Data Structures
Heap Sort

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The Heapsort

given an array of N numbers that we want to sort:

1. Insert all N numbers into a new maxheap
2. wile there are nunbers left in the heap:
   (a) remove the largest value from the heap.
   (b) place it in the last open slot in the new maxheap

However, this is a niave approach, as we should convert the input into a maxheap:

Given an array of N numbers that we want to sort:

1. Insert all N numbers into a new maxheap Convert our input array into a maxheap
2. While there are numbers left in the heap:
   A. Remove the biggest value from the heap
      B. Place it in the last open slot of the array

for step 1 the algorithm is:

1. for (currentNOde = lastNode till rootNode):
   focus on the subtree rooted at currentNode.
   think of this subtree as a maxheap
   keep shifting the top value down until your subtree becomes a valid maxheap

once we finish heapisfying from our *root node*, our entire array will hold a valid maxheap! however, because the array represents a complete binary tree, we dan ignore all nodes before $N/2 - 1$ as all of the nodes after are leafs, so $lastNode = N/2 - 1$

Now, for step 2, we will use the reheapify algorithm as follows;