

CSC 2300 – Data Structures and Algorithms

Homework 6

Due in Class on Tuesday, April 3

Late Policy is Three Late Days for the whole term

1. You are given this array of $2N$ numbers: $1, N+1, 2, N+2, 3, N+3, 4, N+4, \dots, N, 2N$. Find the total number of inversions in the array. How many element comparisons are performed if you apply the insertion sort routine in Figure 7.2 to this array?
2. Repeat Problem 1 with this array of $2N$ numbers: $1, 2N, 2, 2N - 1, 3, 2N - 2, 4, 2N - 3, \dots, N, N+1$.
3. You are given this input of ten number: $10, 9, 8, \dots, 2, 1$. How many element comparisons are performed if you apply the insertion sort routine in Figure 7.2? Show the result of running Shellsort using the increments $\{1, 3, 5\}$. How many element comparisons are performed?
4. Apply heapsort to the array of numbers in Problem 1 with $N=7$. Use the special implementation that does *not* require a second array for temporary storage. Print the array after buildHeap and after each application of deleteMax.
5. Repeat Problem 4 with the array of numbers in Problem 2 and $N=7$.
6. Sort the array in Problem 1 using quicksort with median-of-three partitioning and a cutoff of 3. Use $N=6$. Give details about the *first partition* of the algorithm as shown on pages 282 and 283.
7. Repeat Problem 6 with the array of numbers in Problem 2 with $N=6$.