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Homework 7

1. Suppose we wish to avoid wasting one position in a max-heap array pg[], putting the largest value in pg[0](instead of pg[1]), its children in pg[1]and pg[2], and so forth, proceeding in level order. Give expressions for the index of the parent, left child, and right child of a node at index k where pq[k]is valid?

Parent = Ceiling(k/2) – 1

Left child = k \* 2 + 1

Right child = k \* 2 + 2

2. Build a max-heap using the input sequence of values 4,5,8,2,1,4,9,7,3. Show all steps.

A drawing on a piece of paper

Description automatically generated with medium confidence

3. Draw all of the unique binary min-heaps with the keys 1,2,3,4.

4. For a min-heap implemented as a complete binary tree array, give an algorithm (in pseudo code) that implements a find maximum function which returns (but does not remove) the maximum value from a min-heap. State the exact number of elements that must be analyzed in an n-size heap with this operation; we are not seeking the complexity of this operation.

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