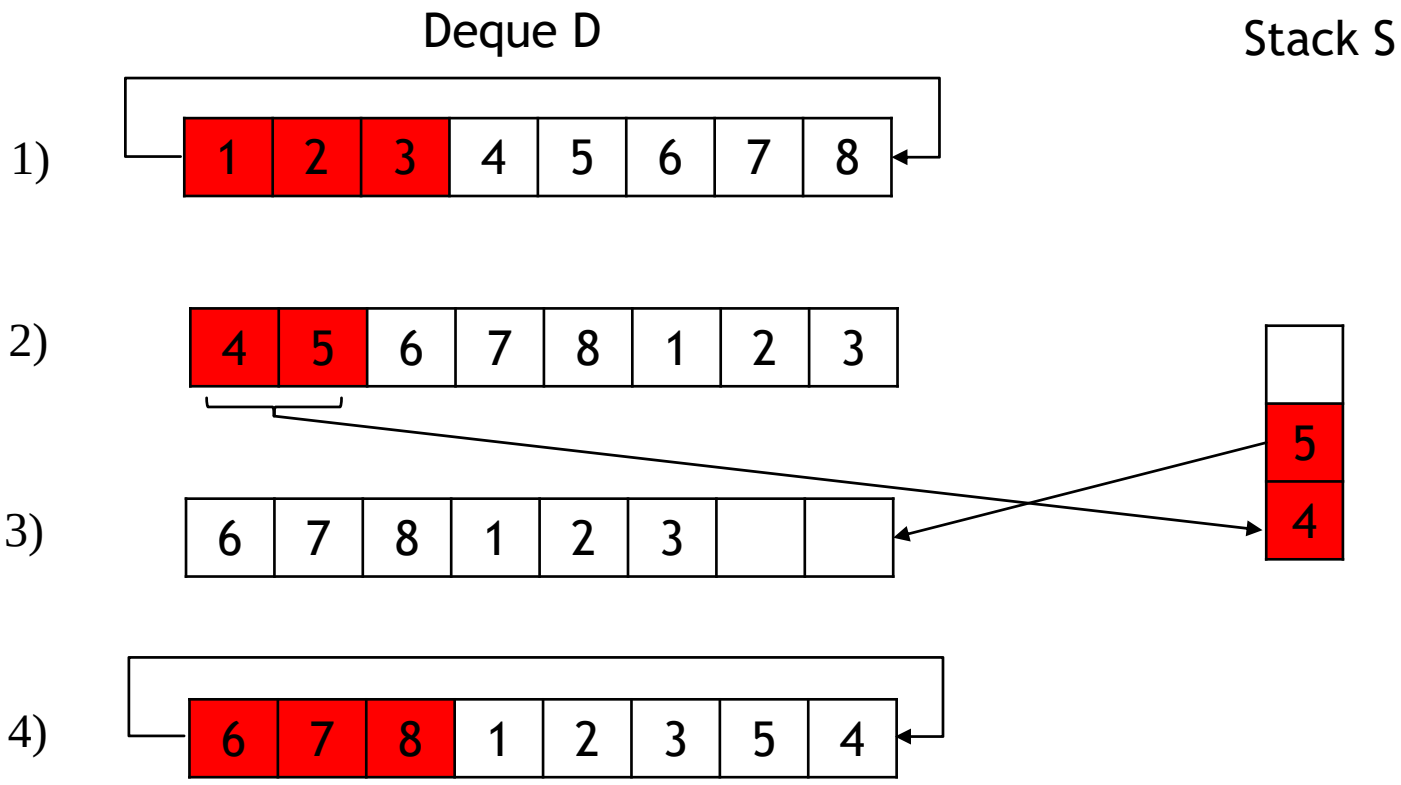
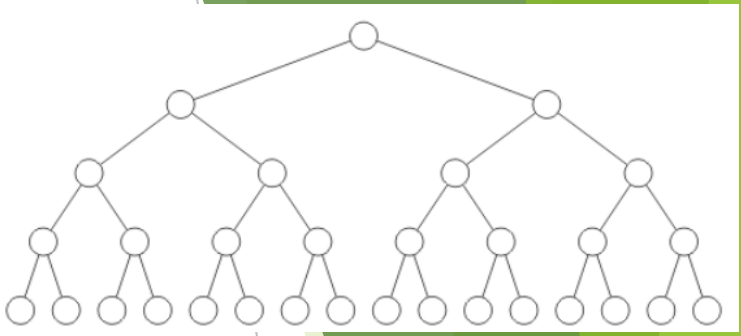
CSI 2110 Tutorial (Section A)

