A+B\*C infix

A+(BC\*)

ABC\*+ postfix

A=2,B=5,C=4

A,B,C,\*,+

2,5,4,\*,+

2,20,+

22

PUSH-INSERTING AND POP-REMOVING

(A+B\*C)

RULE1: OPENING PARENTHESIS AND OPERATORS ARE PUSHED INTO STACK. VARIABLES ARE CONCATENATED INTO POSTFIX EXPRESSION.

RULE2: ON ENCOUNTERING A CLOSING PARENTHESIS ALL THE ELEMENTS IN THE STACK ARE POPPED AND THEY ARE CONCATENATED IN THE POSTFIX EXPRESSION ( LIFO PRINCIPLE).

RULE3: IF HIGHER OPERATOR INCOMING, THEN PUSH.

RULE 4:IF LOWER OR EQUAL INCOMING, THEN POP THE HIGHER OR EQUAL OPERATOR AND THEN PUSH THE INCOMING.

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| A | ( | A |
| + | (+ | A |
| B | (+ | AB |
| \* | (+\* | AB |
| C | (+\* | ABC |
| ) | EMPTY | ABC\*+ |

EX: ( A\*(B+C)-D/(E-F))

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| A | ( | A |
| \* | (\* | A |
| ( | (\*( | A |
| B | (\*( | AB |
| + | (\*(+ | AB |
| C | (\*(+ | ABC |
| ) | (\* | ABC+ |
| - | (- | ABC+\* |
| D | (- | ABC+\*D |
| / | (-/ | ABC+\*D |
| ( | (-/( | ABC+\*D |
| E | (-/( | ABC+\*DE |
| - | (-/(- | ABC+\*DE |
| F | (-/(- | ABC+\*DEF |
| ) | (-/ | ABC+\*DEF- |
| ) | EMPTY | ABC+\*DEF-/- |
|  |  |  |

Ex: (A\*(B+(C+D)\*(E+F)/G)\*H)

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| A | ( | A |
| \* | (\* | A |
| ( | (\*( | A |
| B | (\*( | AB |
| + | (\*(+ | AB |
| ( | (\*(+( | AB |
| C | (\*(+( | ABC |
| + | (\*(+(+ | ABC |
| D | (\*(+(+ | ABCD |
| ) | (\*(+ | ABCD+ |
| \* | (\*(+\* | ABCD+ |
| ( | (\*(+\*( | ABCD+ |
| E | (\*(+\*( | ABCD+E |
| + | (\*(+\*(+ | ABCD+E |
| F | (\*(+\*(+ | ABCD+EF |
| ) | (\*(+\* | ABCD+EF+ |
| / | (\*(+/ | ABCD+EF+\* |
| G | (\*(+/ | ABCD+EF+\*G |
| ) | (\* | ABCD+EF+\*G/+ |
| \* | (\* | ABCD+EF+\*G/+\* |
| H | (\* | ABCD+EF+\*G/+\*H |
| ) | EMPTY | ABCD+EF+\*G/+\*H\* |
|  |  |  |
|  |  |  |
|  |  |  |

Ex: (A\*(B+C)/D-E-(F+G/(H-I)))

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| A | ( | A |
| \* | (\* | A |
| ( | (\*( | A |
| B | (\*( | AB |
| + | (\*(+ | AB |
| C | (\*(+ | ABC |
| ) | (\* | ABC+ |
| / | (/ | ABC+\* |
| D | (/ | ABC+\*D |
| - | (- | ABC+\*D/ |
| E | (- | ABC+\*D/E |
| - | (- | ABC+\*D/E- |
| ( | (-( | ABC+\*D/E- |
| F | (-( | ABC+\*D/E-F |
| + | (-(+ | ABC+\*D/E-F |
| G | (-(+ | ABC+\*D/E-FG |
| / | (-(+/ | ABC+\*D/E-FG |
| ( | (-(+/( | ABC+\*D/E-FG |
| H | (-(+/( | ABC+\*D/E-FGH |
| - | (-(+/(- | ABC+\*D/E-FGH |
| I | (-(+/(- | ABC+\*D/E-FGHI |
| ) | (-(+/ | ABC+\*D/E-FGHI- |
| ) | (- | ABC+\*D/E-FGHI-/+ |
| ) | EMPTY | ABC+\*D/E-FGHI-/+- |
|  |  |  |
|  |  |  |

Ex: (A+(B\*C-((D+E)/(F-G)\*H)^I)-J^K)

