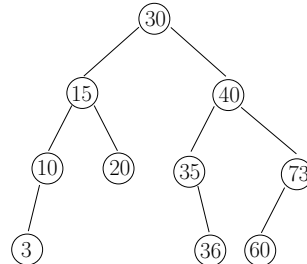


## COMP3506/7505: Special Exercise Set 8

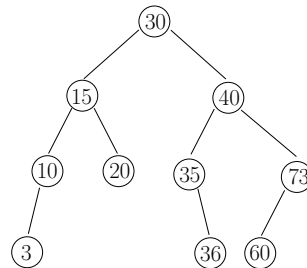
Prepared by Yufei Tao

**Problem 1.** Consider the binary search tree (BST) below:



Show the sequence of nodes visited to find the predecessor of 33.

**Problem 2.** Consider the binary search tree (BST) below:



Show the sequence of nodes visited to find the successor of 33.

**Problem 3 (Textbook Exercise 12.2-1).** Which of the following sequences could not be the sequence of nodes visited in a predecessor query?

- 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.

**Problem 4.** Let  $T$  be a balanced BST storing a set of  $n$  integers. Give an algorithm to find the smallest integer in  $O(\log n)$  time.

**Problem 5.** Let  $T$  be a balanced BST storing a set of  $n$  integers. Give an algorithm to report all these integers in ascending order in  $O(n)$  time.

**Problem 6.** Let  $T$  be a BST storing a set  $S$  of integers. Let  $u$  be a node in  $T$  with key  $k$ . Suppose that  $u$  is an internal node with a right child. Prove that the node whose key succeeds  $k$  in  $S$  must either be a leaf, or have no left child.