Analysis of Algorithms

More ways to deal with complexity estimations

Andres Mendez-Vazquez

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Computing complexities using a tree

From Dasgupta's book. Exercise 2.5

- $T(n) = 7T(\frac{n}{7}) + n$
- $T(n) = T(n-1) + 2$
- $T(n) = T(n-1) + n^c$, where $c \geq 1$ is a constant

Substitution method

Use substitution to prove the complexities.

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Divide and conquer

You are given an array of n elements, and you notice that some of the elements are duplicates; that is, they appear more than once in the array. Show how to remove all duplicates from the array in time $O(nlogn)$

Divide and conquer

Given a sorted array of distinct integers $A[1, ..., n]$, you want to find out whether there is an index i for which $A[i] = i$. Give a divide-and-conquer algorithm that runs in time $O(logn)$.

Divide and conquer

Given a sorted array of distinct integers $A[1, ..., n]$, you want to find out whether there is an index i for which $A[i] = i$. Give a divide-and-conquer algorithm that runs in time $O(\log n)$.

Indicator functions

Use indicator random variables to compute the expected value of the sum of n dice rolls.