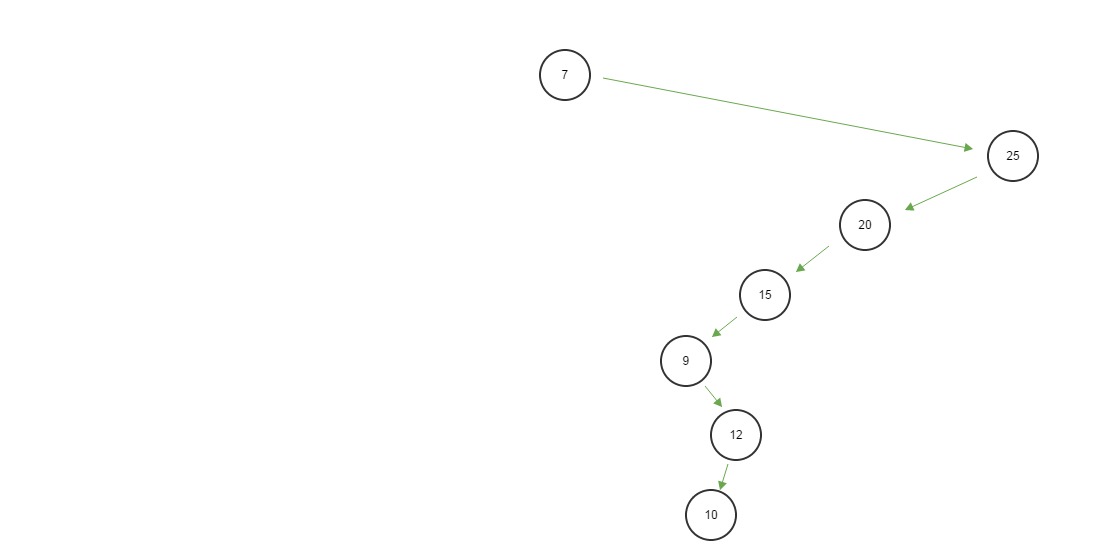
Gray Houston

ghousto

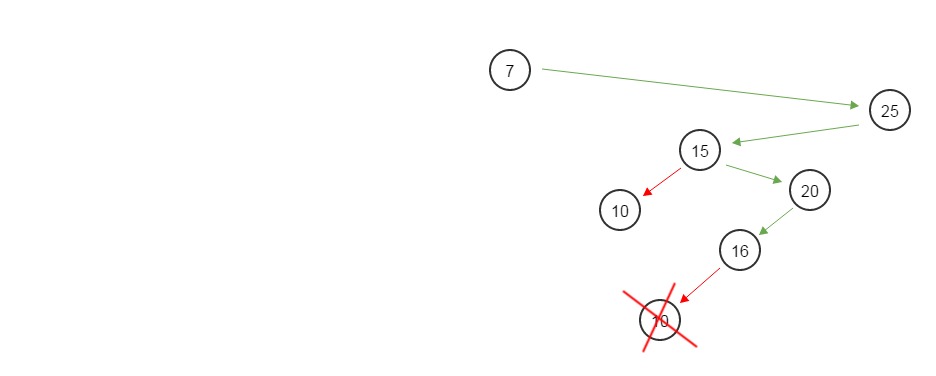
0026483532

Problem Set 1

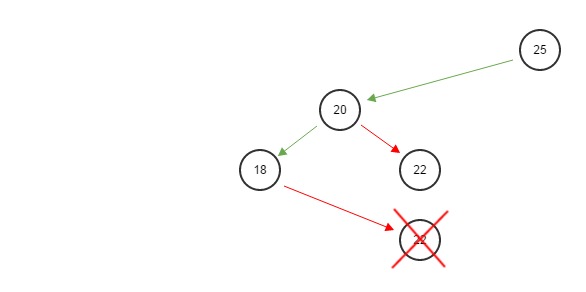
1. 7 → 25 → 20 → 15 → 9 → 12 → 10

 Tree exists

