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Algorithms, Probability, and Computing In-Class Exercises KW39 HS16

In-Class Exercise 1: Bounding a Sequence

Suppose that a sequence $\{x_n\}_{n\geq 1}$ with $x_1 > 0$ satisfies

$$x_n = \sqrt{n} + 2\sum_{i=1}^{n-1} x_i$$

for $n \geq 2$.

Prove or disprove: $x_n = \mathcal{O}(2^n)$.

In-Class Exercise 2: Random Permutations

For a permutation π on the keys $\{1..n\}$, let T_π be the search tree that we obtain from inserting all n keys, one after the other, in the order given by π.

Prove: If π is drawn uniformly at random, then T_π has the same distribution as $\tilde{\mathcal{B}}_{[n]}$ from the lecture.