~~~~~~~~~~~~ Simple Sorts Homework - Advanced C++ Week 5 ~~~~~~~~~~~~

File name: randomNumbers.txt

Text file input Array~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

7127 7090 8459 1750 1411 5623 6901 9875 4659 8956

3126 4144 5685 8898 5687 4985 5053 2163 2208 7497

8118 6915 5994 6332 8327 5 5058 7423 7997 3578

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4145 2783 2716 5223 1096 7351 4234 7937 7279 6454

1807 1438 1774 3886 991 9930 1083 8277 4985 3727

4413 9529 6961 1664 5083 5044 5851 2437 9814 8155

Exchange Sort~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Exchange sort the array

# of comparisons: 49995000

# of exchanges: 25001680

Elapsed time: 405.4 ms

Exchange sort the already sorted array

# of comparisons: 49995000

# of exchanges: 0

Elapsed time: 183.229 ms

Exchange sort the reversed sorted array

# of comparisons: 49995000

# of exchanges: 49990067

Elapsed time: 372.219 ms

The estimated # of comparisons and exchanges were as predicted.

**#compares #exchanges**

Exchange sort O(n^2) n(n-1)/2 #inversions

Insertion Sort~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Insertion sort the array

# of comparisons: 25001680

# of exchanges: 9999

Elapsed time: 64.6781 ms

Insertion sort the already sorted array

# of comparisons: 0

# of exchanges: 9999

Elapsed time: 0.04911 ms

Insertion Sort the already sorted/reversed array

# of comparisons: 49990067

# of exchanges: 9999

Elapsed time: 134.959 ms

The estimated # of comparisons and exchanges were as predicted.

**#compares #exchanges**

Insertion Sort Theta(n^2) inversion + n #inversions

Selection Sort~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Selection sort the array

# of comparisons: 49995000

# of exchanges: 9999

Elapsed time: 104.505 ms

Selection sort the already sorted array

# of comparisons: 49995000

# of exchanges: 9999

Elapsed time: 100.601 ms

Selection Sort the already sorted/reversed array

# of comparisons: 49995000

# of exchanges: 9999

Elapsed time: 147.918 ms

The estimated # of comparisons and exchanges were as predicted.

**#compares #exchanges**

Selection sort n(n-1)/2 < = n-1

(1000(1000-1)/2) = 499950 (1000 – 1) = 9999