1. 7 → 25 → 15 → 20 → 16 → 10 Not a valid tree

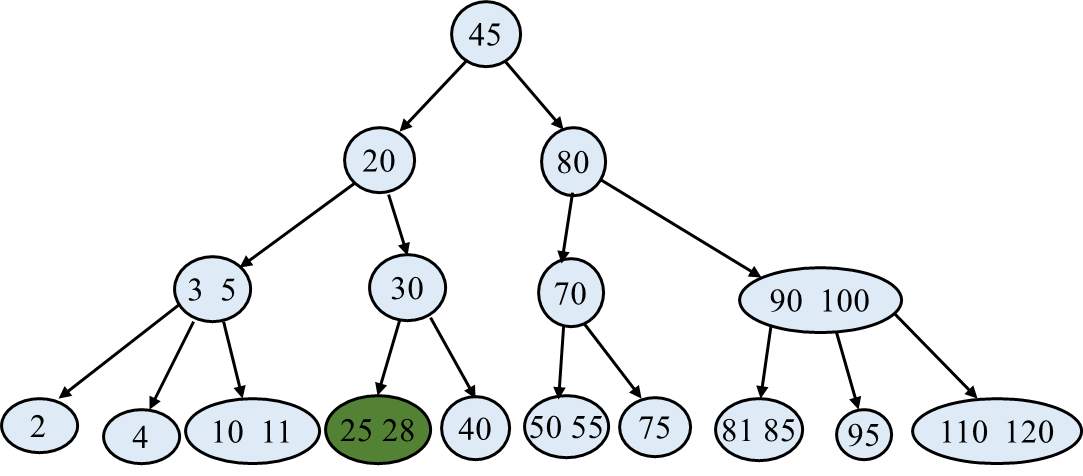


1. 25 → 20 → 18 → ~~22 → 16 → 10~~

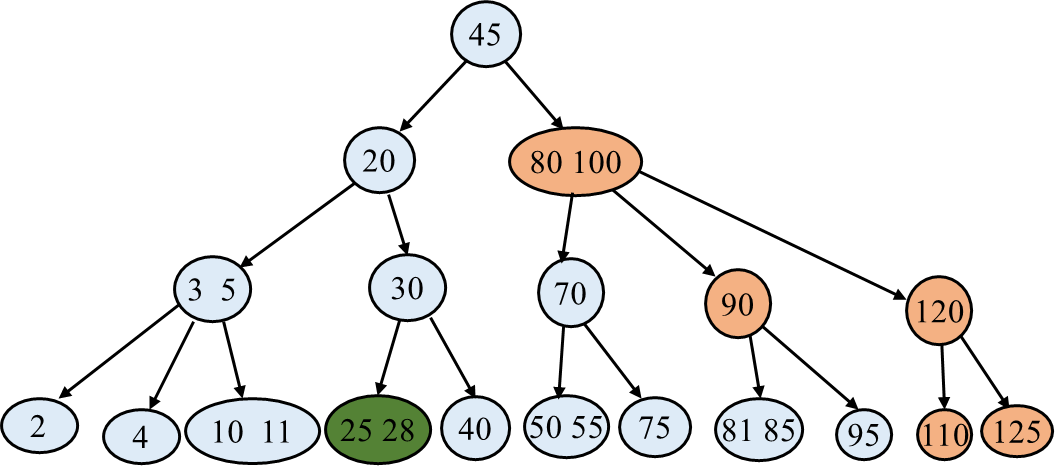


Therefore, this is not a valid tree.

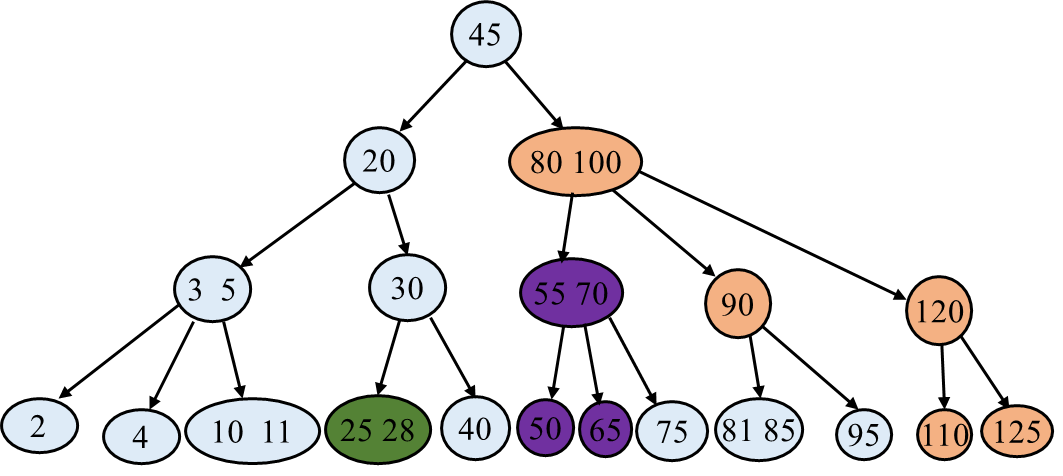
1. insert(28)

