CSD3130 Tutorial 2

Question 1

A sorting method with "Big-Oh" complexity $O(n\log_{10}n)$ spends exactly 1 millisecond to sort 1,000 data items. Assuming that time T(n) of sorting n items is directly proportional to nlog10n, that is, $T(n)=(cn\log_{10}n)$, where c is a constant. Derive a formula for T(n), given the time T(N) for sorting N items, and estimate how long this method will sort 1,000,000 items.

Question 2

Assume that each of the expressions below gives the processing time T(n) spent by an algorithm for solving a problem of size n. Select the dominant term(s) having the steepest increase in n and specify the lowest Big-Oh complexity of each algorithm.

| Expression | Dominant term(s) | Big-Oh complexity |
|---|---|---|
| $5+0.0001n^3+0.025n$ | | |
| $500n+100n^{1.5}+50n\log_{10}n$ | | |
| $n^2\log2n+n(\log2n)^2$ | | |

Question 3:

The number of operations executed by algorithms A and B is $8n \lg n$ and $2n^2$, respectively. Determine $n^0$ such that A is better than B for $n \geq n^0$.