Analysis of Algorithms: Solutions 6

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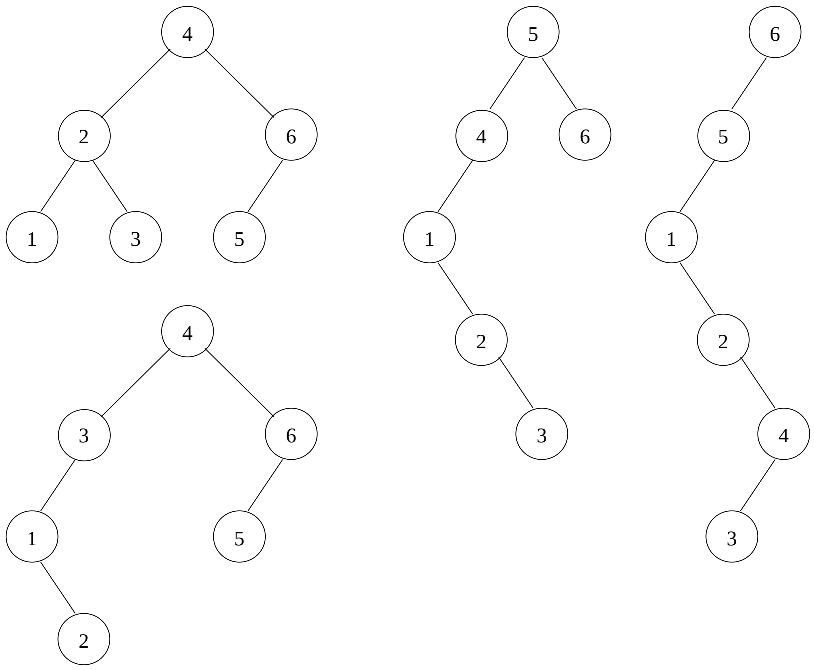
                              X
                              X
number of                     X
homeworks                     X
                     X        X
                     X        X
                     X        X
                     X        X
      X  X           X     X  X
      --------------------------
      2  3  4  5  6  7  8  9  10
                grades
```

The histogram shows the distribution of grades; it does *not* include the bonus.

Problem 1
Draw four binary search trees, with heights two, three, four, and five. Each tree should have six nodes, and the keys of these nodes should be 1, 2, 3, 4, 5, and 6.



Problem 2
Give a nonrecursive version of Inorder-Tree-Walk.

Iterative-Tree-Walk(T)
$x \leftarrow$ Tree-Minimum($root[T]$)
while $x \neq$ NIL
    do print $key[x]$
        $x \leftarrow$ Tree-Successor(x)

Problem 3
Give an algorithm that converts a sorted array $A[1..n]$ into a balanced binary search tree.

Convert(A, p, r)
$q \leftarrow \lfloor (p + r)/2 \rfloor$
create a new node x
$key[x] \leftarrow A[q]$
if $p < q$
    then $y \leftarrow$ Convert($A, p, q - 1$)
            $parent[y] \leftarrow x$
            $left\text{-}child[x] \leftarrow y$
if $q < r$
    then $z \leftarrow$ Convert($A, q + 1, r$)
            $parent[z] \leftarrow x$
            $right\text{-}child[x] \leftarrow z$
return x