

Q1

Convert the infix expressions given below to prefix and postfix, then evaluate them.
Show your work step by step.

i) $A + ((B - C * D) / E) + F - G / H$

ii) $!(A \&\& !((B < C) || (C > D))) || (C < E)$

Note: Before evaluation, you must assign values to variables.

i) $A + ((B - C * D) / E) + F - G / H$

PREFIX : -++A/-B*CDEF/GH

Token	Prefix	Operator Stack
H	H	empty
/	H	/
G	HG	/
-	HG/	-
F	HG/F	-
+	HG/F	-+
)	HG/F	-+)
E	HG/FE	-+)
/	HG/FE	-+)/
)	HG/FE	-+)/)
D	HG/FED	-+)/)
*	HG/FED	-+)/)*
C	HG/FEDC	-+)/)*
-	HG/FEDC*	-+)/)-
B	HG/FEDC*B	-+)/)-
(HG/FEDC*B-	-+)/
(HG/FEDC*B-/	-+
+	HG/FEDC*B-/	-++
A	HG/FEDC*B-/A	-++
	HG/FEDC*B-/A+	-+
	HG/FEDC*B-/A++	-
	HG/FEDC*B-/A++-	empty

POSTFIX : $ABCD^*-E/+F+GH/-$

Token	Postfix	Operator Stack
A	A	empty
+	A	+
(A	+(
(A	+((
B	AB	+((
-	AB	+((-
C	ABC	+((-
*	ABC	+((-*
D	ABCD	+((-*
)	ABCD*-	+(
/	ABCD*-	+(/
E	ABCD*-E	+(/
)	ABCD*-E/	+
+	ABCD*-E/+	+
F	ABCD*-E/+F	+
-	ABCD*-E/+F+	-
G	ABCD*-E/+F+G	-
/	ABCD*-E/+F+G	- /
H	ABCD*-E/+F+GH	- /
	ABCD*-E/+F+GH/	-
	ABCD*-E/+F+GH/-	empty

Evaluate prefix and postfix expression :

I am assigning values to all operands.

A = 5

B = 18

C = 3

D = 4

E = 2

F = 1

G = 12

H = 6

INFIX : $5 + ((18 - 3 * 4) / 2) + 1 - 12 / 6 = 7$ is the result.

Prefix : $--+A/-B*CDEF/GH$

$- + + 5 / - 18 * 3 4 2 1 / 12 6$

Step	Expression	Stack
1	6	6
2	12	6,12
3	/	2
4	1	2,1
5	2	2,1,2
6	4	2,1,2,4
7	3	2,1,2,4,3
8	*	2,1,2,12
9	18	2,1,2,12,18
10	-	2,1,2,6
11	/	2,1,3
12	5	2,1,3,5
13	+	2,1,8
14	+	2,9
15	-	7

Result : 7

Postfix : ABCD*-E/+F+GH/-

5 18 3 4 * - 2 / + 1 + 12 6 / -

Step	Expression	Stack
1	5	5
2	18	5,18
3	3	5,18,3
4	4	5,18,3,4
5	*	5,18,12
6	-	5,6
7	2	5,6,2
8	/	5,3
9	+	8
10	1	8,1
11	+	9
12	12	9,12
13	6	9,12,6
14	/	9,2
15	-	7

Result : 7