Maximum Path Sum of RB-Tree

> ***Plagiarism is forbidden.***
> Write your program with ***C++11***.

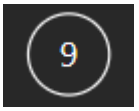
Problem Description

1. A **path** in a binary tree is a sequence of nodes where each pair of adjacent nodes in the sequence has an edge connecting them. A node can only appear in the sequence **at most once**. Note that the path does not need to pass through the root.
2. The **path sum** of a path is the sum of the node's values in the path.
3. Given a sequence of nodes,
    a. Build a **Red-Black Tree** by “inserting all of nodes” in order.
    b. Return
        i. the sequence of pre-order traversal
        ii. *the **maximum path sum** of any **non-empty** path*

Example of Maximum Path-Sum in Binary Tree

> **NOT** RB-Tree Example

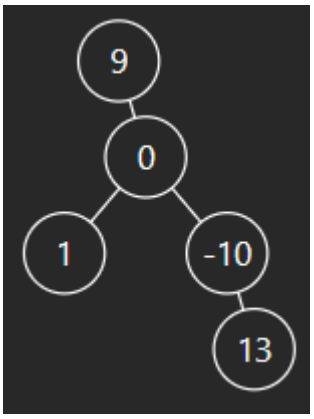
- EX_1:



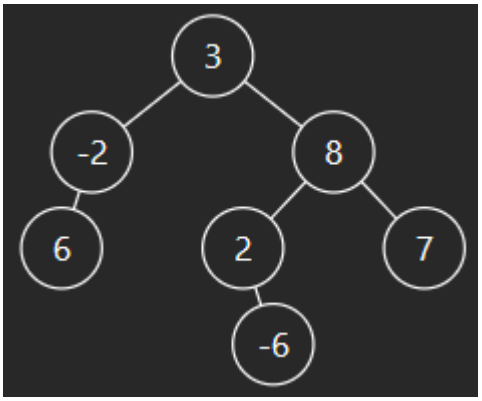
    - Maximum path sum = `9`

- EX_2:

  - Maximum path sum = `12`
- EX_3:



  - Maximum path sum = `13`
- EX_4:



  - Maximum path sum = `22`

Sample I/O Format

- Input:

    - -1 -3 5 3 8 -2 0
- Output:
    - 1 -3 -2 5 3 0 8
      16

Input Constraint

- Assume the number of nodes is N,
    - $0 < N < 100$
- Assume the value of node k = v_k,
    - For all k,
        - $-2^{31} \leq v_k \leq 2^{31} - 1$
        - v_k is INT
    - For all $i \neq j$, $v_i \neq v_j$

Grading

- The score is evaluated by the OJ system. **TA will evaluate your grades based on the most recent version of your submissions.**

E3 Submission

- Submit 1 source file to E3 system
    - [Student_ID_Number]_hw2.cpp (.c)
- **Please submit the source code of your latest submission for each question on the OJ.**
- Please make sure that all characters of the filename are in lower case. For example, if your student number is 9711592, the name of your source file should be “9711592_hw2.cpp”.
- Remember the submission rules mentioned above, or you will get punished on your grade by **-15**.

Due Date

- The upload deadline would be at **23:59 on November 28, 2023**

Problems

- If you have any problem, please post it on E3 forum.
- Alternatively, you can send emails to `anson.twhu.ee11@nycu.edu.tw`