Q1

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Q1.

Prefix notation

i) A + ((B – C * D) / E) + F – G / H

Expression (read form R to L)	Stack	Prefix result
H		H
/	/	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
End of expression	*Just popped and pushed each el.*	HG/FEDC*B-/A++-

Now, I am reversing the prefix expression

-++A/-B*CDEF/GH

And evaluating this expression from right to left

Let each element be 1 for the 'real evaluation'

Prefix expression	Evaluation (result)	'Real expression'	'Real result'
-++A/-B*CDEF/G	H	-++1/-1*1111/1	1

Commented [DR1]: Follow Up:

Commented [DR2]: Follow Up:

Commented [DR3]: Follow Up:

Commented [DR4]: Follow Up:

Commented [DR5]: Follow Up: /(

Commented [DR6]: Follow Up: /(

-++A/-B*CDEF/	H,G	-++1/-1*1111/	1,1
-++A/-B*CDEF	G/H	-++1/-1*1111	1/1=1
-++A/-B*CDE	G/H, F	-++1/-1*111	1,1
-++A/-B*CD	G/H, F, E	-++1/-1*11	1,1,1
-++A/-B*C	G/H, F, E, D	-++1/-1*1	1,1,1,1
-++A/-B*	G/H, F, E, D, C	-++1/-1*	1,1,1,1,1
-++A/-B	G/H, F, E, C*D	-++1/-1	1,1,1,(1*1=1)
-++A/-	G/H, F, E, C*D, B	-++1/-	1,1,1,(1*1=1),1
-++A/	G/H, F, E, B-C*D	-++1/	1,1,1,(1 – 1=0)
-++A	G/H, F, (B-C*D)/E	-++1	1,1,(0/1=0)
-++	G/H, F, (B-C*D)/E, A	-++	1,1,0,1
-+	G/H, F, A + (B-C*D)/E	-+	1,1,(1+0=1)
-	G/H, A + ((B-C*D)/E) + F	-	1,(1+1=2)
End of expression	A + ((B-C*D)/E) + F – G/H *(evaluated solution)*		2-1 = 1(sollution)

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

Expression (read form R to L)	**Stack**	**Prefix result**
)	)	
E	)	E
<	)<	E
C	)<	EC
(		EC<
||	||	EC<
)	||)	EC<
)	||))	EC<
)	||)))	EC<
D	||)))	EC<D
>	||)))>	EC<D
C	||)))>	EC<DC
(	||))	EC<DC>
||	||))||	EC<DC>
)	||))||)	EC<DC>
C	||))||)	EC<DC>C
<	||))||)<	EC<DC>C
B	||))||)<	EC<DC>CB
(	||))||	EC<DC>CB<
(	||)	EC<DC>CB<||
!	||)!	EC<DC>CB<||

&&	||)&&	EC<DC>CB<||!
A	||)&&	EC<DC>CB<||!A
(	||	EC<DC>CB<||!A&&
!	||!	EC<DC>CB<||!A&&
End of expression	*Just popped and pushed each el.*	EC<DC>CB<||!A&&!||

Now, I am reversing the prefix expression

||!&&A!||<BC>CD<CE

And evaluating this expression from right to left

Let A be true, B be 2, C be 3, D be 4 and E be 5

Prefix expression	**Evaluation (result)**	**'Real expression'**	**'Real result'**
||!&&A!||<BC>CD<C	E	||!&&T!||<23>34<3	5
||!&&A!||<BC>CD<	E,C	||!&&T!||<23>34<	5,3
||!&&A!||<BC>CD	C>E	||!&&T!||<23>34	3<5(T)
||!&&A!||<BC>C	C<E, D	||!&&T!||<23>3	T,4
||!&&A!||<BC>	C<E, D, C	||!&&T!||<23>	T,4,3
||!&&A!||<BC	C<E, C>D,	||!&&T!||<23	T,3>4=F
||!&&A!||<B	C<E, C>D, C	||!&&T!||<2	T,F,3
||!&&A!||<	C<E, C>D, C, B	||!&&T!||<	T,F,3,2
||!&&A!||	C<E, C>D, B<C	||!&&T!||	T,F,2<3=T
||!&&A!	C<E, ((B<C) || (C>D))	||!&&T!	T,T||F=T
||!&&A	C<E, !((B<C) || (C>D))	||!&&T	T,!T=F
||!&&	C<E, !((B<C) || (C>D)), A	||!&&	T,F,T
||!	C<E, A && !((B<C) || (C>D))	||!	T,T&&F=F
||	C<E, !(A && !((B<C) || (C>D)))	||	T,!F=T
End of expression	!(A && !((B<C) || (C>D))) || (C<E) *(result)*		T||T=T(result)

