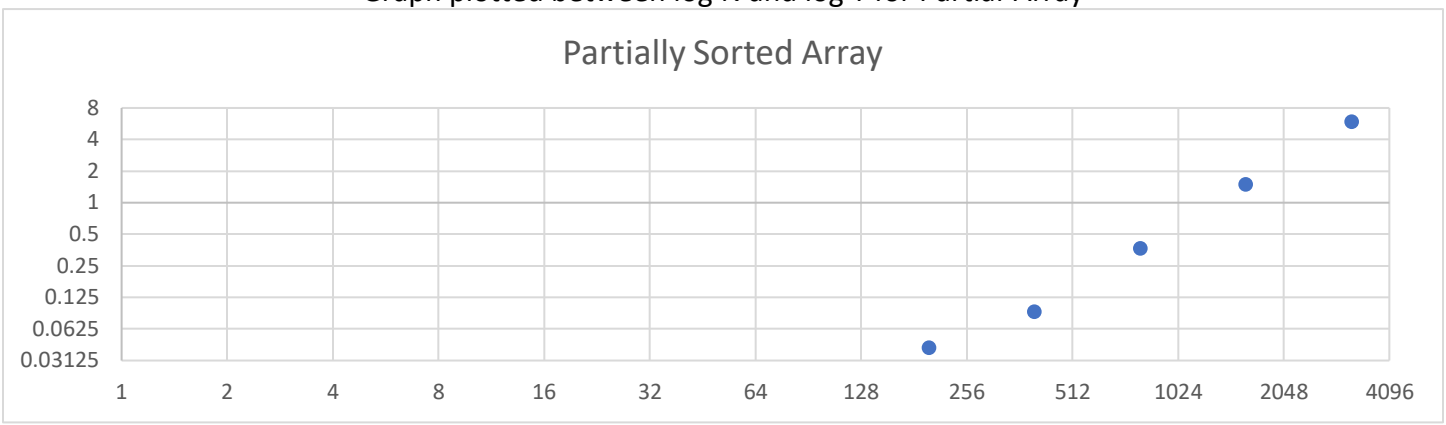
Graph plotted between log N and log T for Random Array



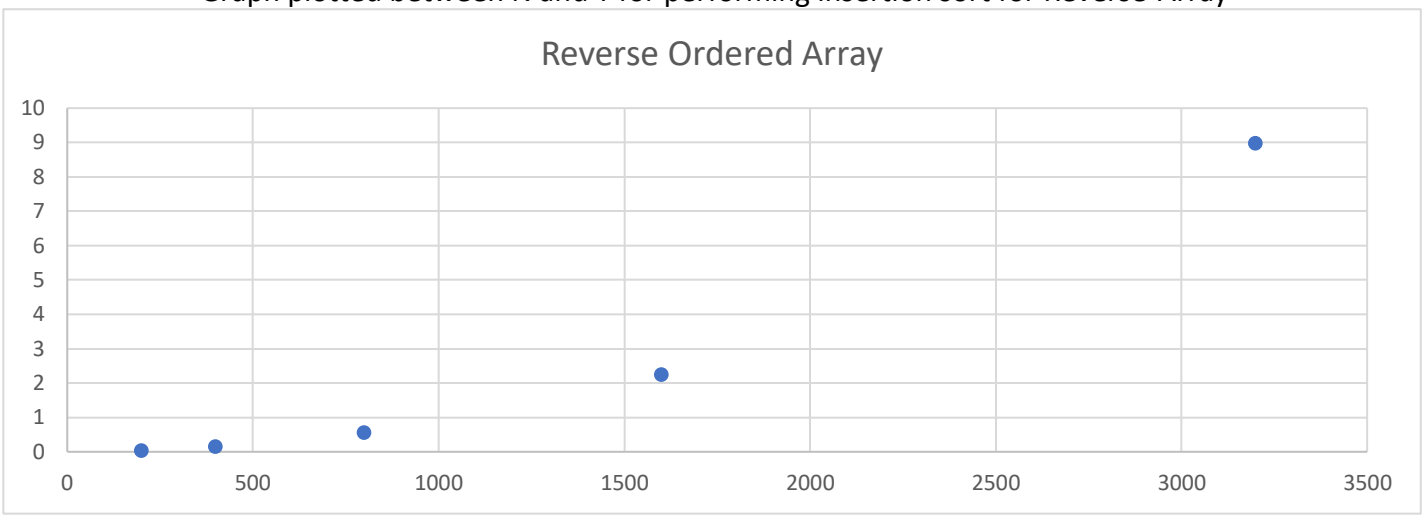
Graph plotted between N and T for performing insertion sort for Partial-Array



