

Stack & Queue -Part IV

Course on Data Structure



CS & IT Engineering

Data Structure



Lecture Number- 17

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Topics

to be covered

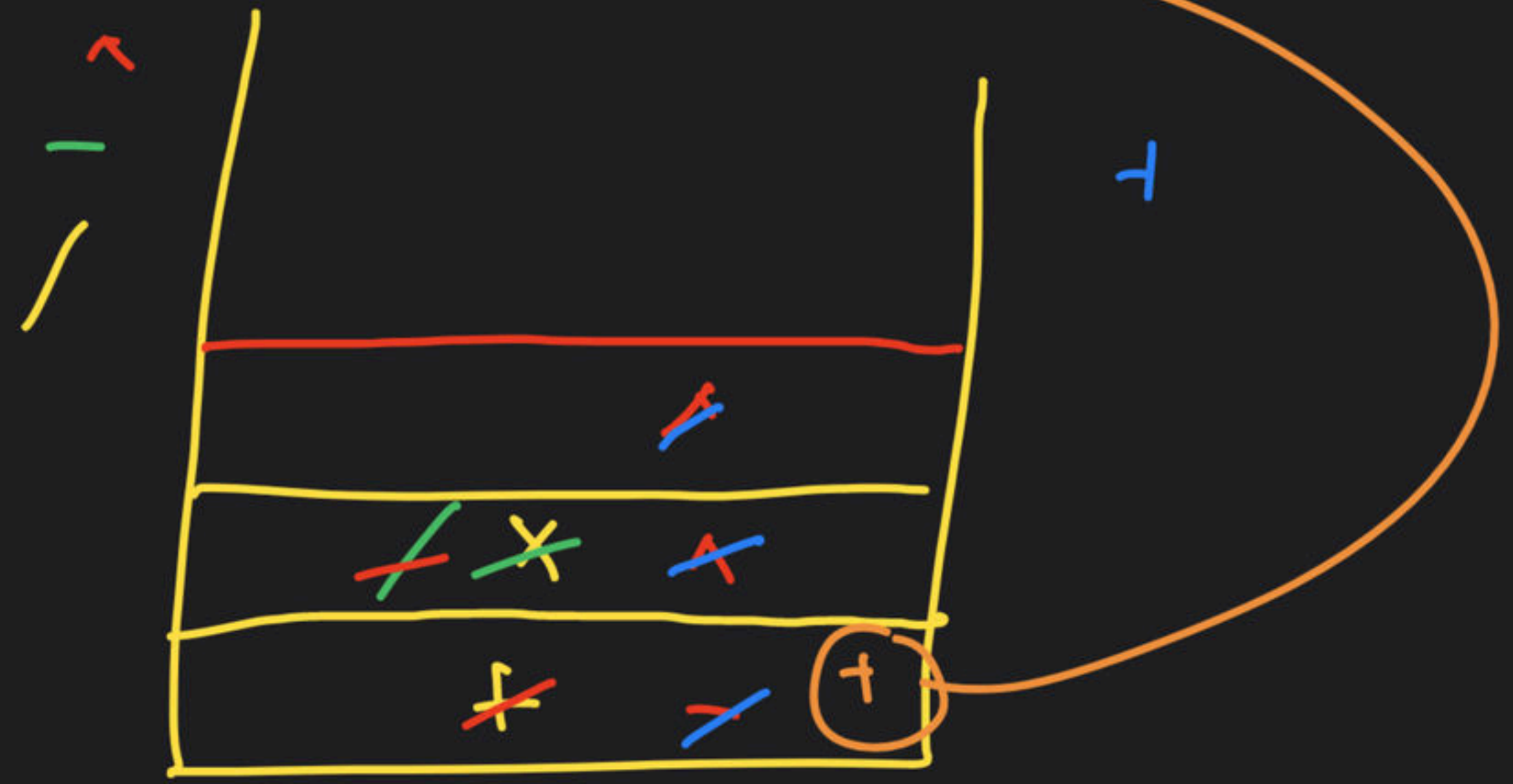
1

Stacks & Queue



i/p: $a + b \times c / d - e^f \wedge g + h$ \sum_{nd}

o/p: $abcxd / +efg^{\wedge\wedge} - h +$



Infix to Prefix

without stack

using stack

Infix: $a + b \times c$

$a + \overbrace{[x b c]}$
op₁ op₂

Prefix: $+ a \times b c$

Ex 2 -
infix: $a + b \times c - d / e^f g$

$$a + b \times c - d / e^{[f g]}$$

$$a + \underbrace{b \times c} - d / [e^f g]$$

$$a + [b \times c] - d / [e^f g]$$

$$\underbrace{a + [b \times c]} - [/ d^e f g]$$

$$[+ a \times b c] - [/ d^e f g] \Rightarrow - \dagger a \times b c / d^e f g$$

Ex 3:

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

$$[+ab] - d / (c-d+e)$$

$$[+ab] - d / ([-cd] + e)$$

$$[+ab] - d / [+ - cde]$$

$$[+ab] - [/d + - cde]$$

$$- +ab/d + - cde$$

infix to prefix using stack

Exⁿ

infix: $2+3$

Reverse of infix : $3+2$ end $+$
 \uparrow

o/p: $32+$

Reverse: $+23$

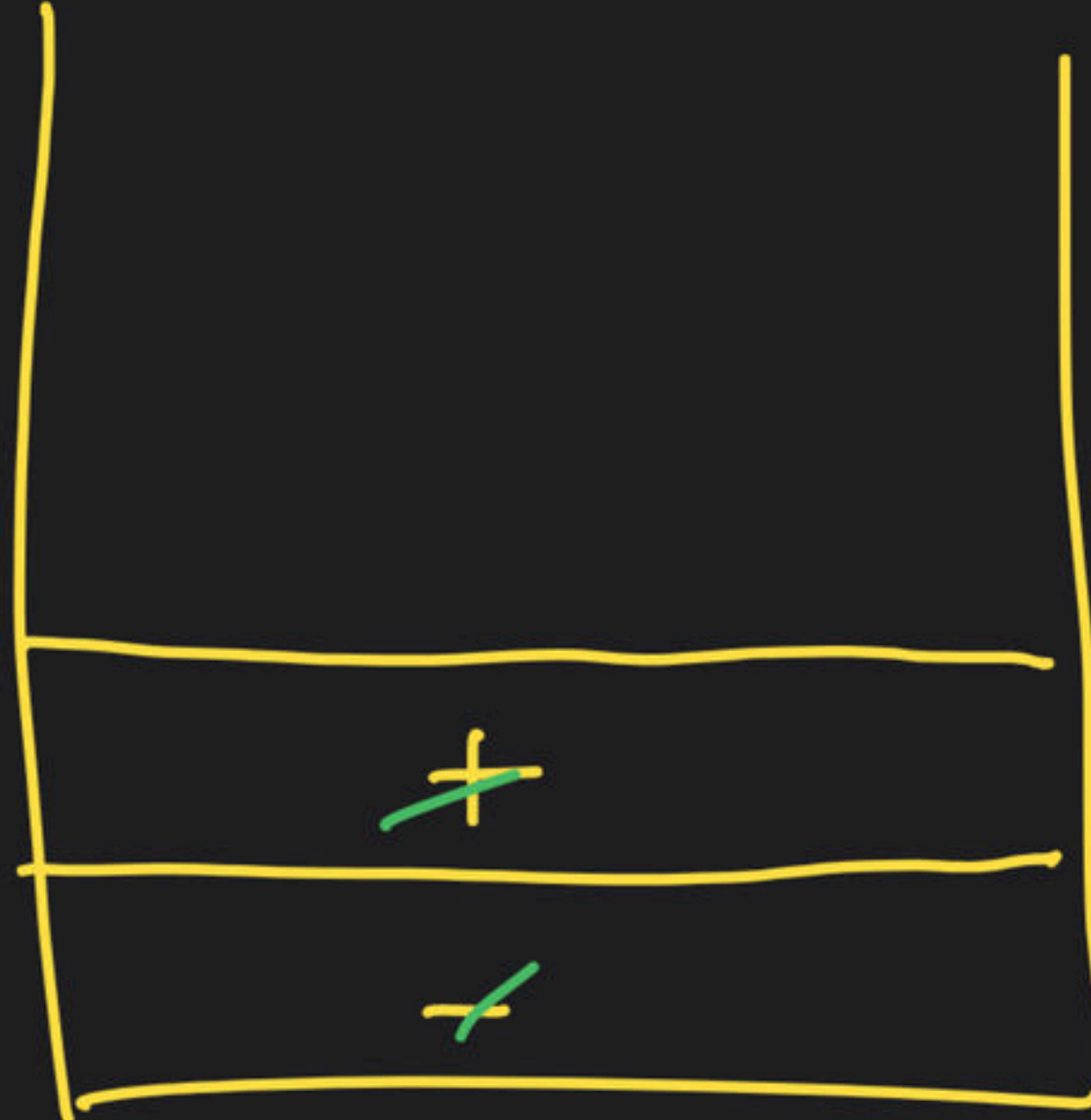


Ex2: i/p: $a + b - c$

Reverse of : $c - b + a$ end
 infix: $\uparrow \quad +$

o/p : $c b a + -$

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



$= n^3$ Infix : $2 + 3 \times 4$

Reverse of : $\begin{array}{ccccccc} & \nearrow & \searrow & \nearrow & \searrow & \nearrow & \\ 4 & \times & 3 & + & 2 & \text{end} & \\ & & & & & & \downarrow \end{array}$
 infix

