Data Structures and Algorithms (CS 130A) **Subhash Suri**

Homework Assignment 2

Handed Out: Jan 31 **Due:** *Feb 14, 11 AM*

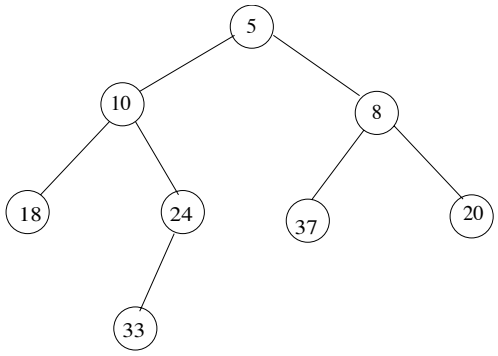
Typeset your answers, and submit using Gradescope.

1. (20 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 a brief justification.

2. (30 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 that results after the deleteMin of (a), insert a new key 7, and show the resulting heap, along with the intermediate steps.



3. (20 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. (30 pts) Show the result of inserting $2, 1, 4, 5, 9, 3, 6, 7$ into an initially empty AVL tree. Show the tree after each insert, and indicate the nodes at which rotations are performed and why.