Yiheng Zhao
yzhao137@uottawa.ca
Office hour: Fri 13:00 – 14:00
Place: STE 5000G

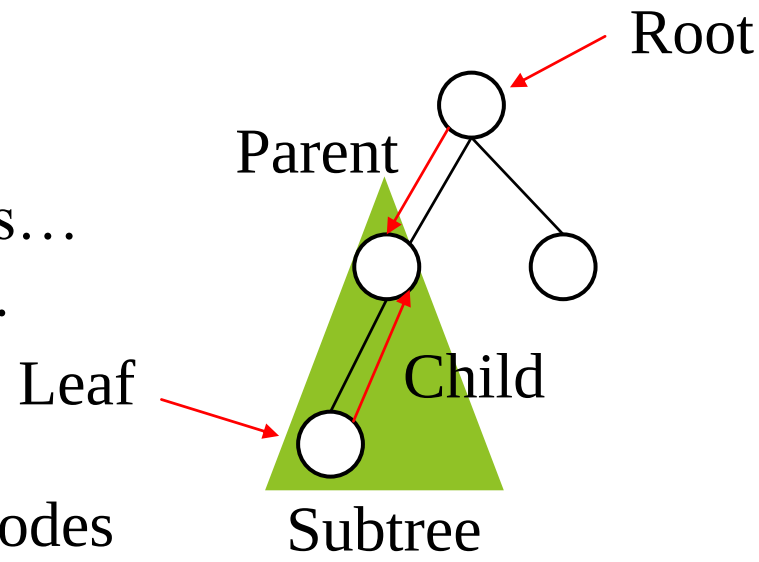
6.14 Suppose you have a deque D containing the numbers (1,2,3,4,5,6,7,8), in this order. Suppose further that you have an initially empty stack S. Give a code Fragment that uses only D and S (and no other variables) and results in D storing the elements in the order (1,2,3,5,4,6,7,8)

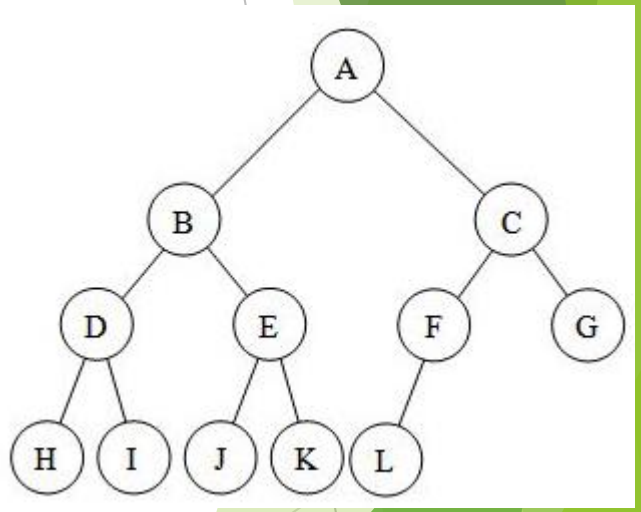


Tree: a connected graph with no cycles



Internal Node: has child
External Node: leaf
Ancestors: parents, grandparents…
Descendant: child, grandchild…
Distance: number of edges
Depth: number of ancestors
Height: maximum depth of all nodes



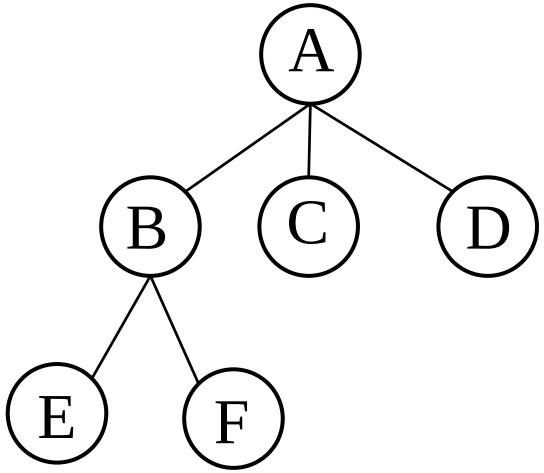


Binary Tree: each node has maximum two children
Full (proper) Binary Tree: each node has zero or two children
Perfect Binary Tree: all leaves are at the same depth
Complete Binary Tree: perfect binary tree + one or more leaves on the last level (left side)

