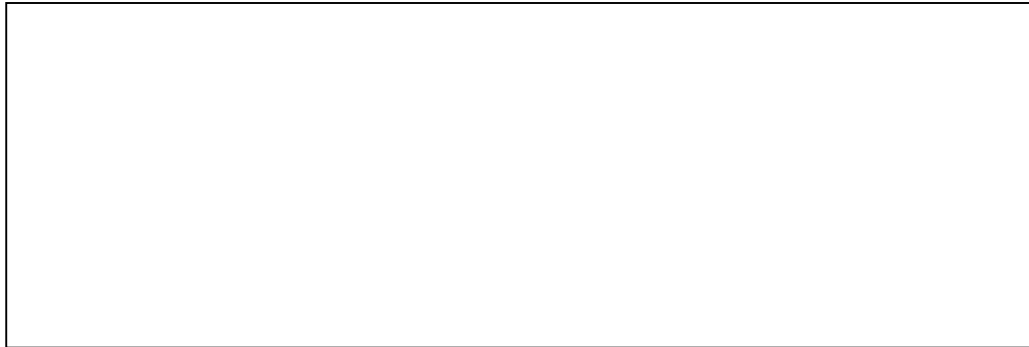


COS 226 – Data Structures and Algorithms
Fall 2014 – Flipped Lecture Section
Group Worksheet week 4 – 10.02.14
25 minutes

- 1. Dynamic median.** Design a data type that supports the following operations
- a. insert in logarithmic time
 - b. find-the-median in constant time
 - c. remove-the-median in logarithmic time.

You may use any ADTs we've discussed in class. This problem may be harder than any you'll find on a 226 exam.



2. Somewhat Leaky Stack.

A leaky stack is a generalization of a stack that supports

- adding a string – $\lg N$ time
- removing the most-recently added string - $\lg N$
- deleting a random string – find a random string and delete in linear time or less

Design a data structure that can perform all operations to meet the performance goals as listed above



3. Heapification.

What is the run-time required to perform a bottom-up sink-based heapification? That is you would sink elements starting from level $(h-1)$ up to level 0 maintaining the heap order property

4. Largest Common Item

Given an N -by- N matrix of real numbers, find the largest number that appears (at least) once in each row (or report that no such number exists).

| | | | | |
|---|---|---|---|---|
| 9 | 6 | 3 | 8 | 5 |
| 3 | 5 | 1 | 6 | 8 |
| 0 | 7 | 5 | 3 | 5 |
| 3 | 5 | 7 | 8 | 6 |
| 4 | 3 | 5 | 7 | 9 |

The running time of your algorithm should be proportional to $N^2 \log N$ in the worst case. You may use extra space proportional to N^2 .