

CSCI-SHU 210 Data Structures

Recitation11 Worksheet Heaps, and Priority Queue

Important nodes for this week's recitation:

- What is Priority Queue ADT
 - Store a collection of items, allow user to get min, or max.
- What is a heap.
 - $\text{Key}(\text{node}) \geq \text{Key}(\text{parent}(\text{node}))$ or,
 - $\text{Key}(\text{node}) \leq \text{Key}(\text{parent}(\text{node}))$
 - This property is different from Binary Search Trees!!!
- How to store binary heap, or binary trees in an array.
 - Node index = i
 - Left child is at $2i + 1$
 - Right child is at $2i + 2$
 - Parent is at $(i - 1) // 2$

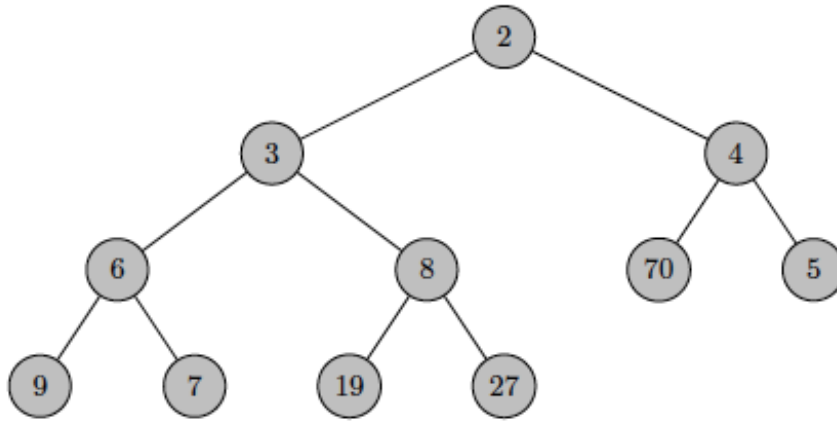
Part 1: binary-heaps

1. Consider the following array representation of a max-binary heap:

[1000, 432, 277, 388, 401, 190, 200, 380, 270, 399]

- A. Show the tree representation of this binary heap.
- B. Insert 600 into this binary heap. Show both the tree representation and the array representation after 600 has been inserted.

2. Consider the following tree representation of a min-binary heap:



- A. Show the array representation.
- B. Show what happens when the root is removed by giving the tree representation of this binary heap.

Your task 3: `heap_priority_queue.py` is an implementation for `min_heap`.

Now, modify the code, so the heap becomes a `max_heap`.