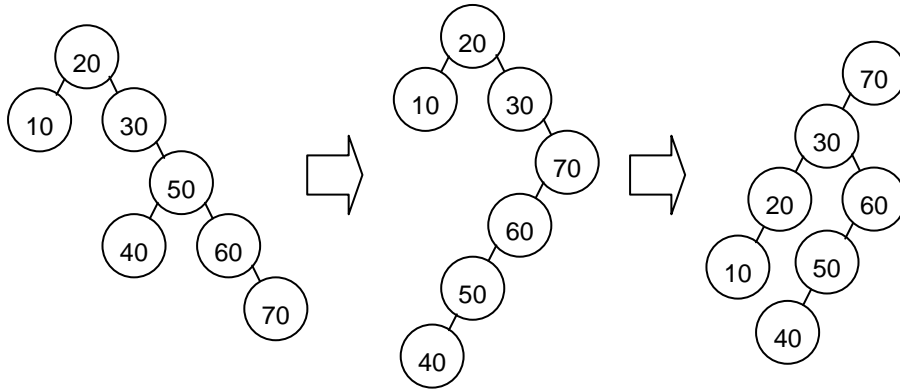


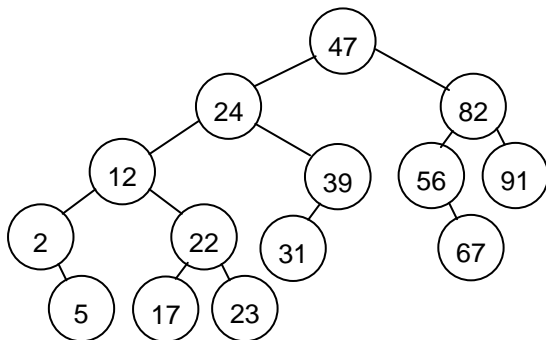
Data Structure and Programming

Solution of Midterm Exam. Spring, 2007

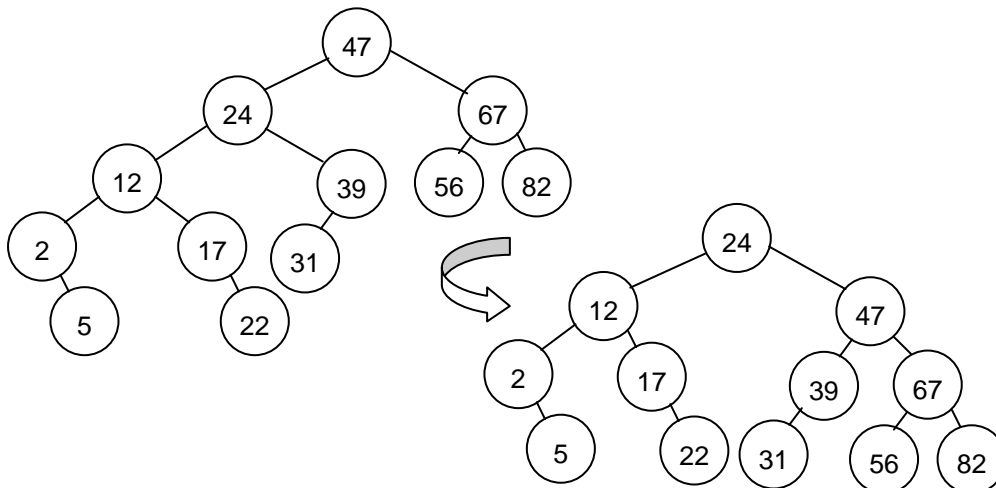
1.



