Week 8 Exercises Part1

Sandra Batista

1.1–1.2

Exercise1: Using a Priority Queue for Sorting

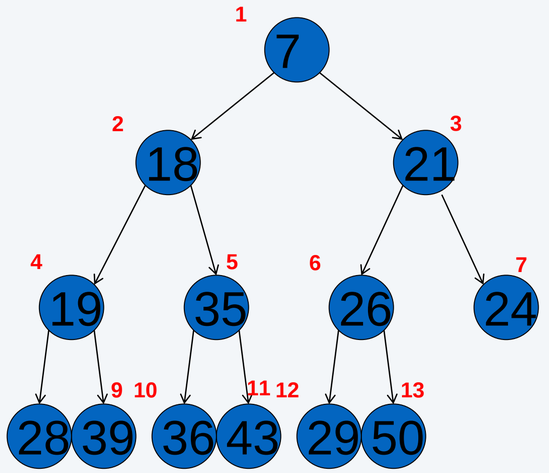
Starter code:
https://github.com/sandraleeusc/csci104_fall2020_lecture/blob/master/heapsort.cpp

1. Instantiate a priority queue of integers that uses a min heap
2. Insert 10 random integers into the min heap
3. Then use the priority queue to print the integers in sorted order
4. Given a min heap with n integers, what is the runtime to print in sorted order?

Exercise 2: Tracing Push

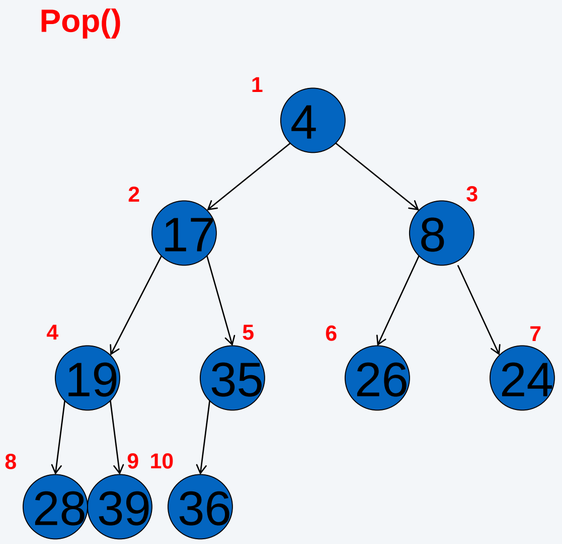
Draw the array and trace for min heap

Push(23)



Exercise 3: Trace Pop

Draw the array and trace for min heap



Exercise 4: Converting An Array to a Min Heap

1. Draw this array as a complete binary tree. Verify that it is not a min-heap.
2. Assume all leaf nodes are valid heaps
3. Then from first non-leaf node apply trickleDown or heapify. First non-leaf node is at index 4. (Why?)
4. Apply heapify on node at index 3.
5. Apply heapify on node at index 2.
6. Apply heapify on node at index 1.
7. Can you verify that this is a min-heap now?
8. Draw the min heap as an array again.