

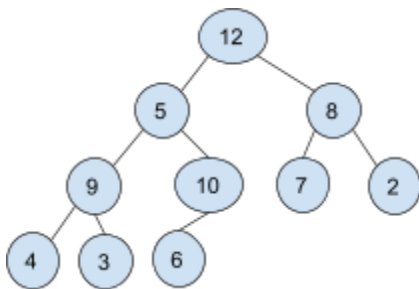
Data Structures - Practice

Which Data Structure makes it true?

1. Insert = $O(1)$, Find element x = $O(1)$, Delete = $O(1)$
2. Insert = $O(n)$, Find i th element = $O(1)$, Delete = $O(n)$
3. Insert = $O(1)$, Find i th element = $O(n)$, Delete = $O(1)$
4. FindBiggest = $O(1)$, FindSmallest = $O(n)$
5. Find most recent = $O(1)$, Find least recent = $O(n)$
6. Find most recent = $O(n)$, Find least recent = $O(1)$
7. I have no duplicate elements and no ordering
8. $|E| = |V| + 1$
9. $|E| \leq |V|^2$

Heaps

10. Show how Heapify works on this heap if called with element 5:



11. For your answer from question 10, show the result of inserting a new element, 11.
12. Consider the array: [13, 17, 14, 6, 15, 10, 1, 5, 7, 12].
I want to perform Heapify with the array and index 0 (the 13). Is it possible? If so, what is the result?
13. Consider the array: [22, 100, 86, 12, 37, 43, 16, 6, 2, 20, 16, 37]
I want to perform Heapify with the array and index 0 (the 22). Is it possible? If so, what is the result?
14. Suppose you have k Heaps of equal size, with a total of n elements altogether. Create and analyze an algorithm to print the numbers collectively in reverse order.

For convenience, assume that if you ask for the top value of an empty heap, you get negative infinity, and assume you have a Delete_top method of a heap that takes $O(\lg n)$ time.

Print-reverse(Heaps[H1, H2, ... Hk]): Heaps is an array of k heaps.
Total elements in all heaps is n .