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CS312 – Analysis of Algorithms

Homework assignment 6 – Growth of Functions questions.

10/06/2019

1. **In your own words, explain what each of the following statements mean:**

* T(n) is Θ(g(n)) – Means that T(n) is exactly theta of g(n).
  + T(n) is Θ(g(n)) – Means that the running time is of an algorithm A is exactly Θ(g(n)).
* T(n) is O(g(n)) – Means that T(n) is Big-O of g(n), which only measures the upper-bound of the algorithm’s running time.
  + T(n) is O(g(n)) – Means that the running time of an algorithm A is at most O(g(n)).
* T(n) is Ω(g(n)) – Means that T(n) is of g(n), which only measures the lower-bound of the algorithm’s running time.
  + T(n) is Ω(g(n)) – Means that the running time of an algorithm A is at least Ω(g(n)).

1. **Explain why the statement, "The running time of algorithm A is at least O(n2)," is meaningless.**

* It is said that, “The running time of an algorithms A is at least O(),” is meaningless, because given an arbitrary algorithm used in a real application; without much information about its constraints, it becomes inconclusive to decide whether its computational complexity would be efficient.

1. **Why is it acceptable to ignore the behavior of algorithms for small inputs?**

* It is acceptable to ignore the behavior of algorithms for small inputs, since the running time for small inputs happens to be negligible.

1. **Sort the following big-O times from best to worst:**

**Before:**

* 1. O(n)
  2. O(lg n)
  3. O(n log n)
  4. O(1)
  5. O(n3)
  6. O(2n)
  7. O()

**After:**

1. O(1)
2. O(lg n)
3. O(n lg n)
4. O(n)
5. O()
6. O()
7. O()