CS 202
HW3

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Question 2)

The theoretical worst-case is that numbers to be added are in ascending order or descending order. If the numbers are sorted in ascending order, the numbers always will be added to the right child (like splicing), and the rotation function will be called when the tree becomes unbalanced. In the opposite scenario, numbers are sorted in descending order, the numbers always will be added to the left child, and the rotation function will be called when the tree becomes unbalanced. The theoretical average-case, random numbers, will reduce the number of rotations in the worst-case because no need to insert continuously right or continuously left. So, the number of situations that no need to rotate increases.

The experimental results support the theoretical results. As it is expected, the number of rotations in random numbers case is lesser than the number of rotations in the case of the ordered numbers, and the number of rotations in ascending numbers and descending are equal because they are mirror cases. Also, when the array size is increasing, the number of rotations increases for all cases. However, the number of rotations in random numbers is increasing slower than in the other two cases, as expected.

arrSize	Random	Ascending	Descending
1000	678	990	990
2000	1389	1989	1989
3000	2102	2988	2988
4000	2849	3988	3988
5000	3571	4987	4987
6000	4144	5987	5987
7000	4814	6987	6987
8000	5635	7987	7987
9000	6276	8986	8986
10000	6970	9986	9986