

CS & IT ENGINEERING



Data Structure & Programming
Stack and Queues

Lec- 02



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TOPICS TO BE
COVERED

Stack-2

Infix to postfix

{ Priority
Associativity } without
using stack

using
stack

Ex 1 :

infix : $2 + 3 \times 5$

$2 + [3 \times 5]$
op1 op2

Postfix : $2 \ 3 \ 5 \times +$

\times
 $+$
 \downarrow

Theory:

^ , ^

infix: $2 + 3 \times 4 / 6 \uparrow 2$

$2 + 3 \times 4 / [6 \uparrow 2]$

$2 + [3 \ 4 \times] / [6 \uparrow 2]$

Op1 Op2
 ↓ ↓
 Operand1 Operand2

$2 + [3 \ 4 \times 6 \uparrow 2 /]$

2 3 4 x 6 2 ↑ / +

↑
/ , ×
+ , -

infix: $(a+b) \times c/d - e \uparrow f \uparrow g/h$

$[ab+] \times c/d - e \uparrow \overset{\checkmark}{f} \uparrow \overset{\checkmark}{g}/h$

$[ab+] \times c/d - e \uparrow \overset{\textcircled{1}}{[fg\uparrow]}/h$

$[ab+] \times c/d - [efg\uparrow\uparrow]/h$

$[ab+cx]/d - [efg\uparrow\uparrow]/h$

$[ab+cx d/] - [efg\uparrow\uparrow]/h$

$[ab+cx d/] - [efg\uparrow\uparrow h/]$

Postfix: $ab+cx d/efg\uparrow\uparrow h/-$

2^{2^3}

$\Rightarrow 2^8$

$\Downarrow 4^3$

Easiest

\uparrow

R to L

$\times, /$

L to R

$+, -$

L to R

Using stack


Infix : $\overrightarrow{2 + 3 \times 5}$

Prefix : $\overrightarrow{+ 2 \times 3 5}$

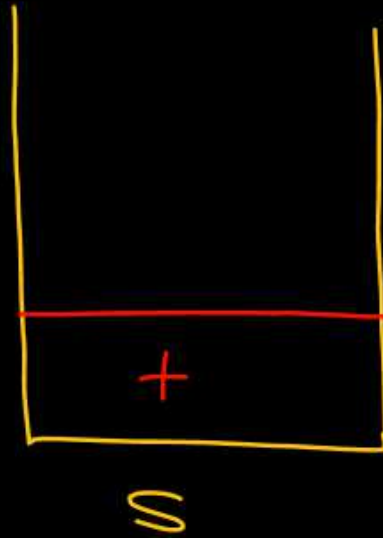
Postfix : $\overrightarrow{2 3 5 \times} +$

Using stack

infix : 2 + 3



Postfix : 2



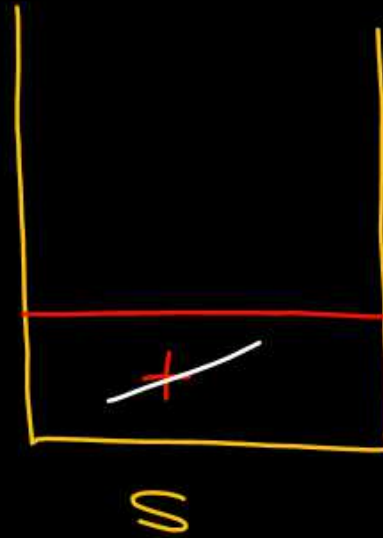
+ is encountered
 \Rightarrow stack is empty
Push it onto stack.

