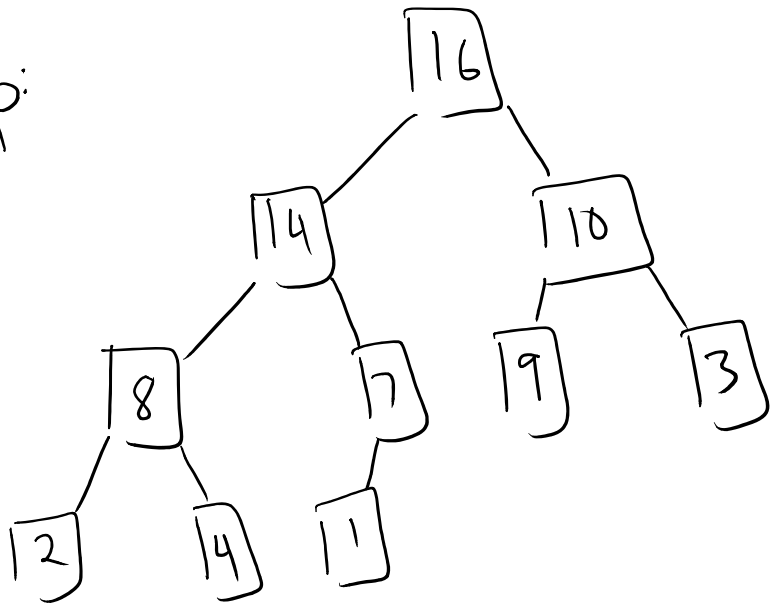


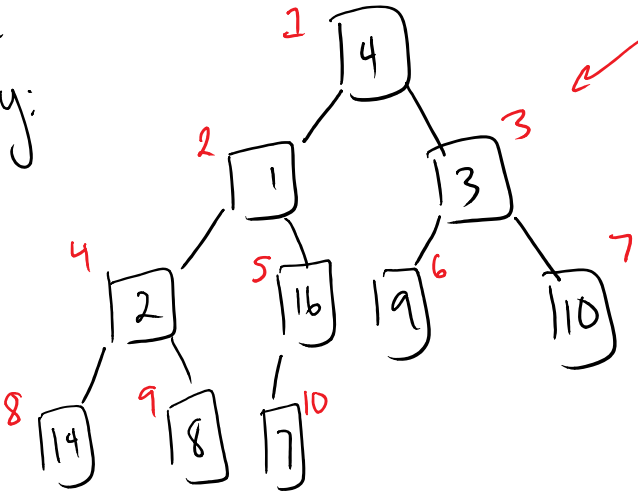
Loop Invariant

Max Heap:

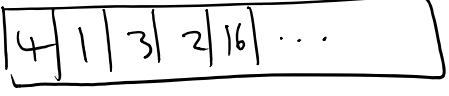


Each node's key is at least size of all descendant's keys.

Suppose Initially:



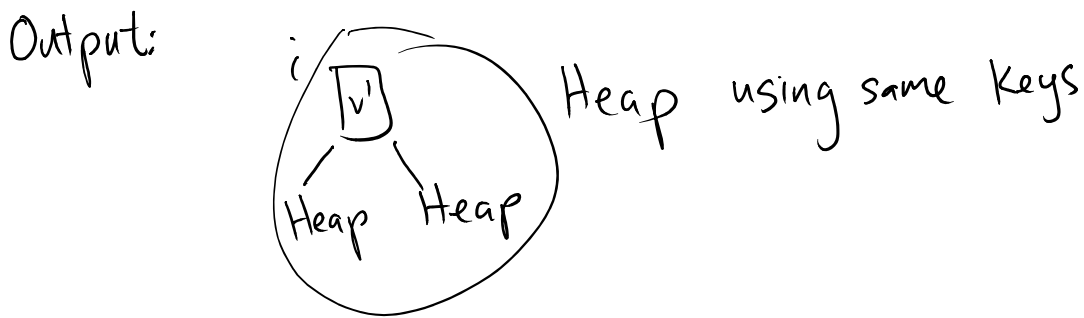
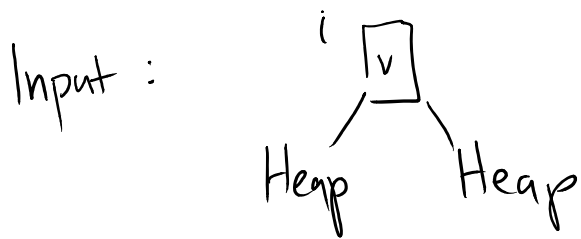
indices of array A containing values (actually stored in Array)



Build-Max-Heap

for $i = \lfloor A.length/2 \rfloor$ to 1
Max-Heapify(A, i)

All indices $> \lfloor A.length/2 \rfloor$ are leaves

Max Heapify(A, i)

What is good loop invariant for Build-Max Heap?

All indices $i+1, \dots, n$ are roots of heaps

Initialization

All indices $\lfloor A.length/2 \rfloor, \dots, n$ are leaves, so roots of heaps

Maintenance

Since all larger indices are roots of heap, the two children of i are roots of heaps, so satisfies conditions of Max Heapify, so Max Heapify makes a heap at i . After, i is root of heap, so all children of i are roots of heaps, and all other indices unchanged.

Termination

At end, index 1 is root of heap ✓