O/P : $43 \times 2 +$

Reverse : $+ 2 \times 34$
 O/P

+

\times ~~*~~

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

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

$\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$
 $$

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

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

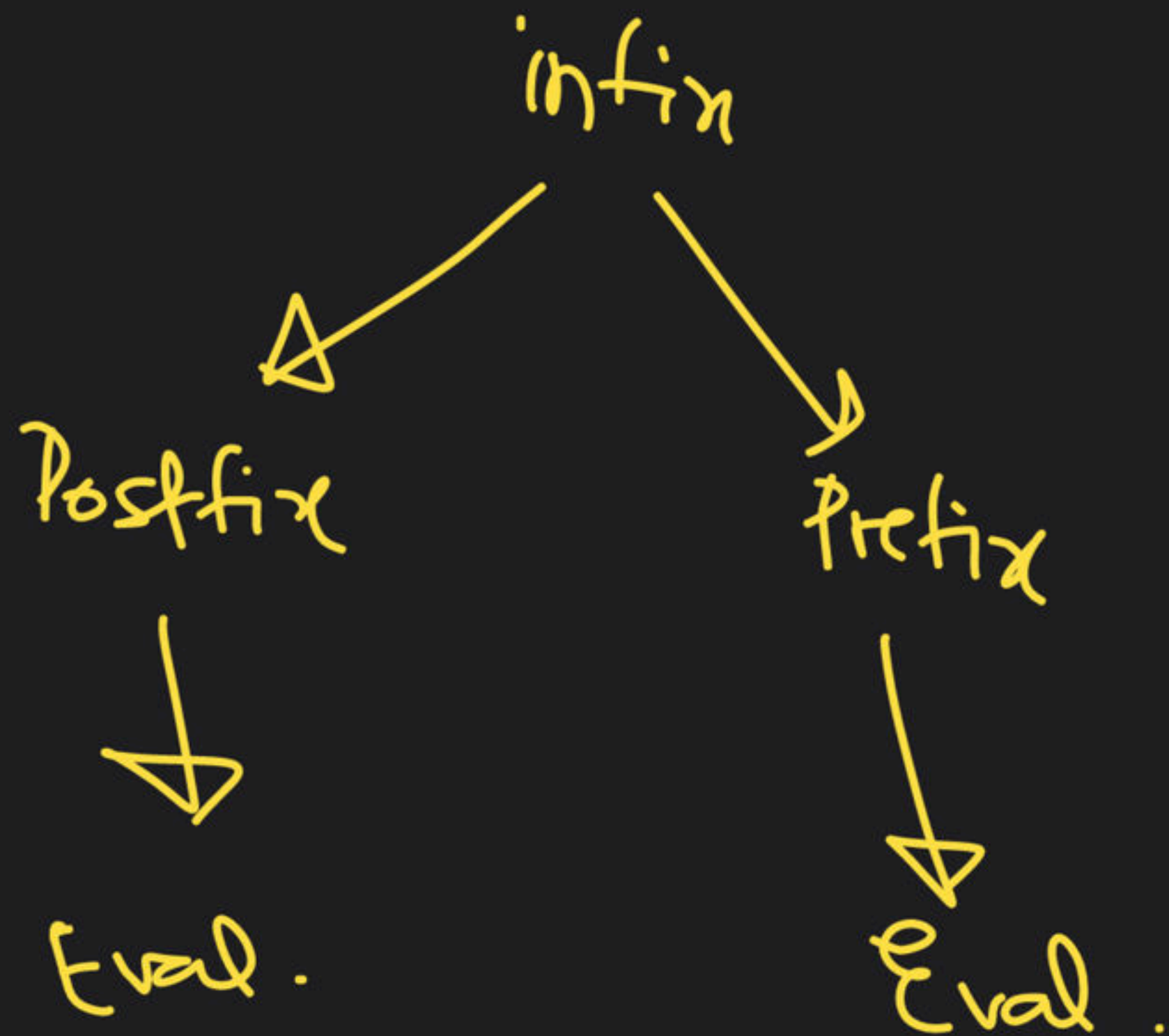
	+
	≠ +
→	± +

o/p: FED \uparrow C \uparrow B \times - A $+$

Reverse op: $\vdash A - X \uparrow B \uparrow C \uparrow D \uparrow E \uparrow F$

A hand-drawn diagram of a 3x3 grid, outlined in yellow. The grid contains the following symbols:

- Top row: A yellow stick figure with a blue diagonal line through it, a blue stick figure with a white diagonal line through it, and a white stick figure with a green diagonal line through it.
- Middle row: A green stick figure with a yellow diagonal line through it.
- Bottom row: A green stick figure with a yellow diagonal line through it, and a green stick figure with a yellow diagonal line through it, enclosed in a green circle.



Postfix Evaluation

Infix: $2 + 3 \times 5$

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

Postfix: 2 3 5 X +
 ↑ ↑ ↑ ↑

(X) → Pop 2 elem.