Traveling in a tree

Pre-order: current -> children

A, B, E, F, C, D



In-order: first child -> current -> other children

E, B, F, A,C,D

Post-order: children -> current

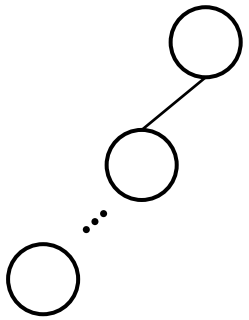
E, F, B, C, D, A

8.7:

What are the minimum and maximum number of internal and external nodes in an improper (not Full) binary tree with n nodes?

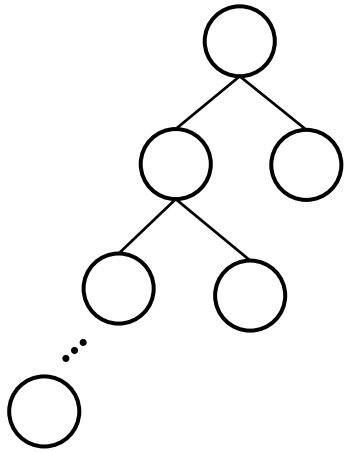
Min: $n_e = 1$

Max: $n_i = n - 1$



Max: $n_e = [\frac{n}{2}]$

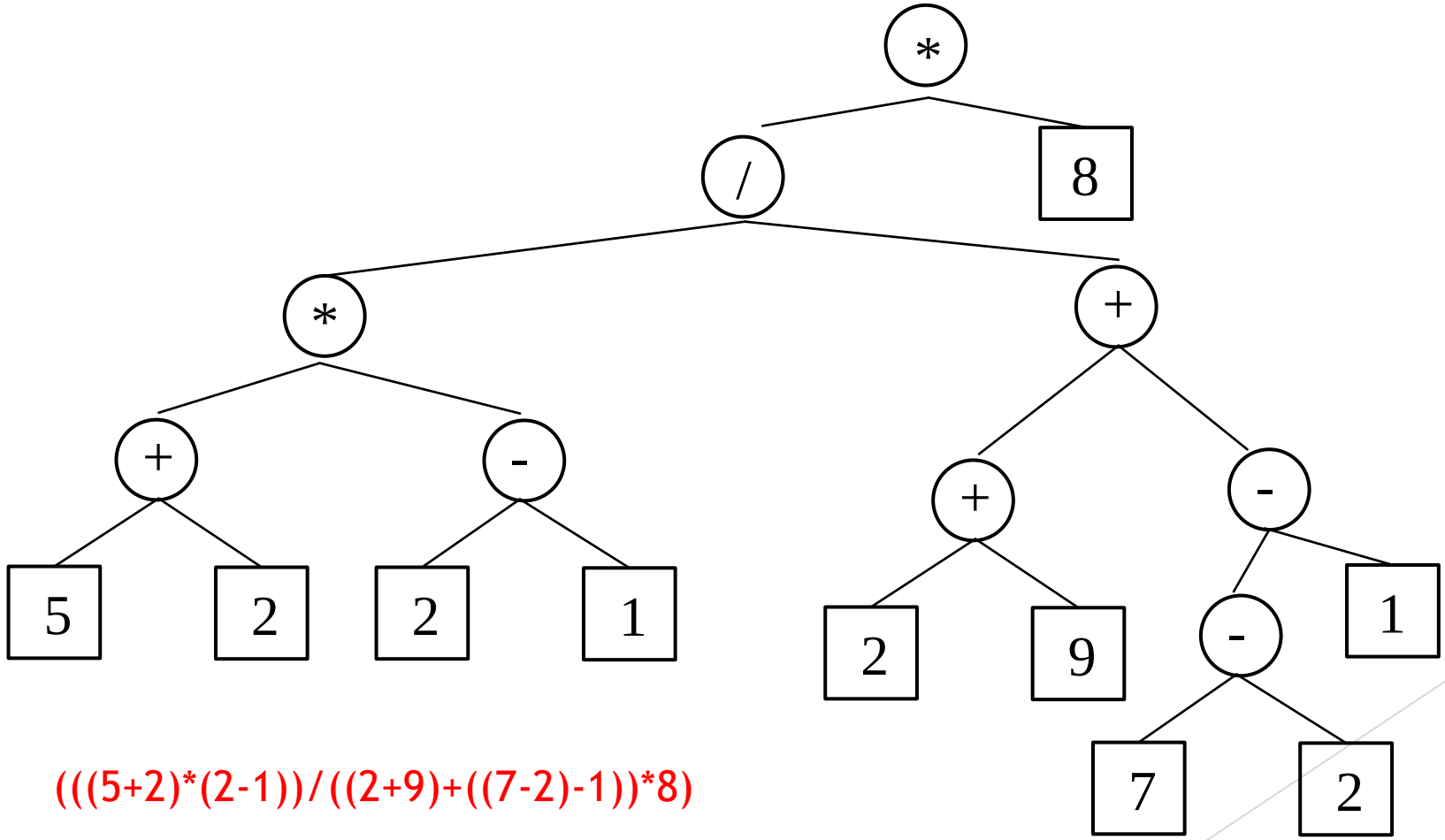
Min: $n_i = n - [\frac{n}{2}]$



'[x]' represents getting the largest integer of x

8.12:

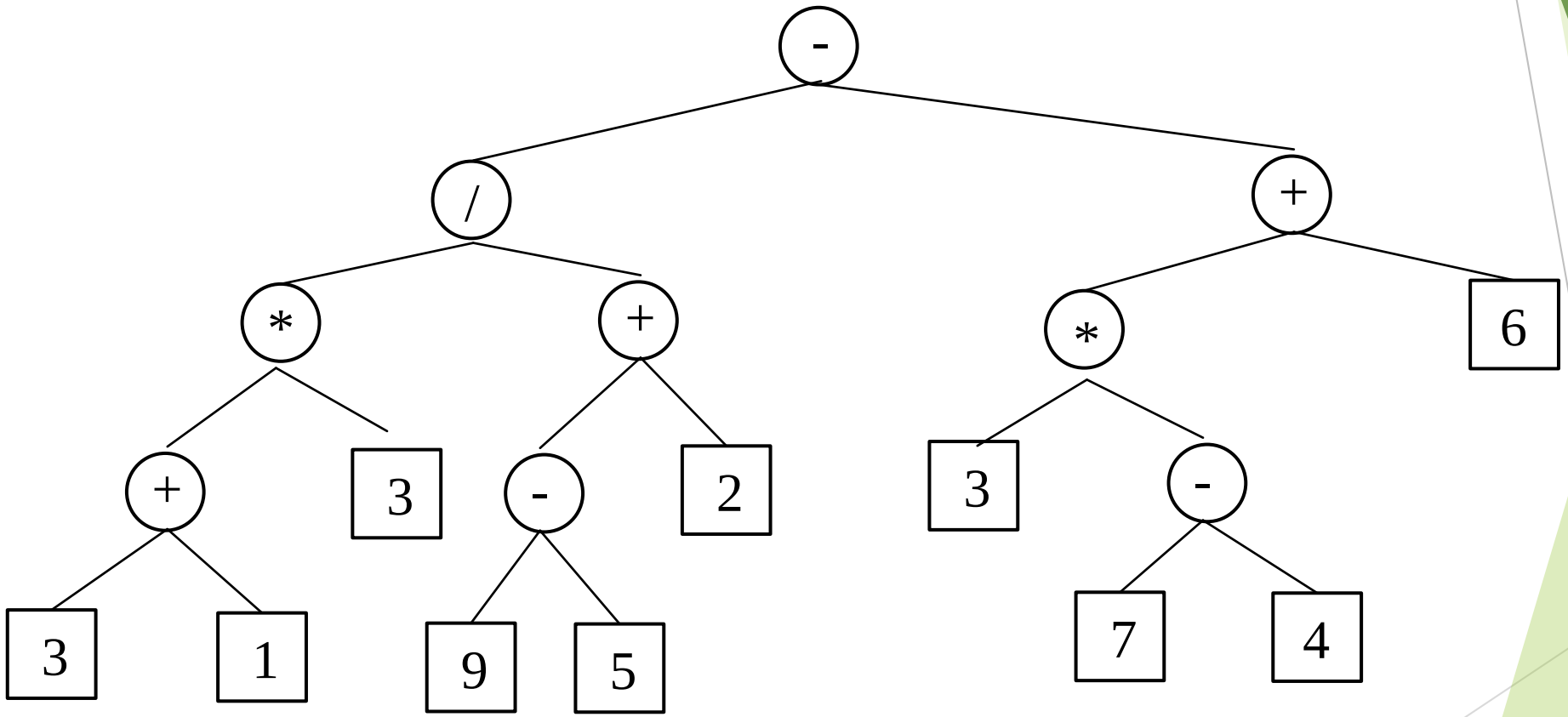
Draw the binary tree representation of the following arithmetic expression: “(((5+2)*(2-1))/((2+9)+((7-2)-1))*8)”



