

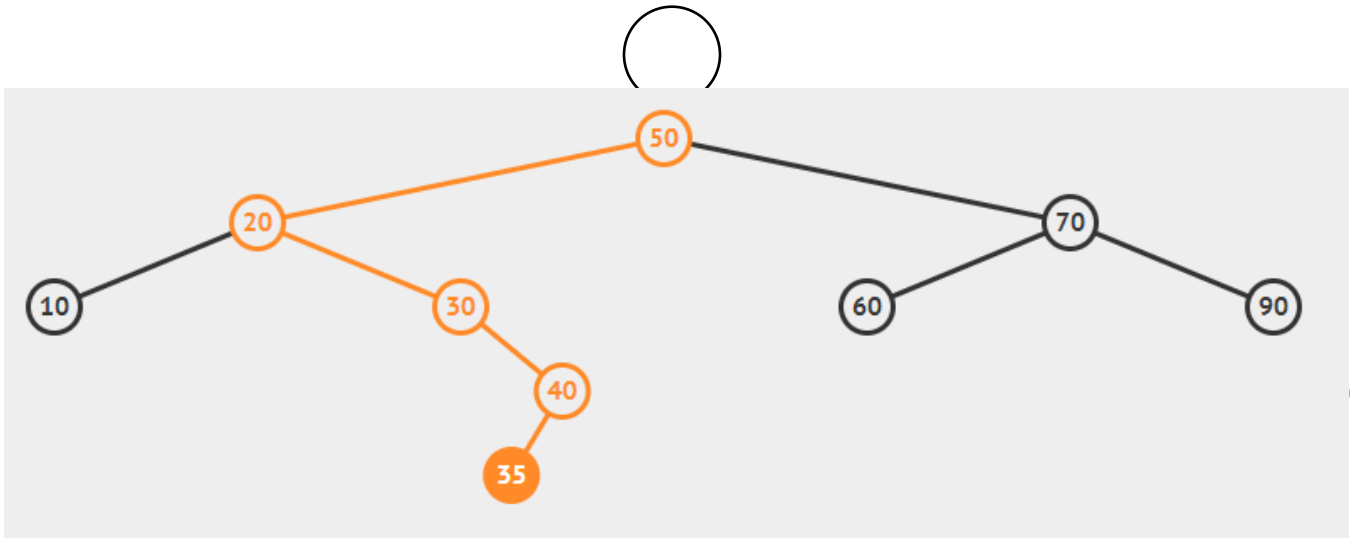
TIC2001 Data Structure and Algorithm Quiz 2

Every operation in this quiz has to follow our lecture notes and notations.

Question 1 AVL BST

Insert the following numbers by the given order into an AVL BST.

50, 20, 70, 10, 30, 60, 90, 40

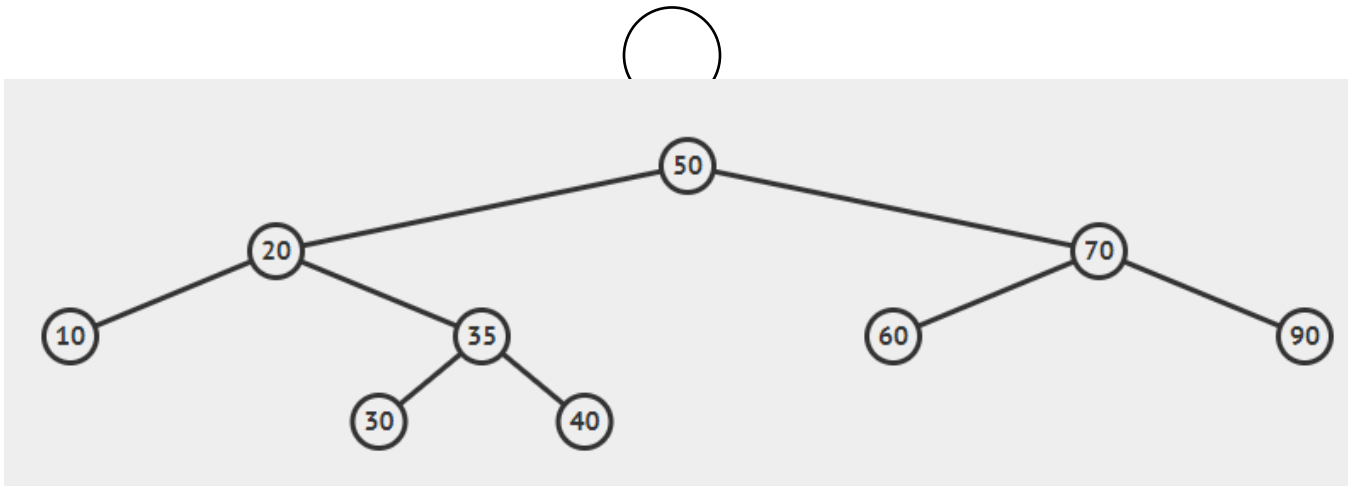


Insert 35 into the tree ABOVE **without** rotation.

