Interview Questions (optional)

3/3 points earned (100%)

Excellent!

Retake

Course Home

---

1 / 1 points

1.

Dynamic median. Design a data type that supports insert in logarithmic time, find-the-median in constant time, and remove-the-median in logarithmic time.

Note: these interview questions are ungraded and purely for your own enrichment. To get a hint, submit a solution.

a

Thank you for your response.

Hint: maintain *two* binary heaps, one that is max-oriented and one that is min-oriented.

---

1 / 1 points

2.

Randomized priority queue. Describe how to add the methods `sample()` and `delRandom()` to our binary heap implementation. The two methods return a key that is chosen uniformly at random among the remaining keys, with the latter method also removing that key. The `sample()` method should take constant time; the `delRandom()` method should take logarithmic time. Do not worry about resizing the underlying array.

a

Thank you for your response.

---

1 / 1 points

3.

Taxicab numbers. A *taxicab* number is an integer that can be expressed as the sum of two cubes of integers in two different ways: $a^3 + b^3 = c^3 + d^3$. For example, $1729 = 9^3 + 10^3 = 1^3 + 12^3$. Design an algorithm to find all taxicab numbers with a, b, c, and d less than n.

- Version 1: Use time proportional to $n^2 \log n$ and space proportional to n^2.
- Version 2: Use time proportional to $n^2 \log n$ and space proportional to n.

a

Thank you for your response.

Hints:

- Version 1: Form the sums $a^3 + b^3$ and sort.
- Version 2: Use a min-oriented priority queue with n items.