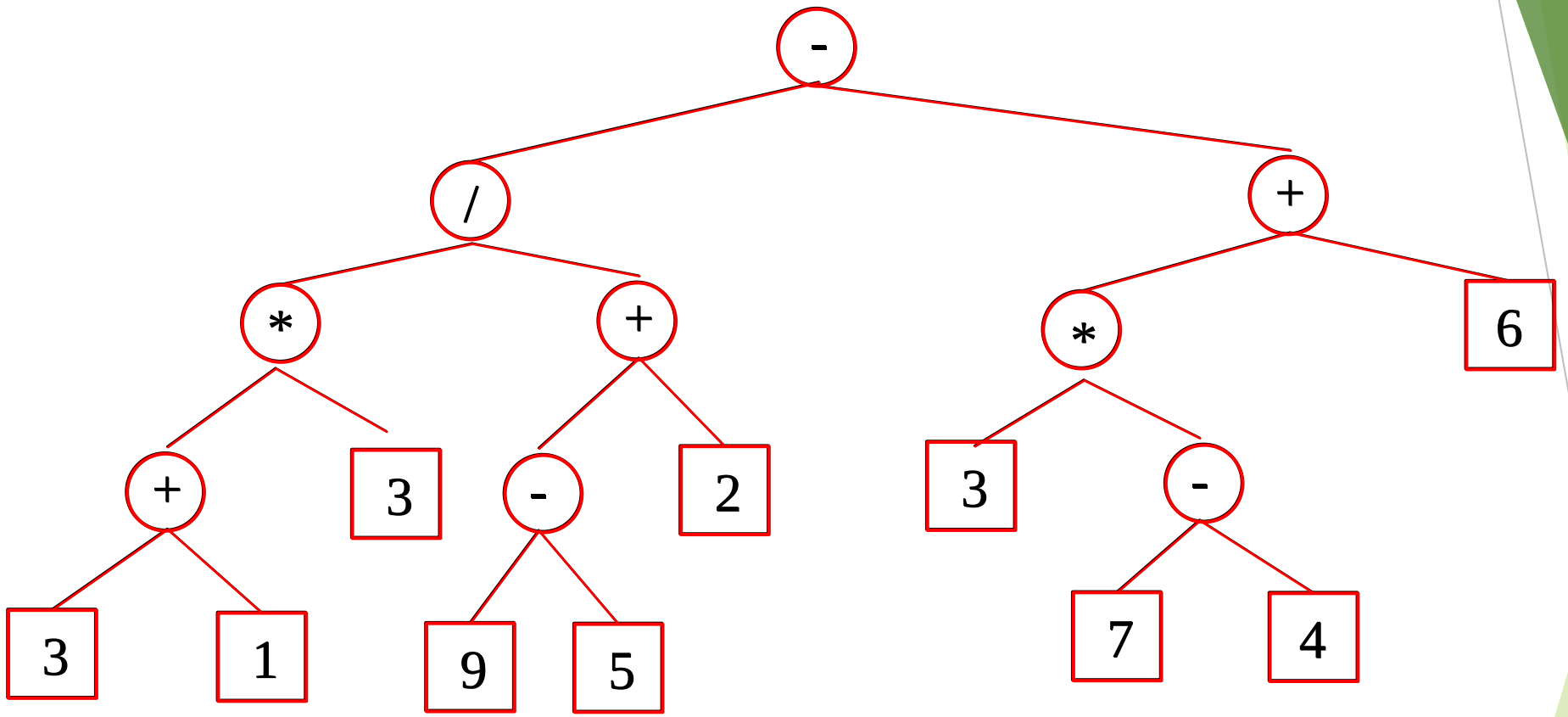
(((5+2)*(2-1))/((2+9)+((7-2)-1))*8)