Using stack

infix : 2 + 3 \leftarrow End

Postfix : 2 3 +

Postfix : 2 3 +



+ is encountered

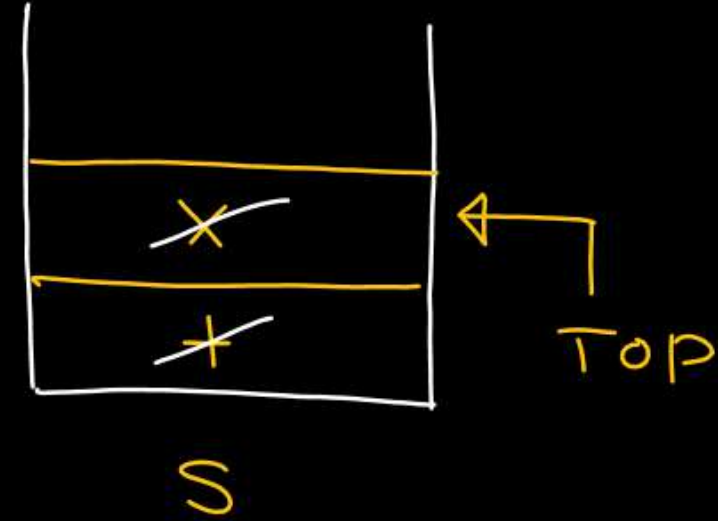
\Rightarrow stack is empty

Push it onto stack

Ex 2

infix: $2 + 3 \times 4$ End

Postfix: $2 3 4 \times +$



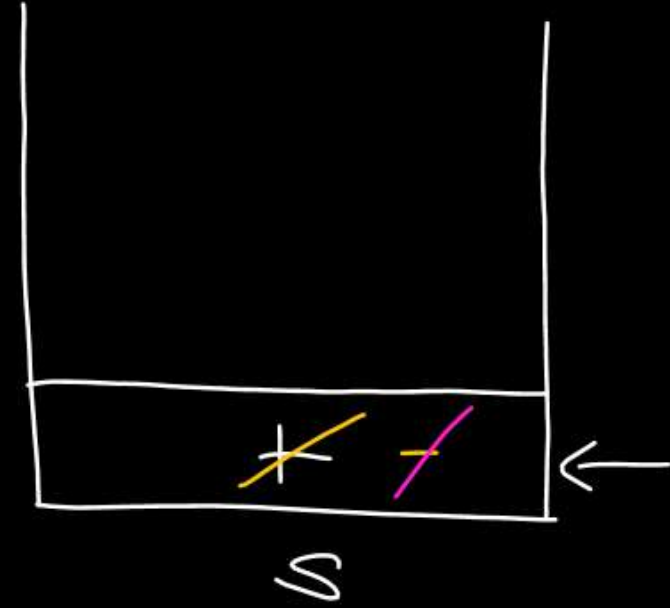
Doc: $\frac{81214}{VIP} \rightarrow wait$

TOP Operator Scan
 $+ < x$

Ex 3.

infix : $a + b - c$ End
 ↓ ↓ ↓ ↓ ↓
 →

Postfix : $a b + c -$

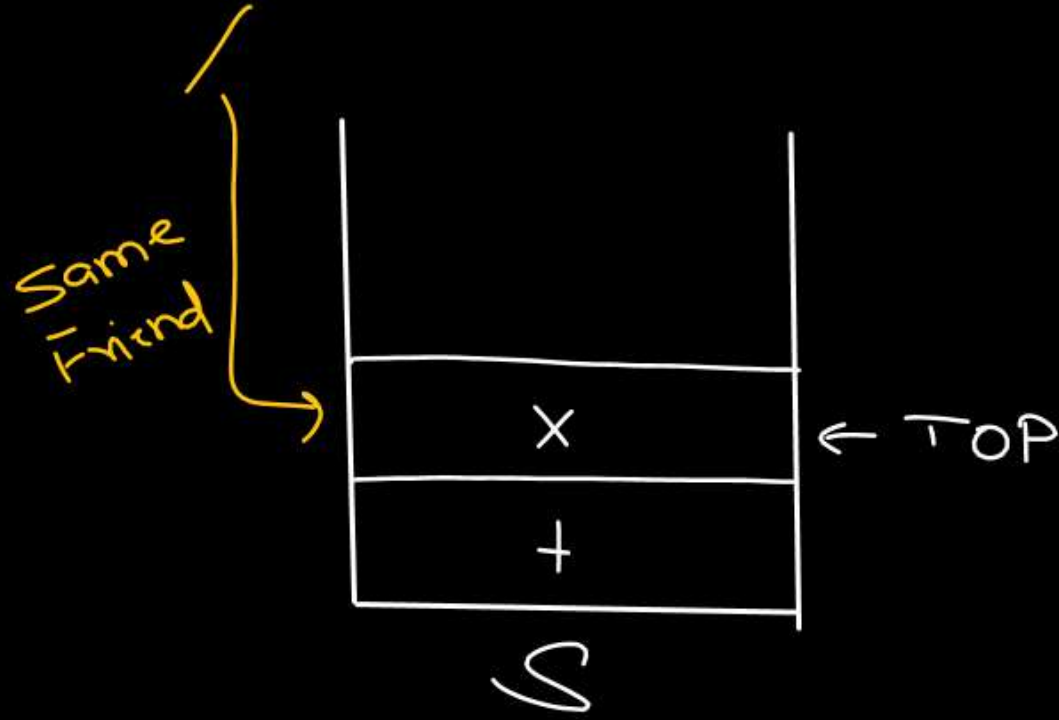


Doc

Ex 4:

