CS20 – Section 093 – Fall 2019

Programming Assignment 8 – Due Wednesday November 13 at 11:59PM

Binary heaps and HeapSort (60 points)

1. Create a function named buildArray which reads a data file consisting of a single fixed-format record with n unsorted, three-digit integers with no separation between them. buildArray is passed three parameters; the array to populate, the size of the array, and a string containing the pathname. buildArray has a void return type. It populates the array which was passed as a parameter.

The functions displayArray, checkIfHeap, heapify, buildHeap, and heapsort, which follow, all use the same parameter list:

an array of integers
the low element number of the array (the low element number is element 0)
the high element number of the array (the high element number is [length of array -1])

2. Create a function named displayArray which displays an array of integers, 10 integers per line.

3. Create a function named checkIfHeap. The function determines if the array bounded by low and high is a heap. If so, the function returns a Boolean value of true; else it returns false.

4. Create a function named heapify which transforms the subtree bounded by low and high into a heap.

5. Create a function named buildHeap which transforms an array into a heap. The array is bounded by low and high. A user wishing to create a heap out of an array would make a call to buildHeap. buildHeap repeatedly calls heapify as an internal function.

6. Create a function named heapSort which sorts a heap. The array is bounded by low and high. heapSort calls buildHeap to first transform the array into a heap, so it's not necessary for a user to first transform the array to be sorted into a heap.

Use the provided main program and test data files. Create a directory called CS20 and copy in the test files a81data.txt and a82data.txt.