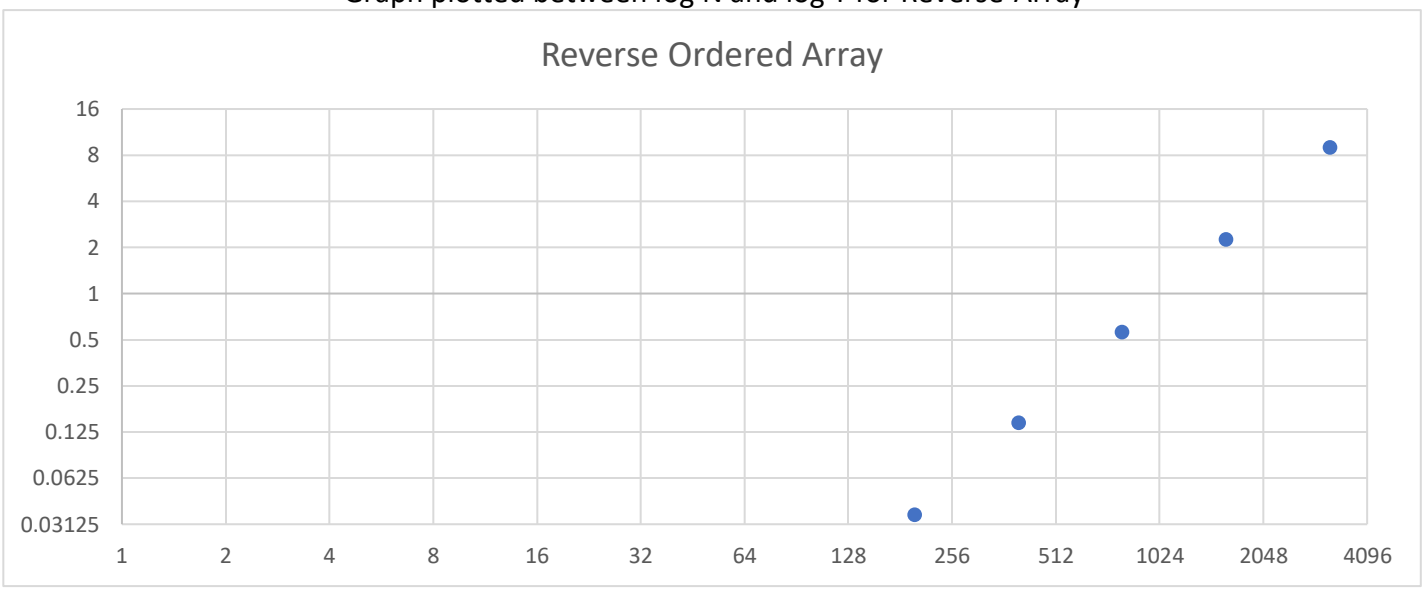
Graph plotted between log N and log T for Partial-Array



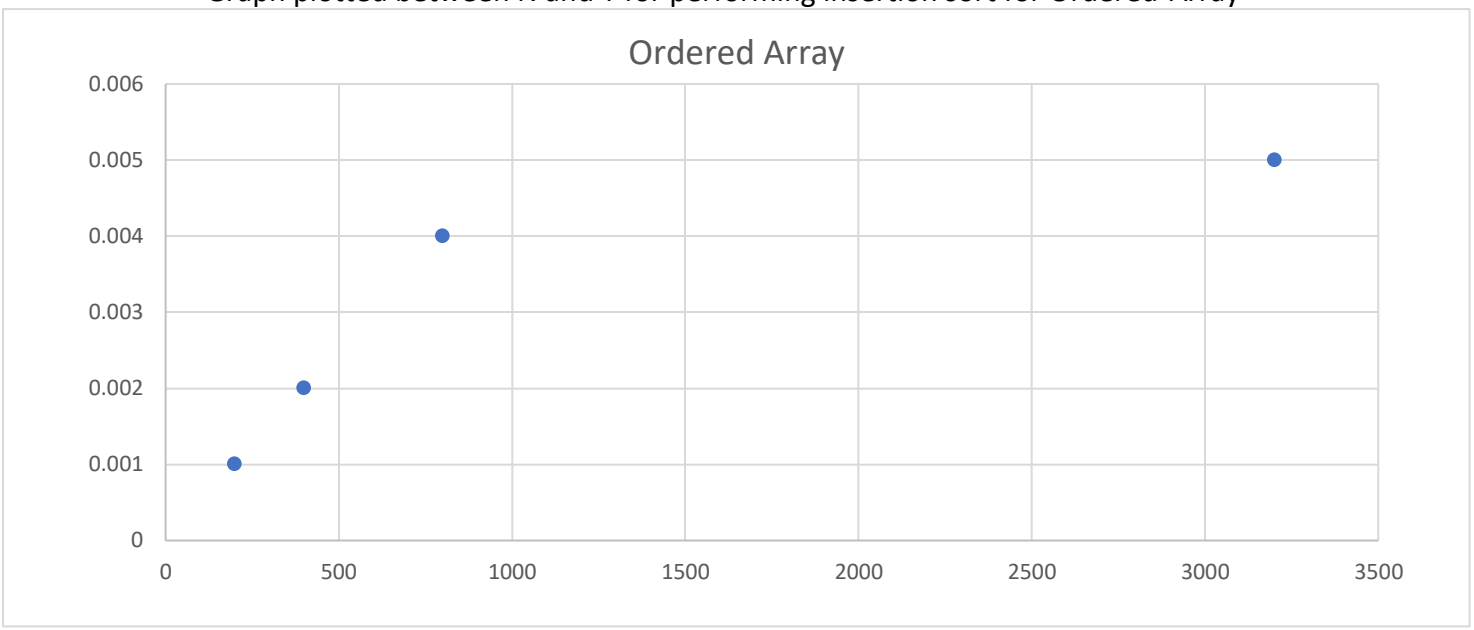
Graph plotted between N and T for performing insertion sort for Reverse-Array



