

Assignment 1  
Min-Heap

Due Sep 6 11:59 pm

A min-heap is a heap in which the root has the smallest value in the heap. Normally one would implement a heap using an array. In this assignment you are to use pointers, not an array. In our min-heap each node has a value and 0, 1 or 2 children heaps. The root node of a min-heap contains the smallest value in the heap. If you pick any node in the heap it has a value that is equal to or less than all the nodes in either the left or right sub-heaps of the node. See the figure 1 below for an example. To add a new value to the heap add it to the top of the heap. If the heap is empty the new value becomes the root. If heap is not empty than the smaller of the two values (current value in heap and the new value) is kept in the root. The larger of the two values is added the sub-heap with the smallest height. If both sub-heaps have the same height then the larger of the two values is added to the left heap. The process is repeated until a value is added to a new node at the bottom of the heap. (There are better ways of adding to a min-heap, but this is the way you are to use in this assignment.) Figure 2 is the result of adding 50 to the heap in figure 1.

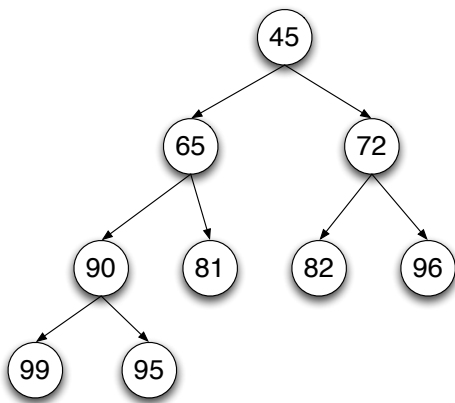


Figure 1

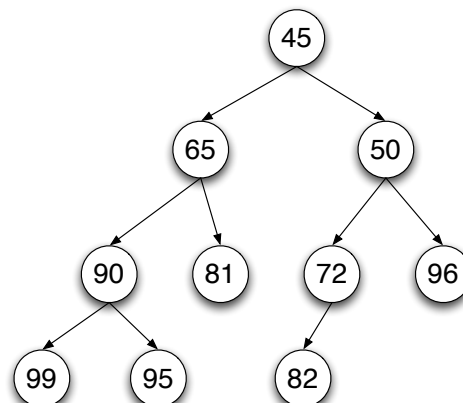


Figure 2

Your code is to have the following functionality:

1. Add integers to your min-heap. There is no need to implement delete.
2. Print out the values in the heap in postorder (the left sub-heap, right sub-heap, root).
3. Print out the odd numbers in the heap in preorder.

Don't store the heap in an array or vector like structure. Do not convert the heap into an array or vector like structure to traverse the heap.

## Grading

Item	Points
Working Code	15 points
Unit Tests	10 points
Comments	10 points
Quality of Code	15 points

**Working Code.** How well your code meets the functional requirements listed above accounts for 30% of the grade for the assignment.

**Unit Tests.** Having unit tests that cover the functionality of your code accounts for 20% of your grade. The unit tests are to be scalable. Tests using just print statements are not scalable.

**Remedial Points.** Don't forget about the remedial points that you can lose.

### Turning in your Assignment

Put your file(s) in a zip file and upload the zip file to the course portal. More about the course portal in class.