8.18:

In what order are positions visited during a preorder traversal of the tree below:



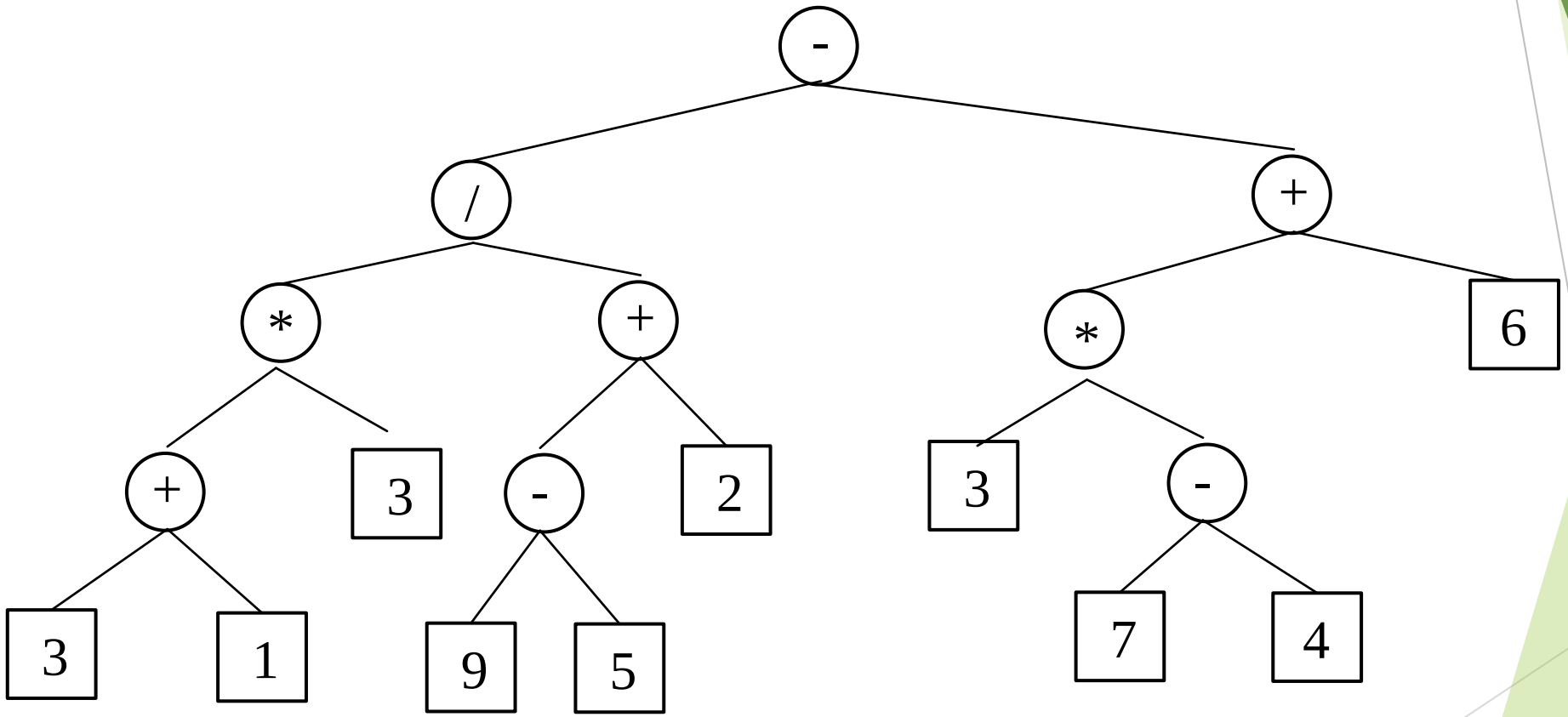
8.18:



