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CSE 2020 Computer Science II

Professor Zhang

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Homework #3

1. (10 points) Priority queue.

a. Show the result (complete binary tree) of inserting 11, 13, 3, 15, 7, 6, 9, 16, 4, 10,

8, 5, 12, and 2 one at a time, into an initially empty binary heap.

b. Show the array that stores the above binary heap.

c. Show the result (complete binary tree) of performing three deleteMin

operations in the heap of the above exercise

2. (10 points) Insertion sort. a. Trace the operation of insertion sort algorithm when sorting the vector vector v = {7, 5, 1, 6, 8, 3, 2}. Please fill the table to show the changes of the vector v after each iteration. The first column is filled. index Original v v after i=1 iteration v after i=2 iteration v after i=3 iteration v after i=4 iteration v after i=5 iteration v after i=6 iteration 0 7 5 1 5 7 2 1 1 3 6 6 4 8 8 5 3 3 6 2 2 b. Please analyze the number of comparisons (v[j - 1] > temp) required in the worst case (the elements in the vector are arranged from the highest to the lowest) and the best case (the elements in the vector are arranged from the lowest to the highest), when using the insertion sort algorithm to sort all elements in a vector with n items. the worst case the best case # of comparisons