Problem sheet 5

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1.) Inorder Tree Walk
Give a nonrecursive algorithm that performs an inorder tree walk. (Hint: There is an easy solution that uses a stack as an auxiliary data structure and a more complicated but elegant solution that uses no stack but assumes that two pointers can be tested for equality. One solution is OK, no need to show both.) (3P)

2.) Search Paths
Suppose that we have numbers between 1 and 1000 in a binary search tree and want to search for the number 363. Which of the following sequences could *not* be the sequence of nodes examined ? Explain why!

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

(2.5P)

3.) Trees
In Chapter 10.4 in CLRS, the representation of trees in memory is described. If we want to represent trees with unbounded branching, i.e. with an arbitrary number of children per node, we have to keep all child nodes in some form of datastructure. One of the datastructures described is the “left child, right sibling”-representation.

Write an $O(n)$-time procedure that prints all the keys of an arbitrary rooted tree with n nodes, where the tree is stored using the left-child, right-sibling representation. (2.5p)

4.) Right Rotation
Write the pseudocode for ROTATERIGHT in Red-Black-Trees. (2P)