1. (15 pts) Given a $d$-heap that has $N$ items initially, suppose we need to perform $M$ \textsc{percolateUp} and $N$ \textsc{deleteMin} operations.

   (a) What is the total running time for all the operations in terms of $M$, $N$ and $d$?
   
   (b) What is the total running time if $d = \Theta(N)$?
   
   (c) What choice of $d$ minimizes the total running time?

2. (15 pts) Show the result of inserting keys 1 to 15 into an initially empty leftist tree. Show the tree after each key is inserted.

3. (15 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.