A → 1st ele

B → 2nd ele

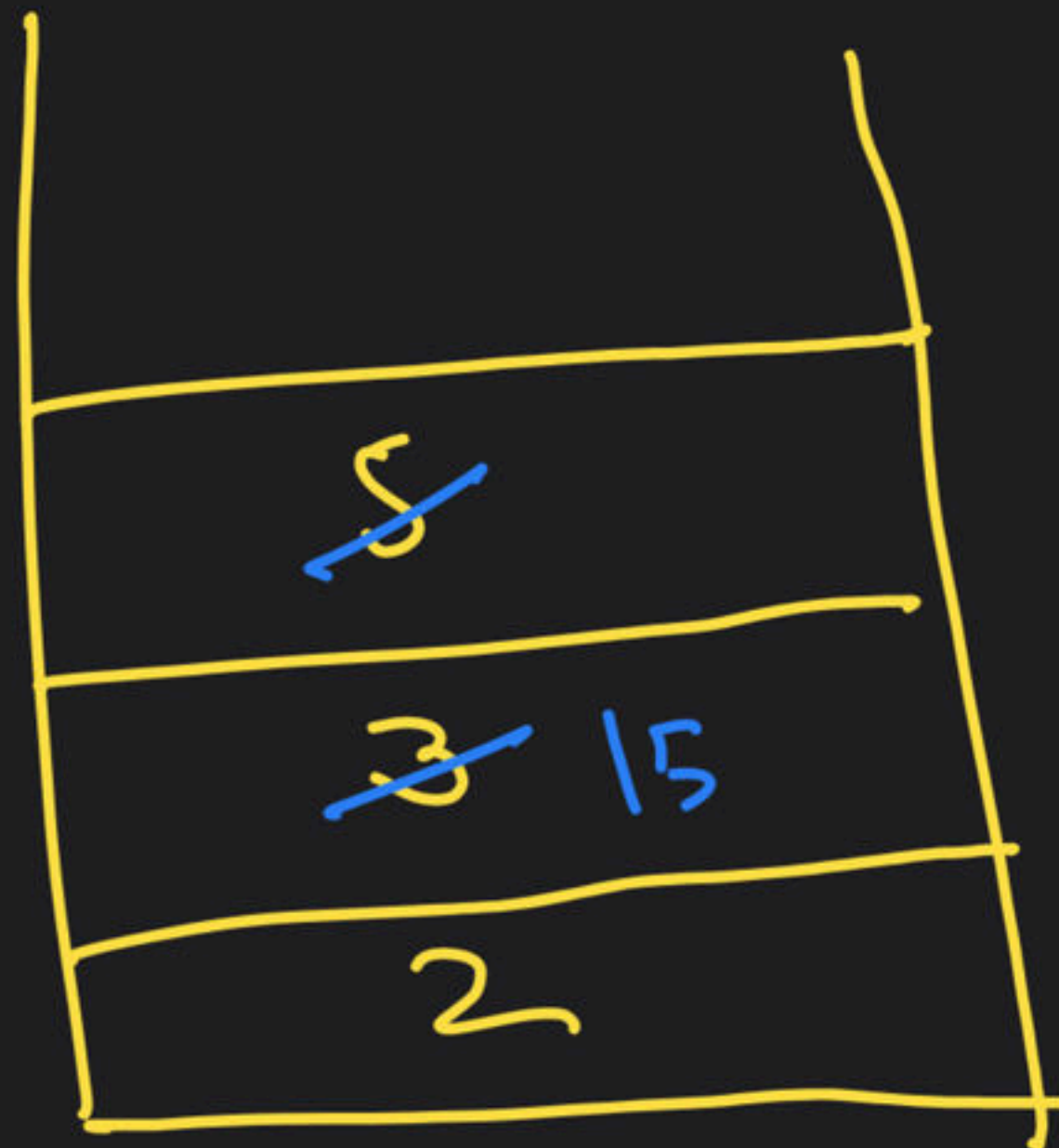
A = 5

B = 3

perform B(X)A

$$3 \times 5 = 15$$

push this on stack



Postfix:

2 3 5 X + end
↑ ↑ ↑ ↑ ↑

+
←
15, 2
→

$$2 + 15 = 17$$



17

Ex 2:Infix: $2 + 3 \times 4 - 6 / 2$ Postfix: $2\ 3\ 4\ \times\ +\ 6\ 2\ /\ -$

Postfix:

2 3 4 X + 6 2 / -
 ↑ ↑ ↑ ↑ ↑

X

pop order
 4, 3

←

Push

$$3 \times 4 = 12$$

+

pop
 12, 2

←

push

$$2 + 12 = 14$$

4
12 3
2 14

Postfix:

2 3 4 x + 6 2 / - ← End
 ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑ ↑

/
 2, 1 pop
 ↓

6 / 2 = 3 push
 ↘

Answer (11)

	4	2		
12	3	6	3	
2	14	(+)		

