Tutorial 8

Example 1

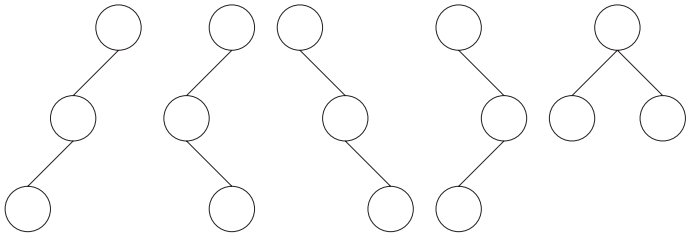
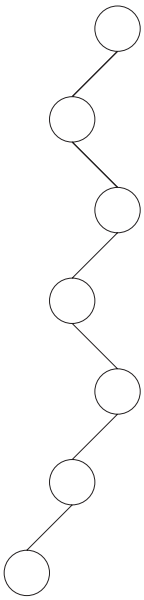


Figure 1: All binary trees with 3 nodes.



1

Figure 2: The highest binary tree with 7 nodes.

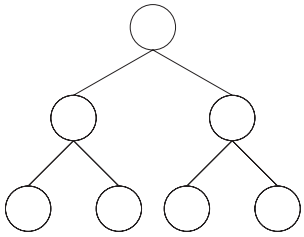


Figure 3: A balanced binary tree with 7 nodes.

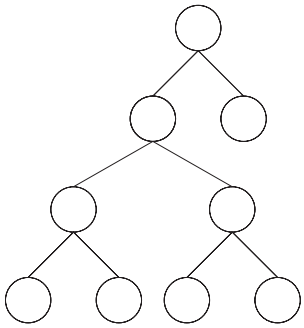


Figure 4: A binary tree with 9 nodes, where each non-leaf has exactly two children.

Example 2

- **no_leaves**(x:ENTRY_TYPE):int
  if $t.nil\_entry(x)$ **then**
  res:= 0
  else if $t.nil\_entry(t.left\_child(x))$ and $t.nil\_entry(t.right\_child(x))$ **then**
  res:= 1
  else
  res:= $(no\_leaves(t.left\_child(x)) + no\_leaves(t.right\_child(x)))$
  end if
  return res

- $O(|t|)$

Example 3

- **Preorder:** 4, 2, 1, 3, 7, 5, 6, 8.
- **Inorder:** 1, 2, 3, 4, 5, 6, 7, 8.
- **Postorder:** 1, 3, 2, 6, 5, 8, 7, 4.

Example 4

- No, counter example:

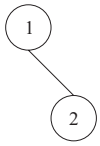


Figure 5: Counter example.

Example 5

	Preorder	Inorder	Postorder
O(1)	O($\|t\|$)	O($\|t\|$)	O($\|t\|$)
O($\|t\|$)	O($\|t^2\|$)	O($\|t^2\|$)	O($\|t^2\|$)
O($\|t^2\| \log \|t\|$)	O($\|t^3\| \log \|t\|$)	O($\|t^3\| \log \|t\|$)	O($\|t^3\| \log \|t\|$)