Algorithms and Data Structures for Data Science

lab_trees

CS 277

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Learning Objectives

Practice storing information in a binary tree

Implement structural functions and traversal functions

Practice manipulating tree structures while preserving content

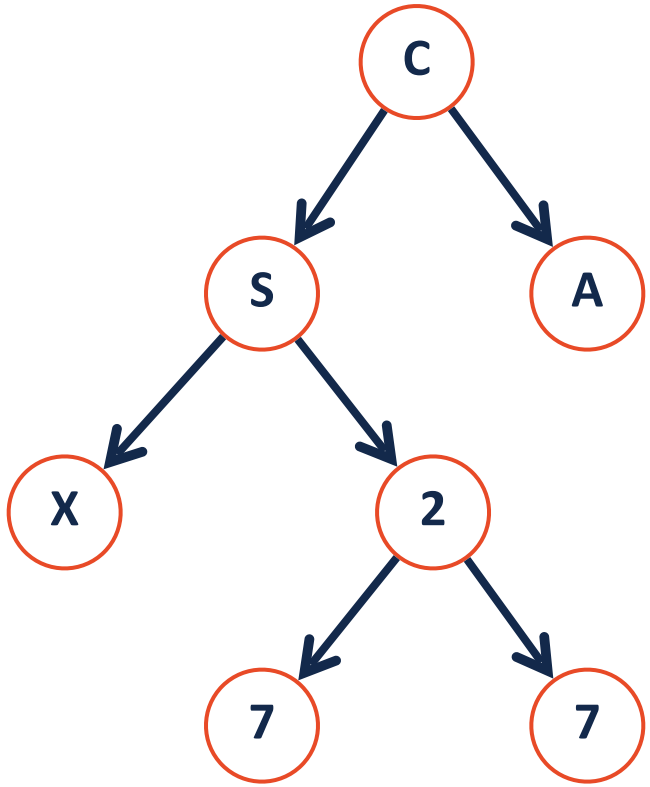
Binary Tree

A **binary tree** is a tree T such that:

$$T = None$$

or

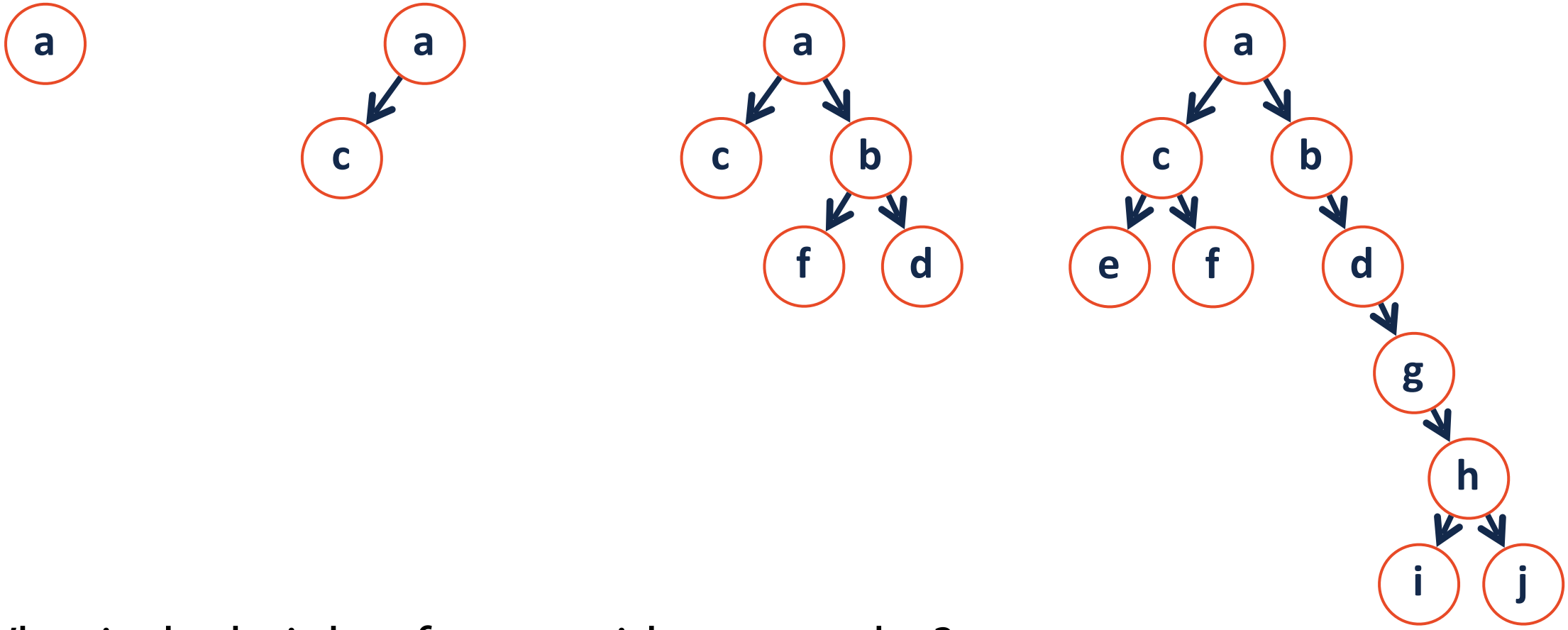
$$T = treeNode(val, T_L, T_R)$$




```
1  class treeNode:
2      def __init__(self, val, left=None, right=None):
3          self.val = val
4          self.left = left
5          self.right = right
```