infix: $a + b \times c / d$

Postfix: $a b c$

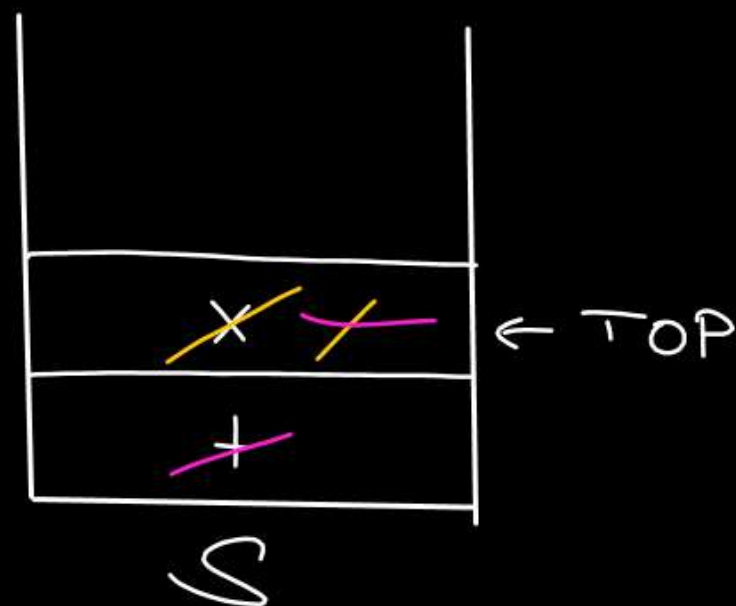


$\left. \begin{array}{l} \times, / \\ + \end{array} \right\} \text{L to R}$

Ex 4:

infix: $a + b \times c / d$ End

Postfix: $a b c \times d / +$



$\left. \begin{array}{c} \times, / \\ + \end{array} \right\} \text{L to R}$

$a + \underbrace{b \times c / d}$
 $a + \underbrace{[b c \times] / d}$
 $a + \underbrace{[b c \times d /]}$
 $a b c \times d / +$

Ex 5.

infix: $2 + (3 \times 4 - 6 / 2)$

Right parenthesis
End

Postfix: 2 3 4 x 6 2 / - +

only delete

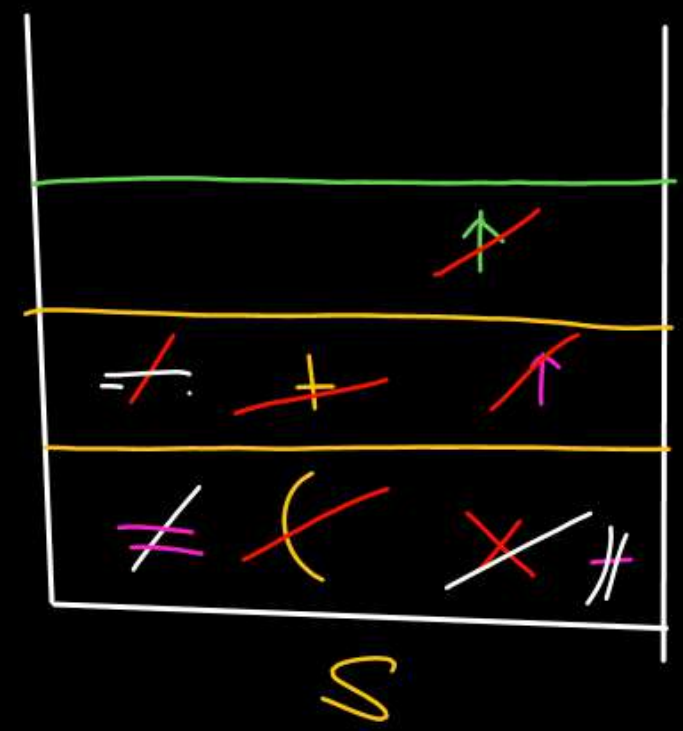
Top

/
x -
(
+

Ex 6.

