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Section 3: Divide-and-Conquer (3 Questions)

Binary Search

1/1 point (graded)

You are given a sorted in non-decreasing order array of integers $A[1..n]$ (that is, $A[1] \leq A[2] \leq \cdots \leq A[n]$) and an array of integers $B[1..m]$. For each element $B[i]$ of the array B, you would like to check whether it is present in the array A. Since the array A is sorted, you may employ the binary search method.

What is the overall running time of the resulting algorithm?

- ○ $O(n+m)$
- ● $O(m \log n)$ ✔
- ○ $O(n \log m)$
- ○ $O(\log n + \log m)$
- ○ $O(nm)$

Submit You have used 1 of 1 attempt

Master Theorem

1/1 point (graded)

Suppose the running time $T(n)$ of an algorithm satisfies the following recurrence relation:

$$T(n) \leq 5 \cdot T\left(\frac{n}{3}\right) + O(n)$$

Which of the following is the smallest correct upper bound on $T(n)$?

- $O(n)$
- $O(n \log n)$
- $O(n^{\log_3 5})$ ✔
- $O(n^{\log_3 5} \log n)$
- $O(n^{\log_5 3})$
- $O(n^{\log_5 3} \log n)$
- $O(n^{5/3})$

Submit You have used 1 of 1 attempt

Closest Elements

1/1 point (graded)

Let

$$A[1..15] = [870, 695, 790, 170, 918, 932, 539, 802, 648, 362, 770, 884, 377, 424, 845]$$

be an array of 15 integers.

Compute the smallest absolute difference between two of its elements. That is, compute $\min |A[i] - A[j]|$ over all $i \neq j$

12 ✔

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