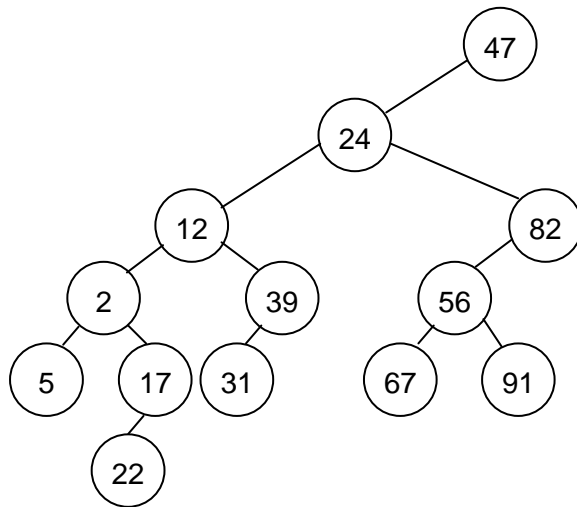
2. (a) insert 23:



(b) delete 91:

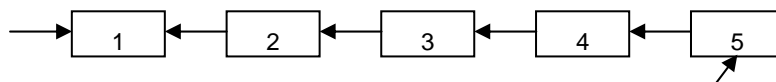


3.

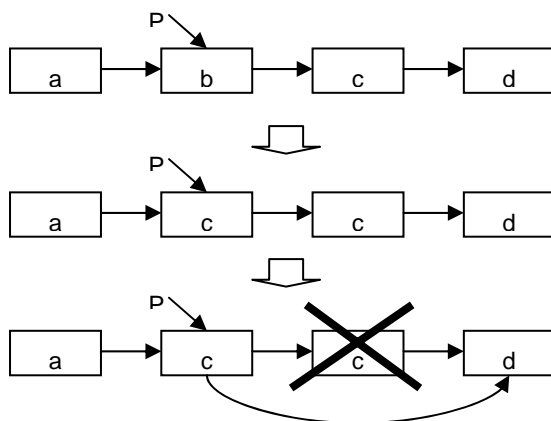


4. (a) 1) Insert n keys into an initially AVL tree. \rightarrow It takes $O(n \log n)$ time.
 2) Perform an inorder traversal. \rightarrow It takes $O(n)$ time.
 \rightarrow Totally it takes $O(n \log n)$ time.
- (b) 1) Construct an AVL tree from S_1 .
 2) For each element in S_2 , delete the element from the above AVL tree.
 3) Perform an inorder traversal
 \rightarrow Totally it takes $O(n \log n)$ time.

5. Use link inversion.

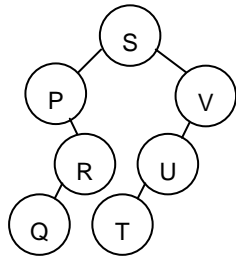


6. 1) Copy c into b .
 2) Delete the original c .

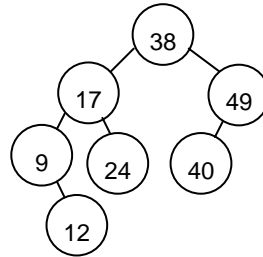


7. (a) $O(n \log n)$
 (b) $n_k = n_{k-1} + n_{k-3} + 1$
 (c) (1) $\Theta(n \log n)$
 (2) $\Theta(n^3)$

(d)

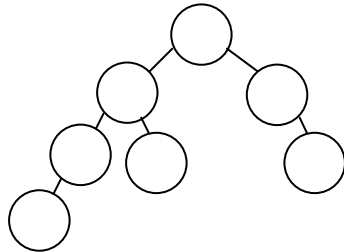


(e)

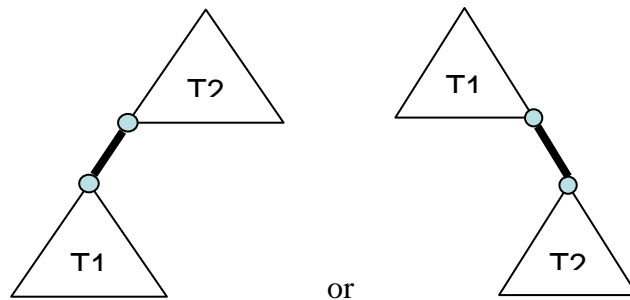


- (f) (1) $O(\log n)$
 (2) $O(1)$

(g) 7 nodes in total:



(h) 1) In a simple way:



2) In a better way:

- a) Splay the largest in T1.
- b) Splay the smallest in T2.
- c) Combine T1 and T2 with the two nodes splayed in above steps.