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| A | ( | A |
| + | (+ | A |
| ( | (+( | A |
| B | (+( | AB |
| \* | (+(\* | AB |
| C | (+(\* | ABC |
| - | (+(- | ABC\* |
| ( | (+(-( | ABC\* |
| ( | (+(-(( | ABC\* |
| D | (+(-(( | ABC\*D |
| + | (+(-((+ | ABC\*D |
| E | (+(-((+ | ABC\*DE |
| ) | (+(-( | ABC\*DE+ |
| / | (+(-(/ | ABC\*DE+ |
| ( | (+(-(/( | ABC\*DE+ |
| F | (+(-(/( | ABC\*DE+F |
| - | (+(-(/(- | ABC\*DE+F |
| G | (+(-(/(- | ABC\*DE+FG |
| ) | (+(-(/ | ABC\*DE+FG- |
| \* | (+(-(\* | ABC\*DE+FG-/ |
| H | (+(-(\* | ABC\*DE+FG-/H |
| ) | (+(- | ABC\*DE+FG-/H\* |
| ^ | (+(-^ | ABC\*DE+FG-/H\* |
| I | (+(-^ | ABC\*DE+FG-/H\*I |
| ) | (+ | ABC\*DE+FG-/H\*I^- |
| - | (- | ABC\*DE+FG-/H\*I^-+ |
| J | (- | ABC\*DE+FG-/H\*I^-+J |
| ^ | (-^ | ABC\*DE+FG-/H\*I^-+J |
| K | (-^ | ABC\*DE+FG-/H\*I^-+JK |
| ) | EMPTY | ABC\*DE+FG-/H\*I^-+JK^- |

Ex: 5,6,2,+,\*,12,4,/,-

ABC+\*DE/-

A\*(B+C)-D/E

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | CALCULATION |
| 5 | 5 |  |
| 6 | 5,6 |  |
| 2 | 5,6,2 |  |
| + | 5 | 6+2=8 |
|  | 5,8 |  |
| \* | TEMPORARILY EMPTY | 5\*8=40 |
|  | 40 |  |
| 12 | 40,12 |  |
| 4 | 40,12,4 |  |
| / | 40 | 12/4=3 |
|  | 40,3 |  |
| - | EMPTY | 40-3=37 |
|  |  |  |
|  |  |  |
|  |  |  |

( A\*(B+C)-D/(E-F))

A=10,B=5,C=7,D=36,E=8,F=2

ABC+\*DEF-/-

10,5,7,+,\*,36,8,2,-,/,-

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | CALC |
| 10 | 10 |  |
| 5 | 10,5 |  |
| 7 | 10,5,7 |  |
| + | 10 | 5+7=12 |
|  | 10,12 |  |
| \* | ------- | 10\*12=120 |
|  | 120 |  |
| 36 | 120,36 |  |
| 8 | 120,36,8 |  |
| 2 | 120,36,8,2 |  |
| - | 120,36 | 8-2=6 |
|  | 120,36,6 |  |
| / | 120 | 36/6=6 |
|  | 120,6 |  |
| - | EMPTY | 120-6=114 |

(A\*(B+(C+D)\*(E+F)/G)\*H)

A=2,B=3,C=4,D=1,E=12,F=2,G=7,H=3

|  |
| --- |
| ABCD+EF+\*G/+\*H\* |

2,3,4,1,+,12,2,+,\*,7,/,+,\*,3,\*

2,3,4,1,+,12,2,+,\*,7,/,+,\*,3,\*

|  |  |  |
| --- | --- | --- |
| symbol | STACK | CALC |
| 2 | 2 |  |
| 3 | 2,3 |  |
| 4 | 2,3,4 |  |
| 1 | 2,3,4,1 |  |
| + | 2,3 | 4+1=5 |
| 12 | 2,3,5,12 |  |
| 2 | 2,3,5,12,2 |  |
| + | 2,3,5 | 12+2=14 |
|  | 2,3,5,14 |  |
| \* | 2,3 | 70 |
|  | 2,3,70 |  |
| 7 | 2,3,70,7 |  |
| / | 2,3, | 10 |
|  | 2,3,10 |  |
| + | 2, | 13 |
|  | 2,13 |  |
| \* |  | 26 |
|  | 26 |  |
| 3 | 26,3 |  |
| \* | EMPTY | 78 |

True,False,not,or,False,True,or,and

|  |  |  |
| --- | --- | --- |
| symbol | Stack | Calc |
| True | True |  |
| False | True,False |  |
| not | True | Not(False)=True |
|  | True,True |  |
| or | TEMPORARILY EMPTY | True or True=True |
|  | True |  |
| False | True,False |  |
| True | True,False,True |  |
| or | True | False or True=True |
|  | True,True |  |
| and | empty | True and True=True |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

Homework: ------

Convert to postfix:

True and False or not False or True

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| True |  | True |
| and | and | True |
| False | and | True,False |
| or | or | True,False,and |
| not | or,not | True,False,and |
| False | or,not | True,False,and,False |
| or | or | True,False,and,False,not,OR |
| True | or | True,False,and,False,not,OR,True |
|  | empty | True,False,and,False,not,OR,True,or |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

