These are some review questions to test your understanding of the material. Some of these questions may appear on an exam.

1 Splay Tree

Please see the rules for splaying on page 1.

1.1 Define Splay tree.

1.2 Show the result of inserting 2, 1, 4, 5, 9, 3, 6, 7 into an empty Splay tree (show the tree at the end of each insertion).

1.3 Show the result of deleting a given node in the tree.

1.4 What does the following statement mean?

"a splay tree has $O(n \log n)$ amortized performance over sequences of insert, remove, and find operations"

In particular, what does 'n' mean?

1.5 Explain, in English, how to insert a new element in a splay tree. Be sure to cover the situation in which the element is already in the tree.

1.6 Explain, in English, how to remove an element from a splay tree. Be sure to cover the situation in which the element to be removed is not in the tree.

1.7 Explain, in English, how to find an element in a splay tree. Be sure to cover the situation in which the element is not in the tree.

Splaying Rules

To splay the node $x$:

1. If $x$ is root, do nothing.

2. If $x$ has no grandparent (i.e., the parent of $x$ is root), rotate $x$ about its parent. This will make $x$ be root.

3. If $x$ has a grandparent:

   (a) If $x$ and its parent are both left-children or both right-children, rotate the parent about the grandparent, then rotate $x$ about its parent.

   (b) If $x$ and its parent are opposite-type children (one is left, the other is right) rotate $x$ about its parent, then rotate $x$ about its new parent (i.e., its former grandparent).