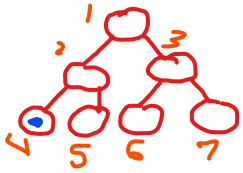
Naseem Auguste

Computer Science I – Exercise
Heaps

1) In an array-based implementation of a Heap, the left-child of the left-child of the node at index i, if it exists, can be found at what array location?

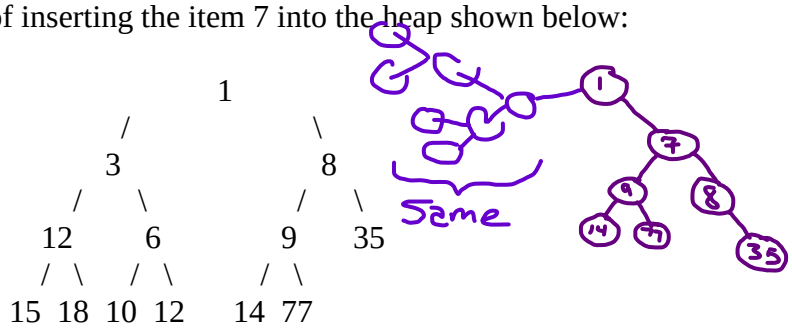


A[i] = A[4,i]

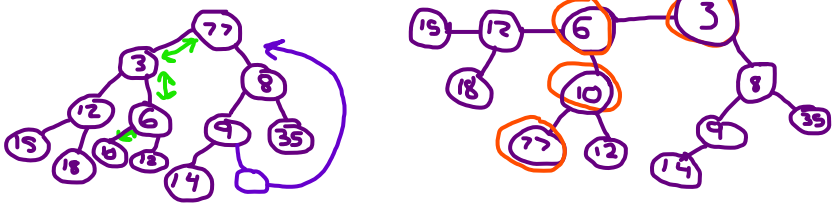
2) In an array-based implementation of a Heap, the right-child of the right-child of the node at index i, if it exists, can be found at what array location?

A[i] = A[4,+3]

3) Show the result of inserting the item 7 into the heap shown below:



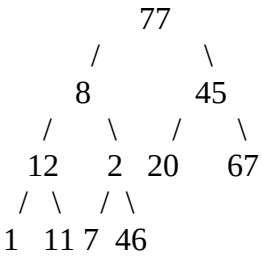
4) Show the result of removing the minimum element from the original heap in question #2 (without 7) from above.

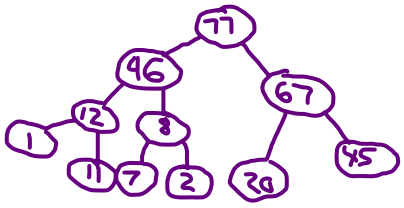


5) Show the array representation of the original heap from question #2.

1	3	8	12	6	9	35	15	18	10	12	14	77

6) Run the whole Heapify function on the following random values:
(this is the function that builds a heap in O(n) time)





7) Explain each step shown in the code below, for the percolateDown function:

```
void percolateDown(struct heapStruct *h, int index) {

   int min;

   if ((2*index+1) <= h->size) {

      min = minimum(h->heaparray[2*index], 2*index, h->heaparray[2*index+1], 2*index+1);
      if (h->heaparray[index] > h->heaparray[min]) {
         swap(h, index, min);
         percolateDown(h, min);
      }
   }
   else if (h->size == 2*index) {
       if (h->heaparray[index] > h->heaparray[2*index])
         swap(h, index, 2*index);
   }
}
```

filters out leaf nodes

find the smallest index

if value at min is greater than the value at index then swap do it again if needed

at the left child

Compare, if index is bigger then swap

(Note: Please reference heap.c *without looking at this function*, if necessary.)