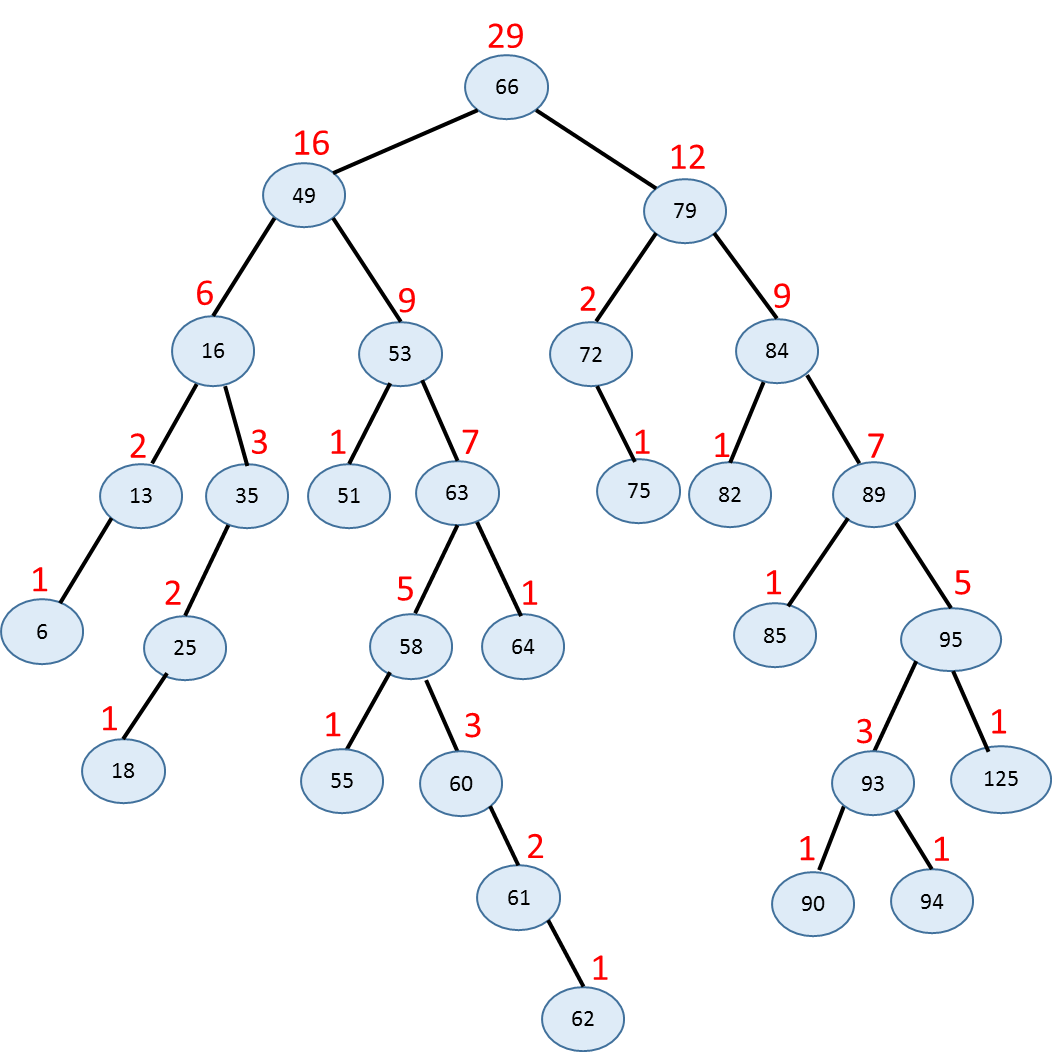