infix: $(a + b) \times c / d - e \uparrow f \uparrow g / h$

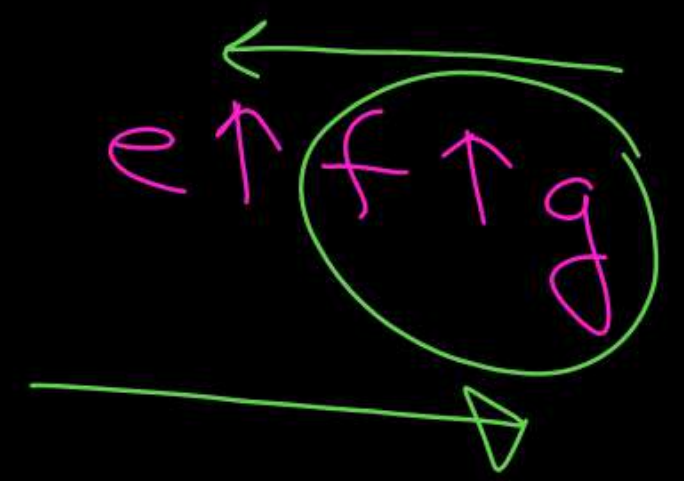
Postfix: $a b + c \times d / e f g \uparrow \uparrow h / -$