Which is the lowest node that lost the height-balance property? __30__

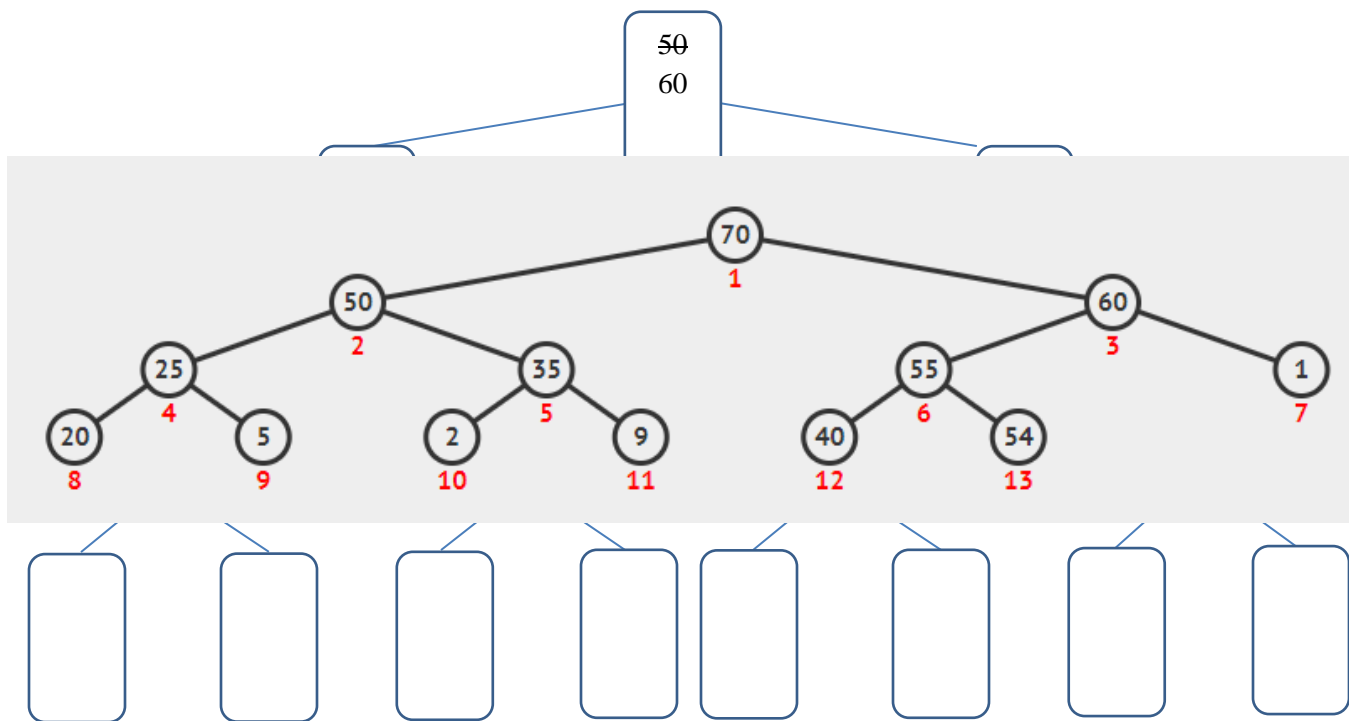
How many rotation(s) do you need? __2__

Perform the rotations to balance the tree and draw your final balanced tree below:

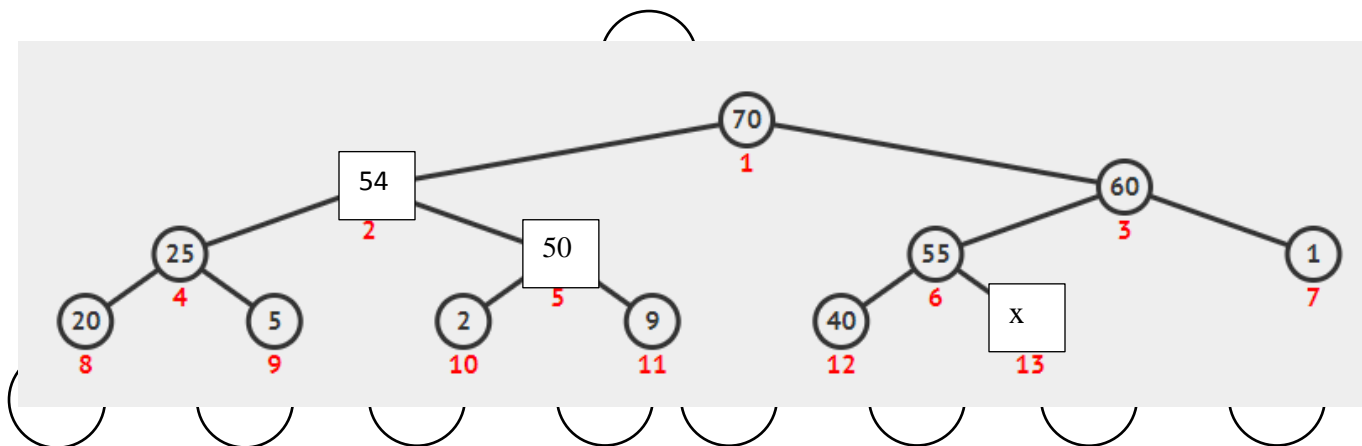


Question 2 Binary Heap

Insert the following numbers according to the given order into the binary heap. Perform bubbling if necessary. The first two are done for you to show you how to do bubbling: 50, 60, 40, 20, 35, 70, 1, 25, 5, 2, 9, 55, 54



Delete the node 35, and restore the heap by bubbling up or down. Show your final heap below.



Question 3 Consultation Booking System.

Before exam, a lot of students want to see the teacher for consultations and he has an online system for them to book time slots. Each student can submit a time t and the system will accept it if there is no other booking within the range of $t \pm 20$ minutes; otherwise, the system will reject the request. E.g. if the system already has the booking of 15:00 and 14:00, a request for 14:15 will be rejected but a request of 15:30 will be accepted. Which data structure is the best for this system? And give one important reason to support your answer.

AVL Tree with successor and predecessor functions. For each request, you can first query what are the timings for the ones right before and right after to know that if your current request is acceptable.