

Data Structures & Algorithms

DSA – Postfix Evaluation using Stack

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Infix

5 + 2



operator operand

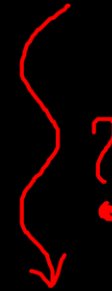
5 + 2
= 7

Prefix

+ 5 2

Postfix

5 2 +



Rules

- Operand -> **Push** it onto the stack
- Operator:
 1. **pop 2 elements**
 2. $\text{result} = \text{<next to top element> operator <top element>}$
 3. **push result** onto the stack

Postfix Evaluation

Infix: $3 - (1 * (2 - 1 * 4))$

$$= 3 - (1 * (2 - 4))$$

$$= 3 - (1 * (-2))$$

$$= 3 - (-2)$$

$$= 3 + 2$$

$$= 5$$

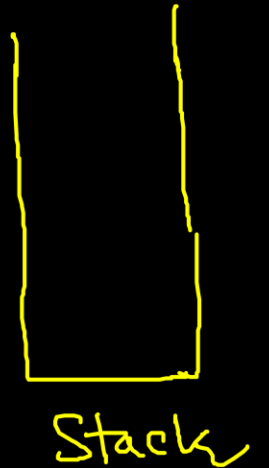
Postfix: $3\ 1\ 2\ 1\ 4\ *\ -\ *\ -$

$$1 * 4 \\ = 4$$

$$2 - 4 \\ = -2$$

$$1 * (-2) \\ = -2$$

$$3 - (-2) \\ = 3 + 2 \\ = 5$$



Postfix Evaluation

1 2 3 4 - / 2 * - \longrightarrow (5)

1: push

2: push

3: push

4: push

-: pop \rightarrow 4, pop \rightarrow 3

$$\begin{aligned} & 3 - 4 \\ & = -1 \rightarrow \text{push} \end{aligned}$$

/: pop \rightarrow -1, pop \rightarrow 2

$$\begin{aligned} & 2 / (-1) \\ & = -2 \rightarrow \text{push} \end{aligned}$$

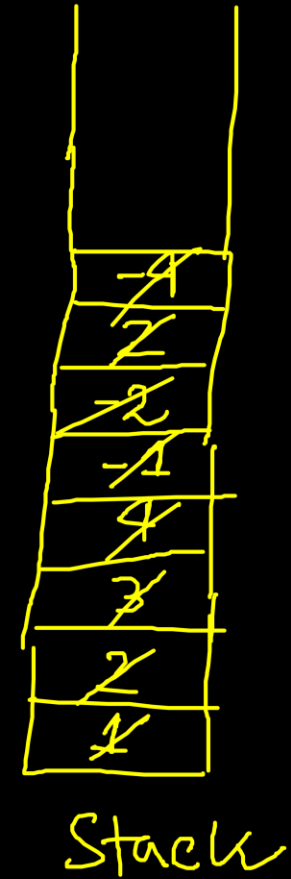
2: push

*: pop \rightarrow 2, pop \rightarrow -2

$$\begin{aligned} & -2 * 2 \\ & = -4 \rightarrow \text{push} \end{aligned}$$

-: pop \rightarrow -4, pop \rightarrow 1

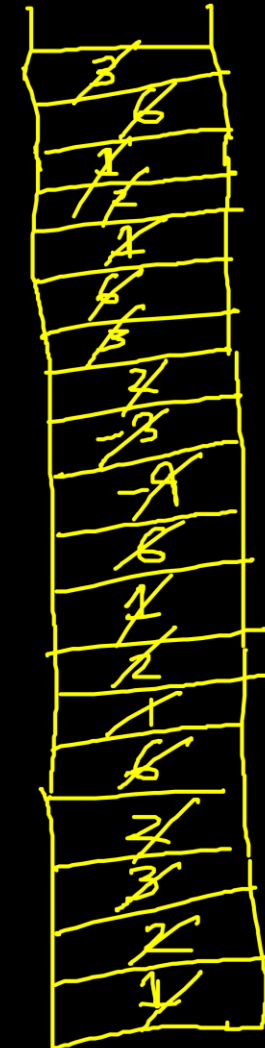
$$\begin{aligned} & 1 - (-4) \\ & = 1 + 4 \\ & = 5 \end{aligned}$$



Postfix Evaluation

1 2 3 2 * 1 2 ^ * - + 2 3 * 1 2 ^ / + \rightarrow 3

1: push
 2: "
 3: "
 2: "
 *: pop \rightarrow 2, pop \rightarrow 3 : $3 * 2 = 6 \rightarrow$ push
 1: push
 2: "
 ^: pop \rightarrow 2, pop \rightarrow 1 : $1 \wedge 2 = 1 \rightarrow$ push
 *: pop \rightarrow 1, pop \rightarrow 6 : $6 * 1 = 6 \rightarrow$ push
 -: pop \rightarrow 6, pop \rightarrow 2 : $2 - 6 = -4 \rightarrow$ push
 +: pop \rightarrow -4, pop \rightarrow 1 : $1 + (-4) = 1 - 4 = -3 \rightarrow$ push
 2: push
 3: "
 *: pop \rightarrow 3, pop \rightarrow 2 : $2 * 3 = 6 \rightarrow$ push
 1: push
 2: "
 ^: pop \rightarrow 2, pop \rightarrow 1 : $1 \wedge 2 = 1 \rightarrow$ push
 /: pop \rightarrow 1, pop \rightarrow 6 : $6 / 1 = 6 \rightarrow$ push



Stack

THANK YOU!