Formula Analysis

Data Structure: Stack (Last in First Out)

Algorithm: Shunting yard algorithm, working as operator-precedence parsing.

Formula: 4*(7+9)+9/3

Check hierarchy

‘(‘ or ‘)’ = 3

‘/’ or ‘*’ = 2

‘+’or ‘–‘ = 1

Let’s break the formula by each char and consider each item as a token

Step 1: 4*(7+9)+9/3

Token = ‘4’

Operand stack

							4

Step 2: 4*(7+9)+9/3

Token=’*’

Operator stack

									*

Step 3: 4*(7+9)+9/3

Token=’(’

Operator stack

								(	*

Step 4: 4*(7+9)+9/3

Token = ‘7’

Operand stack

						7	4

***Step 5**: 4*(7+9)+9/3*

Token = ‘+’

Operator stack

							+	(	*

Step 6: 4*(7+9)+9/3

Token = ‘9’

Operand stack

					9	7	4

Step 7: 4*(7+9)+9/3

Token= ’)’

If(token === ‘)’)

Run till the last operator in not ‘(‘

Pop operator

Pop operand twice

Perform operation with the operator pop_operand2 operator pop_operand1 => 9+7=16

Push the operand to the operand stack

Pop operator

Operator stack

									*

Operand stack

						16	4

Step 8: 4*(7+9)+9/3

Token = '+'

If the hierarchy of the token is less than the last operator in the stack, in this case, + < *

Pop operator

Pop operand twice

Perform operation with the operator pop_operand2 operator pop_operand1 => 16*4=64

Push the operand to the operand stack

Operator stack

Operand stack

							64

Step 9: 4*(7+9)+9/3

Token = '+'

Operator stack

									+

Step 10: 4*(7+9)+9/3

Token = '9'

Operand stack

						9	64

Step 11: 4*(7+9)+9/3

Token = '/'

Operator stack:

Hierarchy of token > hierarchy of the last operator in the stack, so it will be pushed

						/	+

Step 12: 4*(7+9)+9/3

Token = '3'

Operand stack

					3	9	64

Step 13: 4*(7+9)+9/3

Pop operator

Pop operand twice

Perform operator with the operator pop_operand operator pop_operand1 => 9/3=3

Push the operand to the operand stack

Operator stack

									+

Operand stack

						3	64

Step 14: 4*(7+9)+9/3

Pop operator

Pop operand twice

Perform operator with the operator popval2 operator popval1 => 64+3=67

Push the operand to the operand stack

Step 15: 4*(7+9)+9/3

Output: last index of operand stack = 67