1
 3, 4
 4
 14-3
 4

without using stack

$$2 \quad 3 \quad 4 \quad \times \quad + \quad 6 \quad 2 \quad 1 -$$

3 4
3 4

$$2 \quad 12 \quad + \quad 6 \quad 2 \quad 1 -$$

↗

$$14 \quad (6 \quad 2 \quad 1) -$$

$$14 \quad 3 -$$

↘

$$\Rightarrow 14 - 3 = 11$$

infix to prefix

Infix: $2 + 3 \times 5$

Prefix: $+ 2 \times 3 5$

Prefix: $+ 2 \times 3 5$

Reverse Prefix: $5 \ 3 \ \times \ 2 \ + \ 5 \ 4 \ d$

\times

$\begin{array}{c} \rightarrow \\ 3, 5 \\ \rightarrow \end{array}$

$3 \times 5 = 15$

Push \rightarrow

$+$

$\begin{array}{c} \rightarrow \\ 2, 15 \\ \rightarrow \end{array}$

$2 + 15 = 17$

	3	2
5	5	15

\downarrow 17 Ans

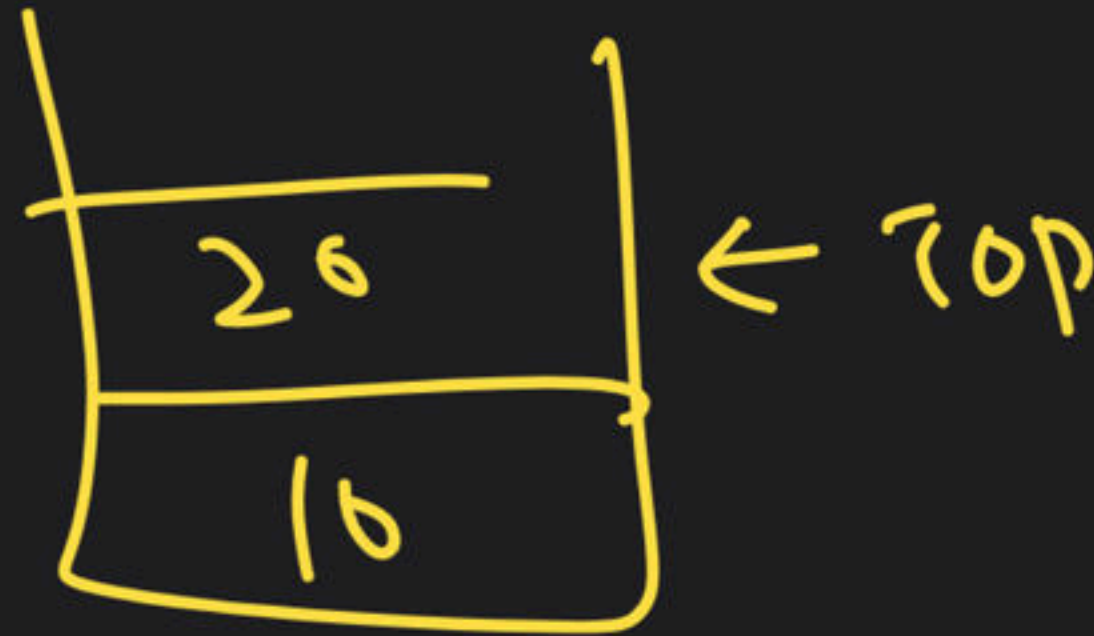
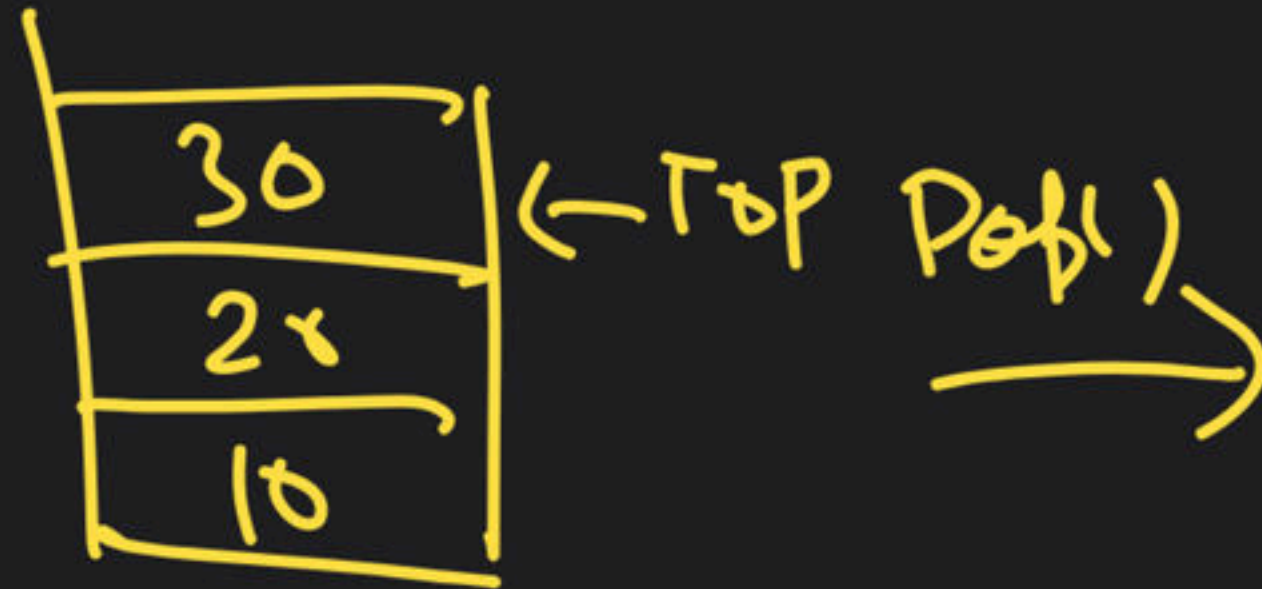
Stack

