

10.4-3.

Write an $O(n)$ -time nonrecursive procedure that, given an n -node binary tree, prints out the key of each node in the tree. Use a stack as an auxiliary data structure.

Answer.

```
PRINT-BINARY-TREE( $T, S$ )
1  PUSH( $S, T.root$ )
2  while not STACK-EMPTY( $S$ )
3       $x = S[S.top]$ 
4      while  $x \neq \text{NIL}$                 // store all nodes on the way towards the left most child
5          PUSH( $S, x.left$ )
6           $x = S[S.top]$ 
7      POP( $S$ )                        //  $S$  has NIL on its top, so pop it
8      if not STACK-EMPTY( $S$ )          // print this node, leap to its in-order successor
9           $x = \text{POP}(S)$ 
10         print  $x.key$ 
11         PUSH( $S, x.right$ )
```

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