Tree Terminology

Height: the length of the longest path from the root to a leaf



What is the height of a tree with ***zero*** nodes?

Tree Height

`height(T) =`

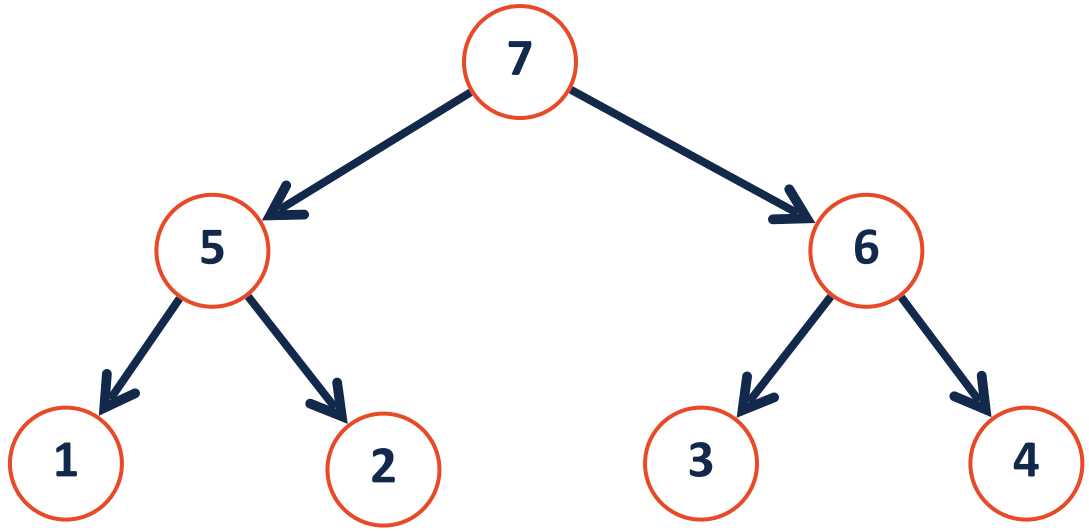
Base Case:

Recursive Step:

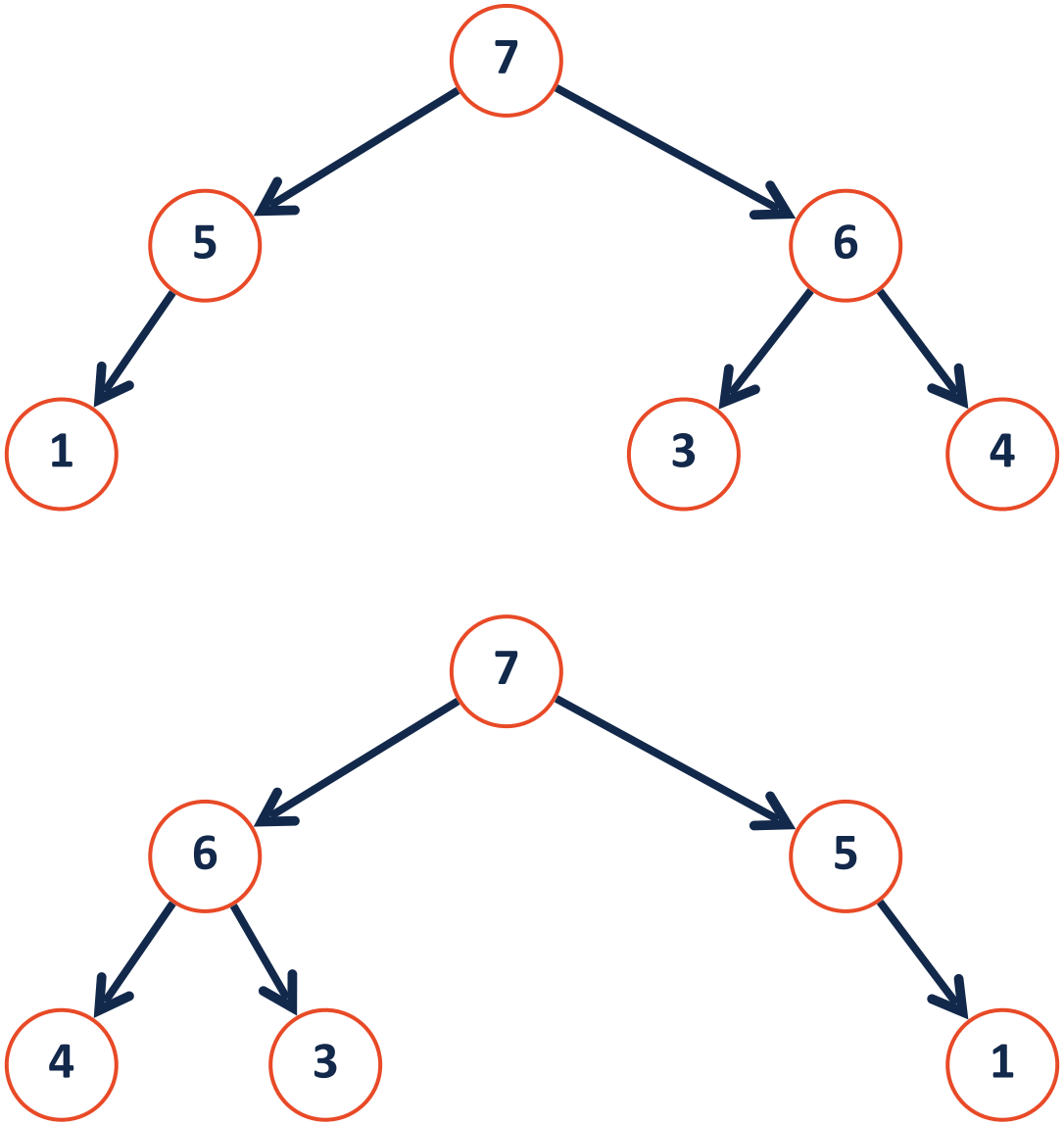
Combining:

In-Order Traversal

1) Recurse left
2) Get current nodes value
3) Recurse right



Mirror



Tree Mirror

Base Case:

Recursive Step:

Combining: