1. (10 pts) Suppose we use the array representation to store a $d$-heap. For an entry located in position $i$, where are its parent and children located? Give both the formulae and their justification.

2. (20 pts) Consider the leftist heap shown below.

   (a) Show the heap after a deleteMin is performed, along with the intermediate steps.
   (b) To the heap of (a), insert a new key 7, and show the resulting heap, along with the intermediate steps.

![Leftist Heap Diagram](image)

3. (10 pts) In a binary tree, a full node is a node with two children. Prove that the number of leaves in the binary tree is always equal to the number of full nodes plus 1.

4. (20 pts) Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7 into an initially empty AVL tree.