Feedback — Interview Questions: Priority Queues

You submitted this homework on **Sun 24 Mar 2013 2:27 PM PDT -0700**. You will be able to view your score after the deadline passes.

These interview questions are for your own enrichment and are not assessed. If you click the *Submit Answers* button, you will get a hint.

Question 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.

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question Explanation

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

Question 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.

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question 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.

Your Answer	Score	Explanation
Total	0.00 / 0.00	

Question Explanation

Hints:

- *Version 1:* Form the sums $a^3 + b^3$ and sort.

- *Version 2:* Use a min-oriented priority queue with N items.
