

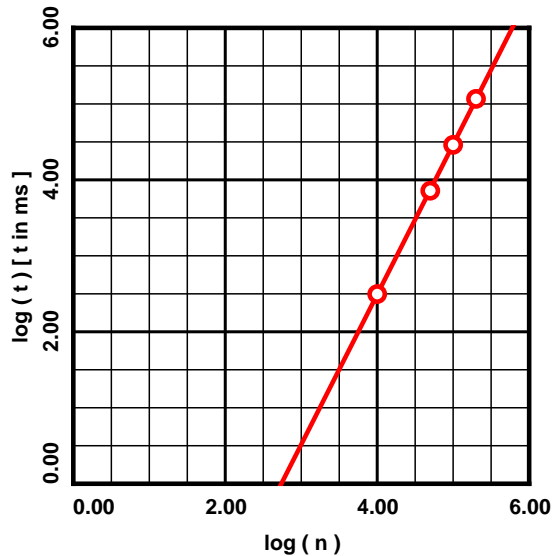
AP COMPUTER SCIENCE A

INSERTION SORT CLASS WORK

- 1) Use the files `is_10000.txt`, `is_50000.txt`, `is_100000.txt` and `is_200000.txt` provided. These files contain randomly ordered lists of integers, *e.g.*, `is_10000.txt` contains 10,000 integers.
- 2) Use program `InsertionSort.java`, which program performs an insertion sort. `InsertionSort.java` needs package `IO`.
- 3) Compile and run `InsertionSort.java` and fill out the table below.

n	t (in ms)	$\log n$	$\log t$
10,000			
50,000			
100,000			
200,000			

- 4) Graph the points $\log n$ versus $\log t$ from the above table on the axes provided below.



As was discussed in lecture, the time it takes to perform an insertion sort is $t \sim O(n^2)$, or $t \approx n^2$. Taking the common logarithm of both sides then gives $\log t \approx 2 \log n$. Thus, the plotted points should follow $\log t = a \log n + b$ closely, where $a \approx 2$.

- 5) Perform a linear regression on the values in the table to obtain the line of best fit $\log t = a \log n + b$ and graph the line on the axes at lower left.

$$a = ?$$

$$b = ?$$

- 6) The points and line of best fit that were already on the graph are what were obtained previously for a selection sort, which also takes time $t \sim O(n^2)$. Which sorting algorithm is faster, the selection sort or the insertion sort?