CSC 255

Unit 3 Programming Assignment 1 [50 points]

Heap Insertion Analysis

Implement two functions that will build a heap of N integers using the following two approaches:

a. Insert them into a heap one by one (percolate up). **[10 points]**
b. Build a heap in linear time (percolate down). **[10 points]**

Confirm the heaps are correctly built using both approaches. Build a heap with the following integers and display the heap: 2, 45, 12, 1, 56, 78, 13, 14, 5, 8, 9, 3, 11, 34.

Using these two different approaches to build a heap, write a driver program that will insert the integers 1 to 5000 into a heap in the following orders:

1. Sorted **[5 points]**
2. Reverse-sorted **[5 points]**
3. Random **[5 points]**

Your program must use the array-based version of the min-heap implementation as delivered by your accompanying textbook.

Write a 100 to 200-word report analyzing the three ordered insertions while contrasting the two methods used (percolate up or percolate down) to build the heap. Include in your analysis a case example of when building a heap using percolate up would be more efficient in building a heap. **[15 points]**