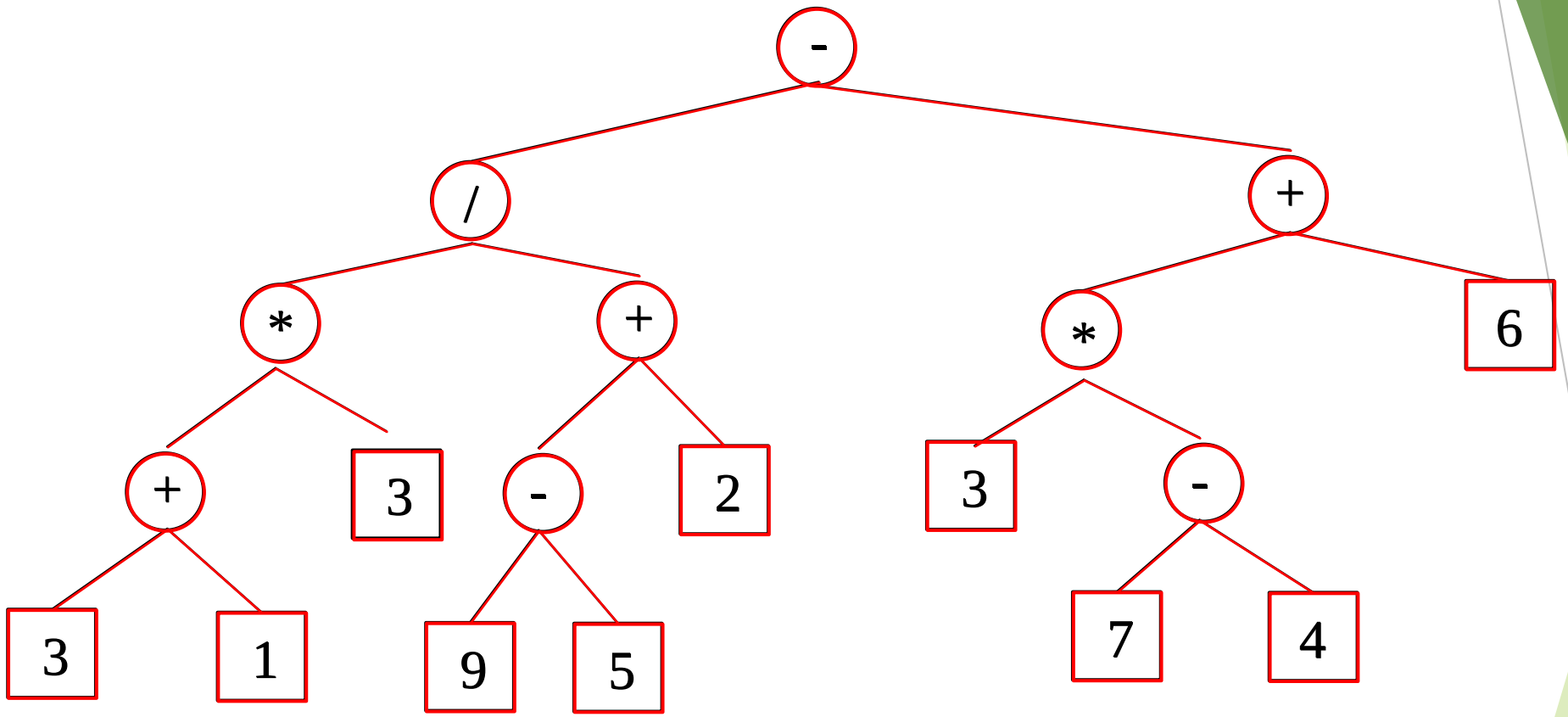
-/*+313+-952+*3-746

8.19:

In what order are positions visited during a postorder traversal of the tree below:



8.18:



31+3*95-2+/374-*6+-

Exercise:

8.22 Draw a binary tree T that simultaneously satisfies the follows:

1) Each internal node of T stores a single character
2) A preorder traversal of yields EXAMFUN.
3) An inorder traversal of yields MAFXUEN.