True,False,and,False,not,OR,True,or

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | CALC |
| TRUE | TRUE |  |
| FALSE | TRUE,FALSE |  |
| AND | TEMPORARILY EMPTY | TRUE AND FALSE=FALSE |
|  | FALSE |  |
| FALSE | FALSE,FALSE |  |
| NOT | FALSE | NOT(FALSE)=TRUE |
|  | FALSE,TRUE |  |
| OR | TEMP EMPTY | FALSE OR TRUE=TRUE |
|  | TRUE |  |
| TRUE | TRUE,TRUE |  |
| OR | EMPTY | TRUE OR TRUE=TRUE |
|  |  |  |
|  |  |  |
|  |  |  |

Find the values :---

1. (A\*(B+C)/D-E-(F+G/(H-I)))

A=2,B=4,C=6,D=5,E=1,F=3,G=1,H=5,I=3

2,4,6,+,\*,5,/,1,-,3,1,5,3,-,/,+,-

|  |  |  |
| --- | --- | --- |
| Symbol | Stack | Calc |
| 2 | 2 |  |
| 4 | 2,4 |  |
| 6 | 2,4,6 |  |
| + | 2 | 4+6=10 |
|  | 2,10 |  |
| \* |  | 2\*10=20 |
|  | 20 |  |
| 5 | 20,5 |  |
| / |  | 4 |
|  | 4 |  |
| 1 | 4,1 |  |
| - |  | 3 |
|  | 3 |  |
| 3 | 3,3 |  |
| 1 | 3,3,1 |  |
| 5 | 3,3,1,5 |  |
| 3 | 3,3,1,5,3 |  |
| - | 3,3,1 | 2 |
|  | 3,3,1,2 |  |
| / | 3,3 | 0.5 |
| + | 3 | 3.5 |
|  | 3,3.5 |  |
| - | empty | -0.5 |

2. (A+(B\*C-((D+E)/(F-G)\*H)^I)-J^K)

A=1,B=2,C=3,D=4,E=5,F=6,G=3,H=2,I=1,J=2,K=1

1,2,3,\*,4,5,+,6,3,-,/,2\*1,^,-,+,2,1,^,-

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | CALC |
| 1 | 1 |  |
| 2 | 1,2 |  |
| 3 | 1,2,3 |  |
| \* | 1,6 |  |
| 4 | 1,6,4 |  |
| 5 | 1,6,4,5 |  |
| + | 1,6,9 |  |
| 6 | 1,6,9,6 |  |
| 3 | 1,6,9,6,3 |  |
| - | 1,6,9,3 |  |
| / | 1,6,3 |  |
| 2 | 1,6,3,2 |  |
| \* | 1,6,6 |  |
| 1 | 1,6,6,1 |  |
| ^ | 1,6,6 |  |
| - | 1,0 |  |
| + | 1 |  |
| 2 | 1,2 |  |
| 1 | 1,2,1 |  |
| ^ | 1,2 |  |
| - | EMPTY | -1 |
|  |  |  |
|  |  |  |

PREFIX:--------

Ex:(A+B\*C+D/E)

A+(\*BC)+D/E

A+(\*BC)+(/DE)

(+A\*BC)+(/DE)

++A\*BC/DE

RULE1:FIND THE REVERSE OF THE INFIX EXPRESSION

RULE2:PERFORM POSTFIX OPERATION ON THIS REVERSED EXPRESSION.

RULE3:IF THE INCOMING OPERATOR IS LESS THAN(NOT EQUAL LIKE NORMAL POSTFIX) THE STACK TOP THEN POP AND THEN PUSH.

RULE4:FINALLY,FIND THE REVERSE OF THE POSTFIX EXPRESSION.

->(E/D+C\*B+A)

|  |  |  |
| --- | --- | --- |
| SYMBOL | STACK | POSTFIX |
| ( | ( |  |
| E | ( | E |
| / | (/ | E |
| D | (/ | ED |
| + | (+ | ED/ |
| C | (+ | ED/C |
| \* | (+\* | ED/C |

->(E/D+C\*B+A)

|  |  |  |
| --- | --- | --- |
| B | (+\* | ED/CB |
| + | (++ | ED/CB\* |
| A | (++ | ED/CB\*A |
| ) | EMPTY | ED/CB\*A++ |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

++A\*BC/DE

A=[2,4,6,8,10,12]

S=4

S=10

S=11

|  |  |  |  |
| --- | --- | --- | --- |
| l | u | m | a[m] |
| 0 | 5 | 2 | 6 |
| 0 | 1 | 0 | 2 |
| 1 | 1 | 1 | 4 |
|  |  |  |  |
| 0 | 5 | 2 | 6 |
| 3 | 5 | 4 | 10 |
|  |  |  |  |
| 0 | 5 | 2 | 6 |
| 3 | 5 | 4 | 10 |
| 5 | 5 | 5 | 12 |
| 5 | 4 |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |