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 $O(n \lg n)$ 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).