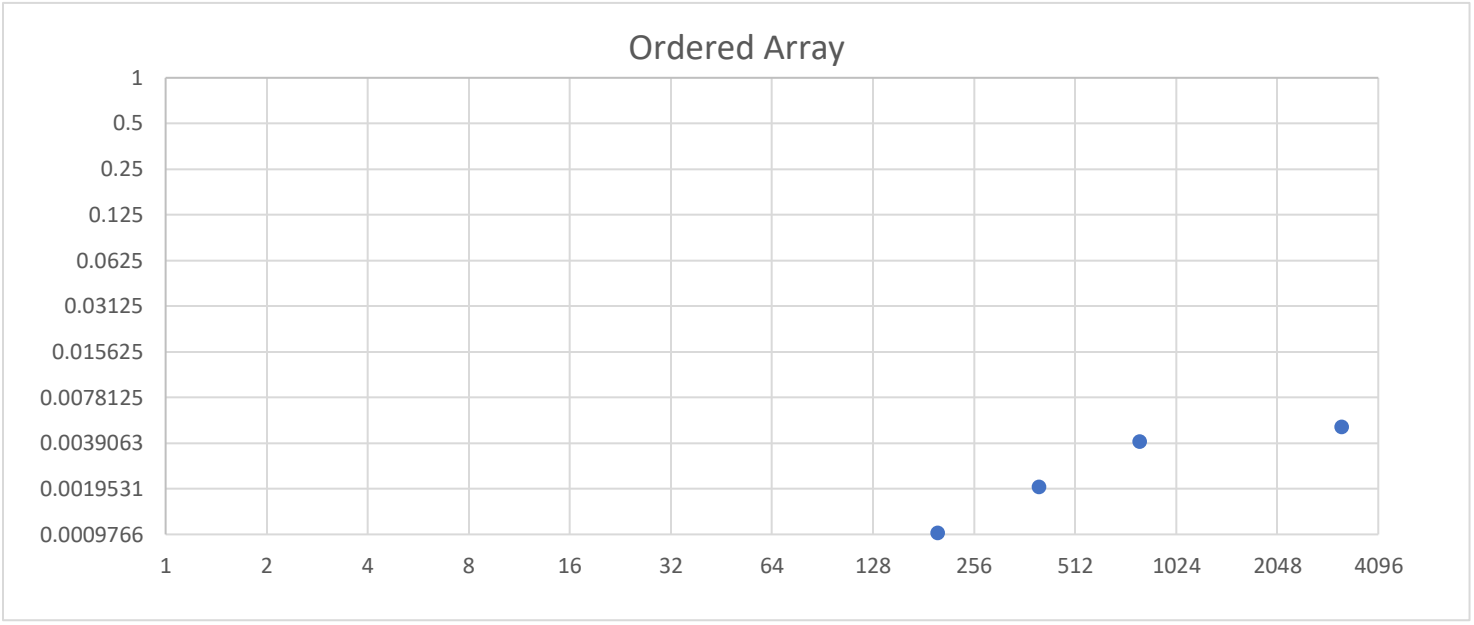
Graph plotted between log N and log T for Reverse-Array



Graph plotted between N and T for performing insertion sort for Ordered-Array



Graph plotted between log N and log T for performing insertion sort for Ordered-Array



Unit test case screen shots:

Timer Test:

Benchmark Test:

InserstionSort Test: