
Fundamental Algorithms

Deadline: December 12, 2007

Problem 1 (10 Points)

Suppose we have a binary search tree with keys in the range from 1 to 1000. We search for key 363. Which of the following cannot represent the sequence of keys of nodes visited during this search?

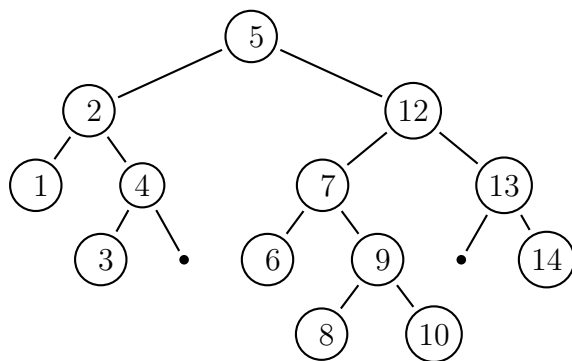
- a 2, 252, 401, 398, 330, 344, 397, 363
- b 924, 220, 911, 244, 898, 258, 362, 363
- c 925, 202, 911, 240, 912, 245, 363
- d 2, 399, 387, 219, 266, 382, 381, 278, 363
- e 935, 278, 347, 621, 299, 392, 358, 363

Problem 2

After `insert(x)` or `delete(x)` operations on an AVL tree, the tree needs to be rebalanced using single/double rotations. Show that all the rotations of an AVL tree are made out of two simple operations.

Problem 3

Given is an AVL tree. Perform the operation `insert(11)` on it. Balance the tree.



Problem 4

Prove that an AVL-tree containing n nodes is of height $\Theta(\lg n)$.

Problem 5

On an AVL tree with a single node 1, insert the numbers 2, 3, ..., 12 one by one. Show the balancing.