CSE 310 : Summer 2019

30 Pts

Due: Saturday 1st by 11:59 pm

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**Objectives:** Objective of this recitation is to reinforce algorithm design and performance analysis (theoretically and practically) ideas discussed in the class and apply algorithm analysis/design technique in solving a new problem

**Note:**  This an **individual submission** and no-collaboration expected.

Submission: Please carefully read the submission instructions given for each question.

**1.[30 Pts] Programming Question:**

In this problem you will be comparing the running time of merge sort, quick sort Insertion sort, and selection sort algorithms.

1. Frist, develop three C++/C methods that implement the above four sorting algorithms described in the book. Your code should match with the exact algorithms described in the book. I have provided a supplementary document with four sorting algorithms that you need to implement here. We will use these four methods in part (b) below
2. In this part, we record the running time by running the three sorting algorithms implemented in part (a) above for arrays of following sizes. Initialize the array with randomly generated double values between 100 .00 - 1000.00

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Array Size (n) | Insertion Sort | Merge Sort | Quick Sort | Selection Sort |
| 1000 | 6 | 94 | 1601 | 1254 |
| 10000 | 62 | 1113 | 178129 | 168539 |
| 25000 | 167 | 2993 | 1132265 | 900351 |
| 50000 | 315 | 7695 | 4614774 | 3548714 |
| 100000 | 540 | 17854 | 17950435 | 14027954 |
| 150000 | 775 | 20194 | 42248416 | 33684532 |
| 200000 | 1160 | 29275 | 75918018 | 60425623 |

\* All in micro seconds

1. Plot three graphs that represents the running time with respect to the size n based on table above for the three sorting algorithms repeatedly. (you can use excel to plot the graphs)
2. Compare the graphs in (c) and the asymptotic analysis based running time of above sorting algorithms. Can you conclude that asymptotic running time is a good indicator of actual performance of the algorithm after comparing the graphs in (c) and the asymptotic analysis based running time? Explain your answer.

I believe it is a good indicator because it follows closely to being a polynomial or linear based on which sorting algorithms used.

**Submission: C/C++ program with answer to (a),**

**Completed tables for (b),**

**graphs from (c), and written answer to part (d)**

**Make a zip file name recitation2.zip including all parts mentioned above**