Postfix notation

i) A + ((B – C * D) / E) + F – G / H

Expression (read form L to R)	Stack	Postfix result
A		A
+	+	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
End of expression	*Just popped and pushed each el.*	ABCD*-E/+F+GH/-

Commented [DR7]: Follow Up:

Commented [DR8]: Follow Up: /

Commented [DR9]: Follow Up: /

Commented [DR10]: Follow Up:

ABCD*-E/+F+GH/-

Evaluating from left to right

Let each element be 1

Prefix expression	Evaluation (result)	'Real expression'	'Real result'
BCD*-E/+F+GH/-	A	111*-1/+1+11/-	1
CD*-E/+F+GH/-	A,B	11*-1/+1+11/-	1,1
D*-E/+F+GH/-	A,B,C	1*-1/+1+11/-	1,1,1
*-E/+F+GH/-	A,B,C,D	*-1/+1+11/-	1,1,1,1
-E/+F+GH/-	A,B,C*D	-1/+1+11/-	1,1,1*1
E/+F+GH/-	A,B – C*D	1/+1+11/-	1,1-1=0
/+F+GH/-	A,B-C*D,E	/+1+11/-	1,0,1
+F+GH/-	A, (B-C*D)/E	+1+11/-	1,0/1=0
F+GH/-	A + (B-C*D)/E	1+11/-	1+0=1

+GH/-	A + (B-C*D)/E, F	+11/-	1,1
GH/-	A + (B-C*D)/E + F	11/-	1+1=2
H/-	A + (B-C*D)/E + F, G	1/-	2,1
/-	A + (B-C*D)/E + F, G,H	/-	2,1,1
-	A + (B-C*D)/E + F, G/H	-	2,1/1=1
End of expression	A + (B-C*D)/E + F – G/H *(result)*		2-1=1(result)

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

Expression (read form L to R)	**Stack**	**Postfix result**
!	!	
(	!(	
A	!(	A
&&	!(&&	A
!	!(&&!	A
(	!(&&!(	A
(	!(&&!((	A
B	!(&&!((	AB
<	!(&&!((<	AB
C	!(&&!((<	ABC
)	!(&&!(	ABC<
||	!(&&!(||	ABC<
(	!(&&!(||(	ABC<
C	!(&&!(||(	ABC<C
>	!(&&!(||(>	ABC<C
D	!(&&!(||(>	ABC<CD
)	!(&&!(||	ABC<CD>
)	!(&&!	ABC<CD>||
)	!	ABC<CD>||!&&
||	||	ABC<CD>||!&&!
(	||(	ABC<CD>||!&&!
C	||(	ABC<CD>||!&&!C
<	||(<	ABC<CD>||!&&!C
E	||(<	ABC<CD>||!&&!CE
)	||	ABC<CD>||!&&!CE<
End of expression	*Just popped and pushed each el.*	ABC<CD>||!&&!CE<||

ABC<CD>||!&&!CE<||

Evaluating from left to right

Let A be T, B=2, C=3,D=4,E=5

Prefix expression	**Evaluation (result)**	**'Real expression'**	**'Real result'**
BC<CD>||!&&!CE<||	A	23<34>||!&&!35<||	T
C<CD>||!&&!CE<||	A,B	3<34>||!&&!35<||	T,2
<CD>||!&&!CE<||	A,B,C	<34>||!&&!35<||	T,2,3
CD>||!&&!CE<||	A, B<C	34>||!&&!35<||	T,2<3=T
D>||!&&!CE<||	A, B<C, C	4>||!&&!35<||	T,T,3
>||!&&!CE<||	A, B<C, C, D	>||!&&!35<||	T,T,3,4
||!&&!CE<||	A, B<C, C > D	||!&&!35<||	T,T,3>4=F
!&&!CE<||	A, (B<C) || (C>D)	!&&!35<||	T,T||F=T
&&!CE<||	A, !((B<C) || (C>D))	&&!35<||	T,!T=F
!CE<||	A && !((B<C) || (C>D))	!35<||	T&&F=F
CE<||	!(A&&!((B<C)||(C>D)))	35<||	!F=T
E<||	!(A&&!((B<C)||(C>D))), C	5<||	T,3
<||	!(A&&!((B<C)||(C>D))), C, E	<||	T,3,5
||	!(A&&!((B<C)||(C>D))), C<E	||	T,3<5=T
End of expression	!(A&&!((B<C)||(C>D))) || (C<E) *(result)*		T||T=T(result)

Note: pushing and popping are the methods called for manipulating the stack and I didn't explicitly write them because they are obvious