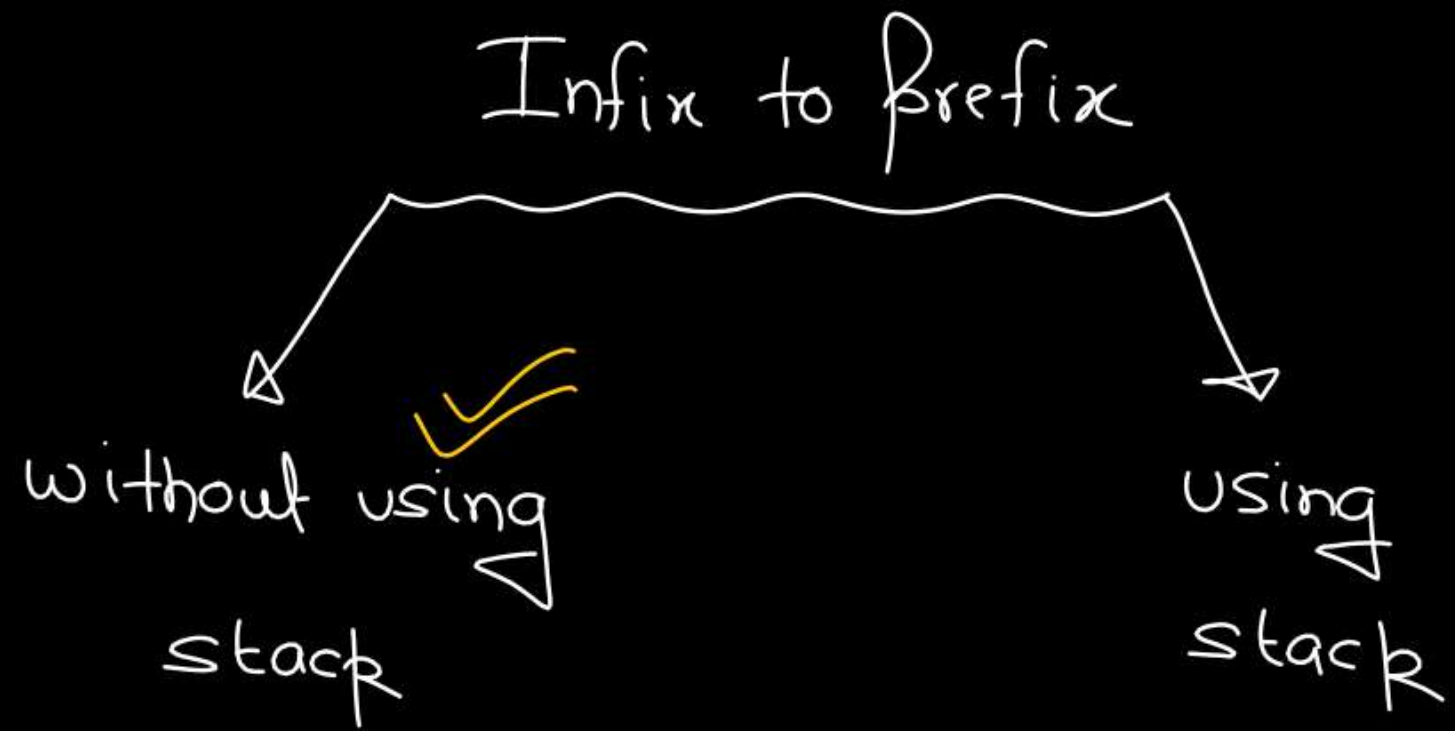


2 min

\uparrow R to L

$\left. \begin{matrix} \times & / \\ + & - \end{matrix} \right\} \text{L to R}$





Ex 1: infix: $2 + 3 \times 5$

\swarrow op1 \searrow op2

$2 + [\times 3 5]$

$+ 2 \times 3 5$

Ex2:

infix: $(a+b) \times c/d - e \uparrow f \uparrow g/h$

$$[+ab] \times c/d - e \uparrow f \uparrow g/h$$

$$[+ab] \times c/d - e \uparrow [\uparrow f g] / h$$

$$[+ab] \times c/d - [\uparrow e \uparrow f g] / h$$

$$[\times +abc] / d - [\uparrow e \uparrow f g] / h$$

$$[/ \times +abcd] - [\uparrow e \uparrow f g] / h$$

$$[/ \times +abcd] - [/ \uparrow e \uparrow f g h]$$

$$- / \times +abcd / \uparrow e \uparrow f g h$$

infix to prefix

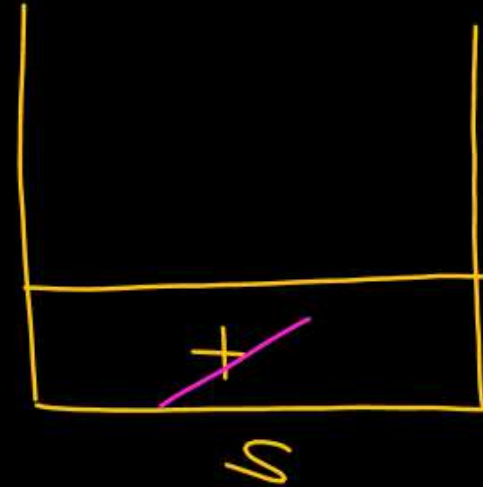
Ex1.

infix : $a + b$

reverse infix : $b + a$

O/P : $ba +$

reverse O/P : $+ab$



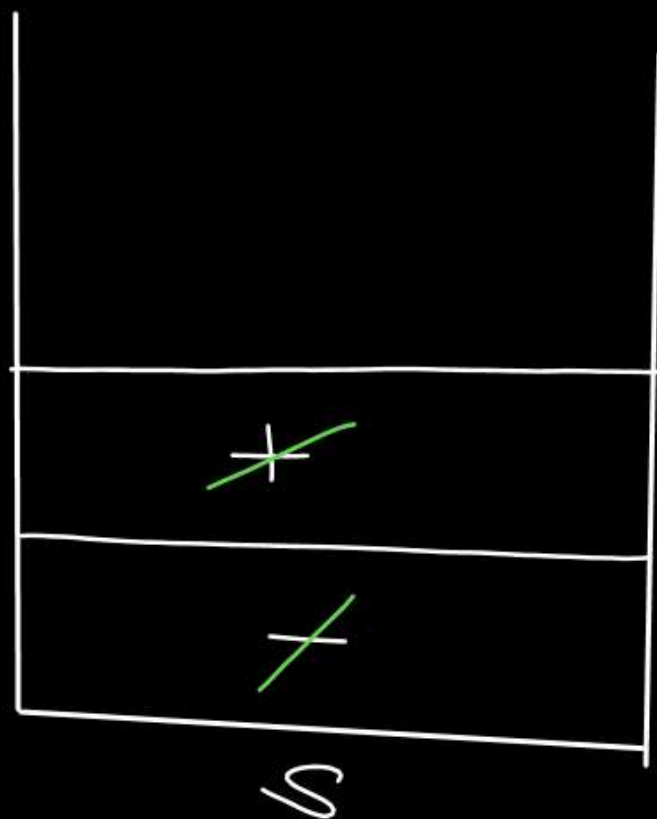
Ex 2.