arrays $\left. \begin{array}{l} \rightarrow \text{Push} \\ \rightarrow \text{Pop} \end{array} \right\} O(1) \text{ constant time.}$

using L.L.

LIFO

unacademy
10, 20, 30
↓



①

head
NULL

②

Push(10)



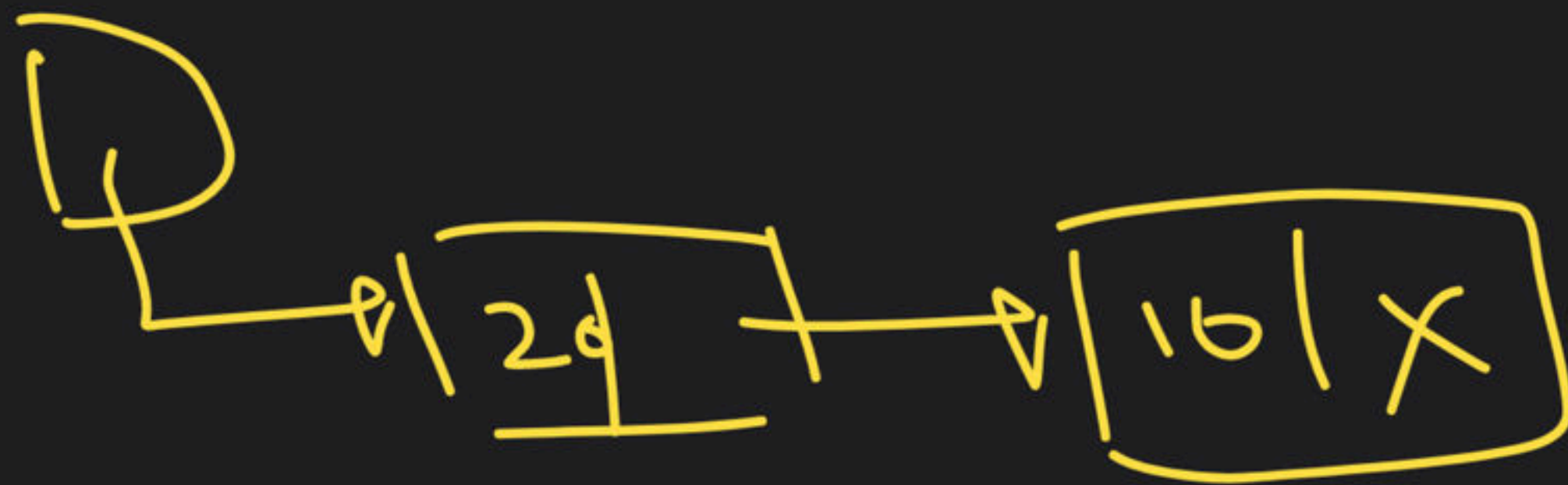
③

Push(20) \Rightarrow Insert at beg \Rightarrow b(1)

Push(36)



Pop \Rightarrow delete from brg $\Rightarrow O(1)$



$$\approx \begin{bmatrix} 8:50 - 10 \\ 8:50 - 10 \end{bmatrix}$$

THANK YOU!

Here's to a cracking journey ahead!