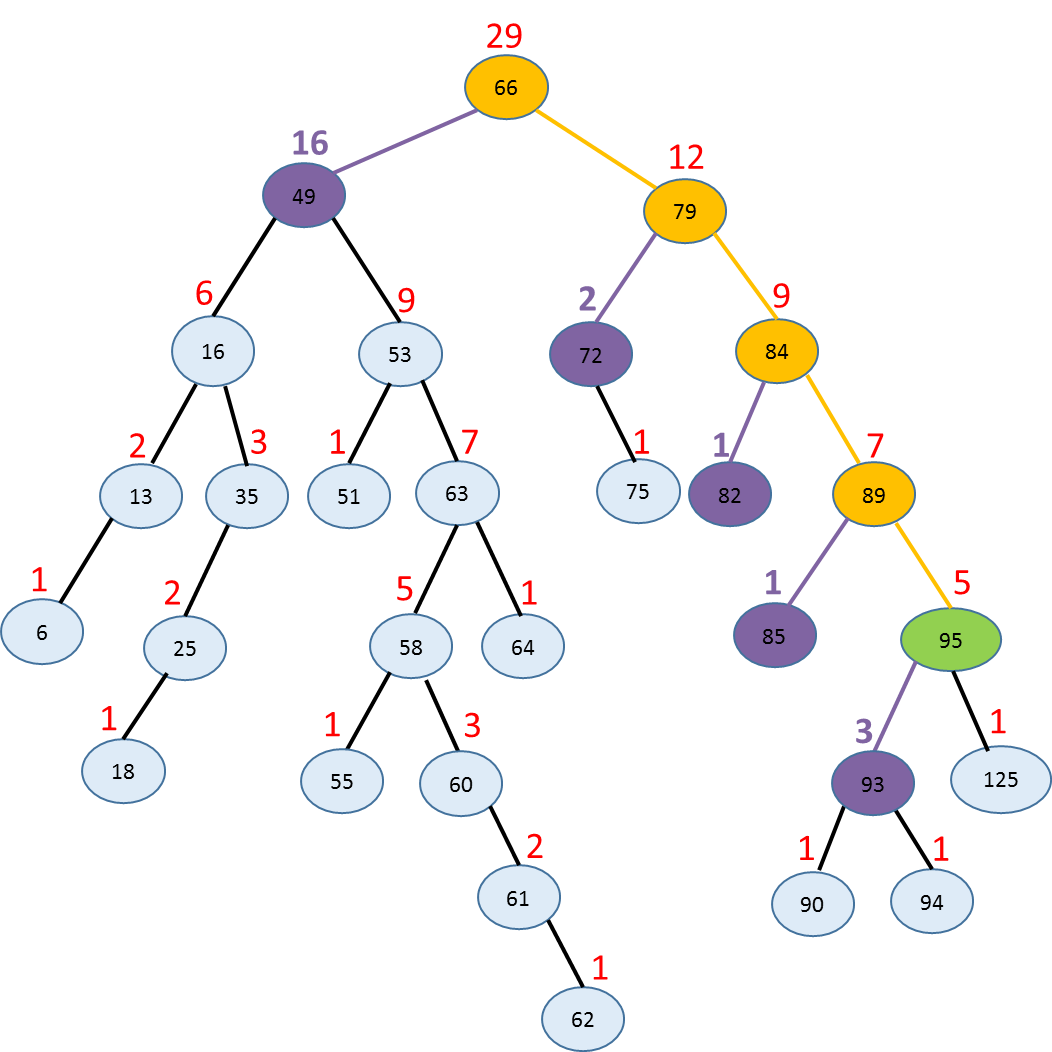
1. insert(125)