infix : $a + b - c$

reverse infix : $c - b + a$

o/p : $c b a + -$

reverse o/p : $- + a b c$



$a + b - c$
 $[+ab] - c$
←
 $- + a b c$

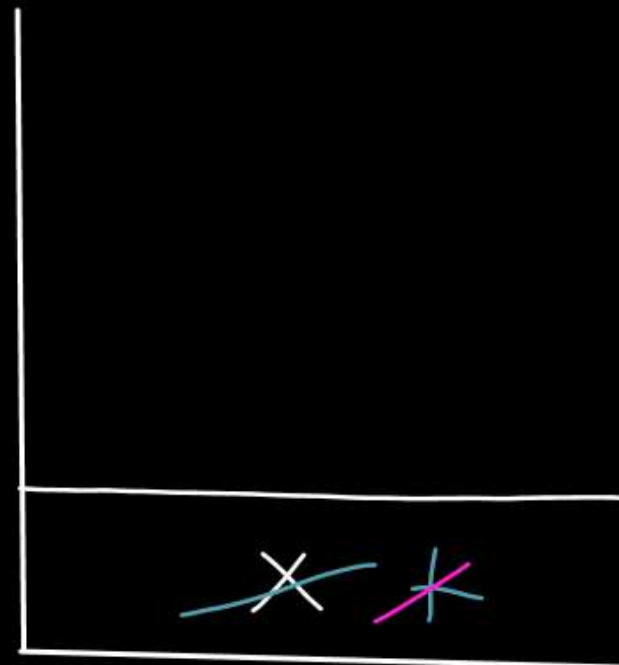
Ex 3:

infix: $2 + 3 \times 4$

reverse infix: $4 \times 3 + 2$

O/P: $4 \ 3 \ \times \ 2 \ +$

+



Ex-4

infix: $a + (b \times c - d/e)$

reverse infix: $) \overset{\checkmark}{e} \overset{\checkmark}{/} \overset{\checkmark}{d} - \overset{\checkmark}{c} \overset{\checkmark}{\times} \overset{\checkmark}{b} (+ a$

o/p: $e d / c b \times - a +$

reverse o/p: $+ a - \times b c / d e$

/
- //
/ *

Ex 5: infix: $A + (B \times C \uparrow D \uparrow E - F)$

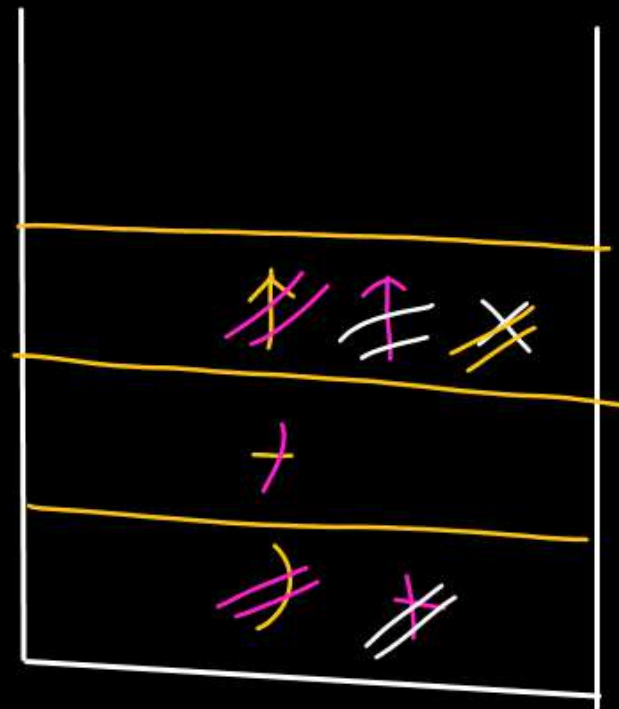
reverse infix: $) F - E \uparrow D \uparrow C \times B (+ A$

O/P: $F E D \uparrow C \uparrow B \times - A +$

reverse O/P: $+ A - \times B \uparrow C \uparrow D E F$

\uparrow R to L
 \leftarrow
 $C \uparrow D \uparrow E$

\times



Code →

