CSE 326: Data Structures and Algorithms
Assignment #4
February 2, 1998
due: Monday, February 9

1. (a) Page 251, exercise 1a. Show the AVL tree after each insertion.
   (b) Page 251, exercise 1b.
   (c) Show the result of deleting the key 538 from the tree of part (1b).
2. (a) Number the nodes of the last tree in Figure 7.2 according to the order in which they are visited in an inorder traversal.
   (b) Using the numbers from part (2a) as the keys, show the result of doing an AVL-TreeDeleteMin on this AVL tree. (Show the tree after each rotation. For your information, it is not hard to see that executing a DeleteMin on these worst case trees causes $\Theta(\log n)$ rotations to occur. You might be interested in proving this to yourself.)
3. (a) Explain why it is much more convenient for AVLTreeDeleteMin to be written recursively than iteratively.
   (b) In executing AVLTreeDeleteMin, it is possible that there are rotations at a node v and some (distant) ancestor u of v, but no rotation at any of the nodes on the path between u and v. State exactly under what conditions this can happen.
   (c) Describe at what point you would invoke AVLTreeDeleteMin as a subroutine in the general AVL tree deletion algorithm, and how you would use the three values it returns.
4. Page 254, exercise 26. Show the splay tree at least after each insertion and deletion.