

CS/DSA 4413 ALGORITHM ANALYSIS

Homework 2, Due on Sep 5, 2019.

1. Compute the size of the problem that can be solved on a machine that takes 10^{-9}sec/op in one day when $T(n) = 15n^2, 8n^3, 2^n, 3^n, n!, n \log n$. Also plot $T(n)$ vs n where $n \in [0, 2048]$ on a single graph. (10 pt)

Note: You can use any programming language to generate the graphs.

2. Using fig 2.2 and 2.4 (refer textbook) as a model, illustrate the operation of insertion sort, merge sort on the arrays. $A = \langle 13, 57, 19, 28, 21, 68, 17, 54 \rangle$, $B = \langle 76, 45, 32, 78, 21, 68, 45, 34 \rangle$.

Which algorithm is better performing and why? (10 pt)

3. Define average case, worst case and best case complexity. Derive the average case complexity for Sequential Search. Also prove $\sum_{i=1}^n i = n(n+1)/2$. (15 pt)

Hint: Use Induction - Discrete Math

4. For inputs of size n , let's assume algorithm-1 runs in $T_1(n) = 8n^2$ steps, algorithm-2 takes $T_2(n) = 64n \log n$ steps. For what value of n (mention the interval) does algorithm-2 perform better than algorithm-1. (10 pt)