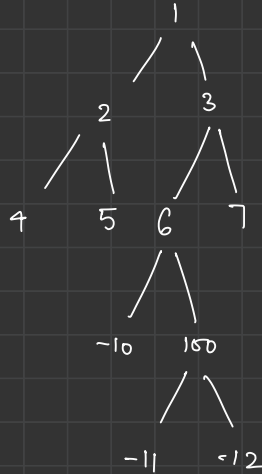




Max^m Path Sum



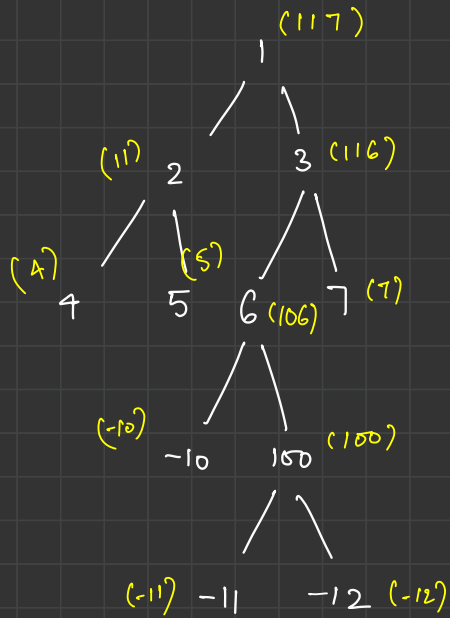
$\{ nC_2 \text{ ways} \}$

Brute force

TC: $n! \times n$

$= O(n!)$

$\left\{ \begin{array}{l} \text{exponential} \\ \text{time} \\ \text{complexity} \end{array} \right\}$



{ to get both sum,
we will get a leaf }

{ TC: $N \times N$
= $O(N^2)$ }

faith: max^m path sum in a tree + best path to attach.

```
class Pair  
{  
    int maxPathSum;  
    int bestPath;  
}
```

→ TC: O(N)

```

Pair helper(Node root) {
    if (root == null) {
        return new Pair(Integer.MIN_VALUE, 0);
    }

    Pair left = helper(root.left);
    Pair right = helper(root.right);

    int maxPathSumFromRoot = root.data;
    if (left.bestPath > 0) {
        maxPathSumFromRoot += left.bestPath;
    }
    if (right.bestPath > 0) {
        maxPathSumFromRoot += right.bestPath;
    }

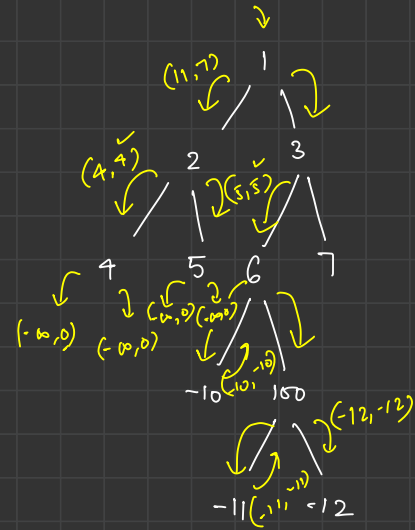
    int maxPathSumOfTree = Math.max(maxPathSumFromRoot, Math.max(left.maxPathSum, right.maxPathSum));

    int bestPathOfTree = Math.max(root.data, Math.max(root.data + left.bestPath, root.data + right.bestPath));

    return new Pair(maxPathSumOfTree, bestPathOfTree);
}

```

$TC: O(N)$
 $SC: O(H)$



Infix Evaluation and Conversion

① prefix Expression

② Infix Expression

③ postfix Expression

{ human readable }
format

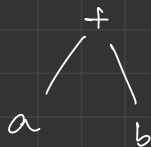
preferred by Machine

eg

infix: $a + b$ ✓ human

prefix: $+ ab$ } machine

postfix: $ab +$



Evaluation

Ex: $(2 + ((6 * 4) / 8) - 3)$

$$\hookrightarrow (2 + (24 / 8) - 3)$$

$$\hookrightarrow (2 + 3 - 3)$$

$$\hookrightarrow (2 + 0)$$

$$\hookrightarrow (2) \text{ ans!}$$

priority

①

Bracket

②

division, multiplication

③

Add, sub.

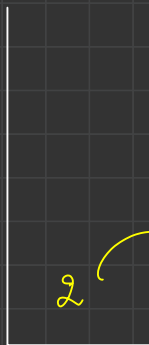
When two same priority ops there solve right one first.

$$(2 + ((6 \times 4) / 8) - 3)$$

~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~ ~~↑~~



opx



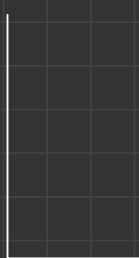
opd

2 + 0

2 → (ans) ✓

ε_{2p} : $(5 \times 3) / 5$
 $\cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x} \cancel{x}$

$\frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2} \frac{1}{2}$



5px



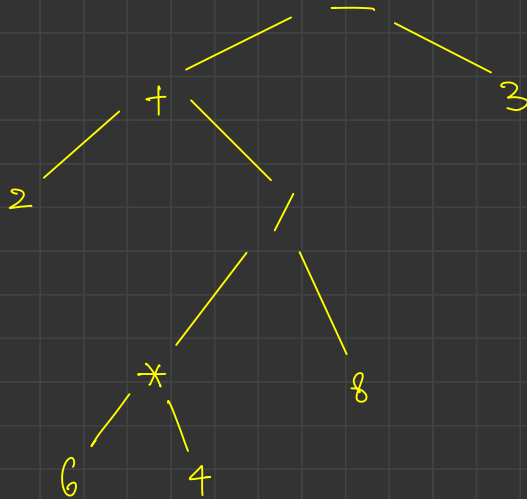
Spd

$$5 \times 3 = 15$$

$$15/5 = 3$$

Exp: $((2 + ((6 * 4) / 8)) - 3)$

v1 o v2 (fn)



→ Prefix (o v1 v2)

Preorder: - + 2 / * 6 4 8 3 }

Postorder: 2 6 4 * 8 / + 3 - }

→ Postfix (v1 v2 o)