Algorithms: Solutions 8

Problem 1
Give a nonrecursive algorithm that prints all elements of a binary search tree in sorted order.

ITERATIVE-TREE-WALK(T)
$x \leftarrow$ TREE-MINIMUM($root[T]$)
while $x \neq$ NIL
  do print $key[x]$
    $x \leftarrow$ TREE-SUCCESSOR(x)

The running time is $\Theta(n)$, where n is the number of nodes in the tree.

Problem 2
Consider a binary search tree, and give an algorithm that prints all nodes whose keys are between two given values.

INORDER-RANGE-WALK(x, min, max)
if $x \neq$ NIL
  then if $min \leq key[x]$
      then INORDER-RANGE-WALK($left\text{-}child[x]$, min, max)
    if $min \leq key[x] \leq max$
      then print $key[x]$
    if $key[x] \leq max$
      then INORDER-RANGE-WALK($right\text{-}child[x]$, min, max)

The running time is $O(h+k)$, where h is the height of the tree, and k is the number of nodes whose keys are between the two given values.