Exercises

1. **(10 points)** Show the contents of an AVL tree at the end of each of the following sequences of operations:
   
   (a) Insert(20); Insert(30); Insert(40);
   (b) Insert(35); Insert(37); Insert(36);
   (c) Insert(10); Insert(29); Remove(35);
   (d) Remove(36); Remove(40);

   **Solution:** The resulting trees are shown:

   ![Trees](image)

   2. **(10 points)** Find an example AVL tree such that removing a single (specific) value from the tree causes rebalancing to occur starting at two different nodes. Keep this tree as small as possible.

   **Solution:** Deleting the indicated node causes a single rotation from the right at its parent and at its grandparent (the root).
3. **10 points** Show the contents of a splay tree after

(a) Insert(1); Insert(3); Insert(5); Insert(7)
(b) Insert(2); Insert(4); Insert(6); Insert(8)
(c) Find(1); Find(5)
(d) Remove(4); Remove(8)

**Solution:** The resulting trees are shown. For part (d) the first answer is correct, but the second one is allowed since a clever implementation might eliminate the last splaying step.