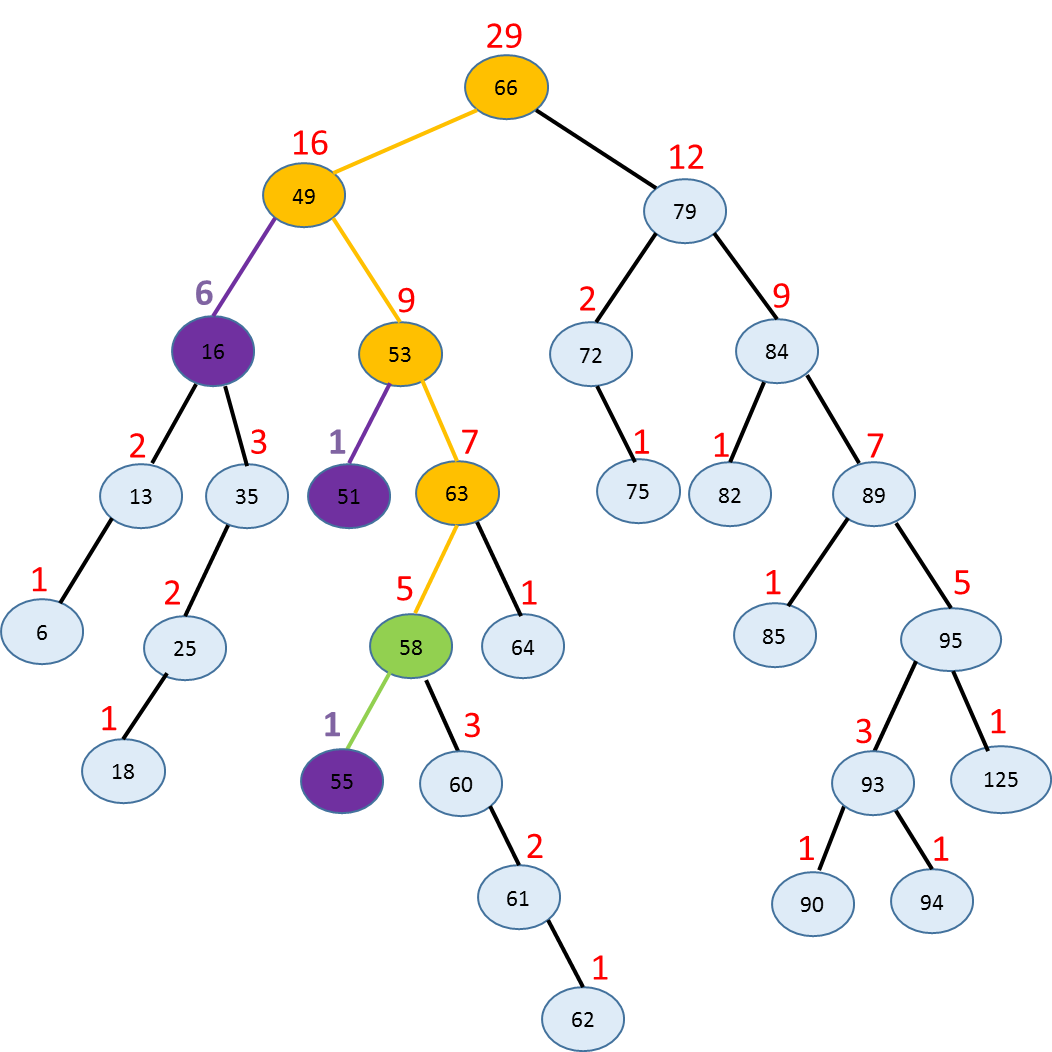
1. insert(65)







Rank(95) = (16+1) + (2+1) + (1+1) + (1+1) + 3 = 27



Rank(58) = (6+1) + (1+1) + 1 = 10

1. For the smallest case, a 2-3 tree with the minimum number of nodes (assuming a complete tree), each node only contains 1 key. If each node only has 1 key, this structure is a balanced binary search tree (BBST). A complete BBST of height h will contain (at most) 20 + 21 + … + 2h = 2h+1 – 1. Therefore, because a 2-3 tree with minimum nodes is a BBST, this minimal 2-3 tree will have n = 2h+1 -1 nodes.

In the case of a 2-3 tree with the maximum number of nodes, the number of nodes at each height h is equal to 30 + 31 + 32 + … + 3h. This sums to 3h+1 – 1. Therefore, for a 2-3 tree of height h with the maximum possible number of nodes, the number of nodes n = 3h+1 – 1.