

3. Stack

15 June 2024 13:54

Stack :-



It is inspired from real life stack.

- open It is open from one end only.
- Only the top of stack can be accessed at the open end.
- insert → push(x)
- remove → pop()
- push(sc), pop(), top() | peek(), isEmpty(), size()

• All these operations takes $O(1)$ time.

- Initially empty stack.
- push(10) →
- push(20) →
- push(30) →
- top() → 30
- pop() →
- size() → 2
- push(100) →
- top() → 100
- isEmpty() → False
- pop() →
- pop() →
- top() → 10

stack follows LIFO principle
L - Last In
F - First Out

stack follows LIFO
↓
last in, first out.

2. Parenthesis checker

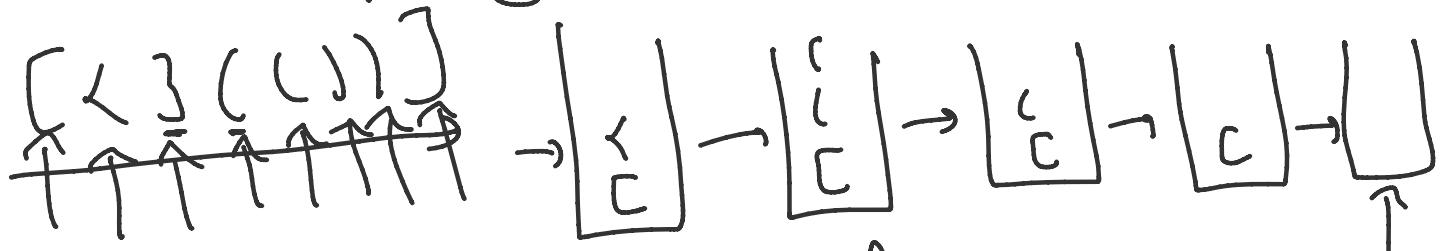
$$\frac{\{ \{ \} \}}{\{ \} \{ \}} \rightarrow \{ (3+5) \times (2+3) \} \quad [\{] () < () \}$$

) () ([] invalid

- ① #open brackets of the same type =
#close brackets of the same type.

② $\{ () \} \quad \{ \} ()$ bracket which
 $\{ ([]) \}$ opens last, must
close first

- ③) (× For every pair of brackets,
opening must be before closing.



()) (C → C → break

$\leftarrow \uparrow \uparrow$ $\left[\begin{matrix} & \\ & \end{matrix} \right] \rightarrow \left[\begin{matrix} & \\ & \end{matrix} \right]$

$\left(\begin{matrix} & \\ & \end{matrix} \right) \uparrow \rightarrow \left[\begin{matrix} & \\ & \end{matrix} \right] \rightarrow \left[\begin{matrix} & \\ & \end{matrix} \right] \rightarrow \left[\begin{matrix} & \\ & \end{matrix} \right]$

Q. Remove duplicates

$a a a b b c d d d$
 $\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$ $\left[\begin{matrix} d \\ c \\ b \\ a \end{matrix} \right]$

ans = abcd

Q. Removing duplicates - 2

Part 1 \rightarrow aaa \rightarrow a

bb \rightarrow "

Part 2 \rightarrow \boxed{aaa} \rightarrow a

Part 1 \rightarrow aaca \rightarrow a

Part 2 \rightarrow \boxed{acaa} \rightarrow "

$\circlearrowleft a a a b c c c d d$
 $\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$

$\left[\begin{matrix} a \end{matrix} \right] \rightarrow \left[\begin{matrix} c \\ b \\ a \end{matrix} \right] \rightarrow \left[\begin{matrix} b \\ a \end{matrix} \right]$

$\circlearrowleft aa \rightarrow "$

$\circlearrowleft a a a b c c c d d$
 $\uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow \uparrow$

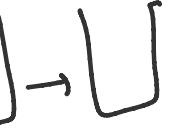
$\left[\begin{matrix} a \end{matrix} \right] \rightarrow \left[\begin{matrix} c \\ b \\ a \end{matrix} \right] \rightarrow \left[\begin{matrix} d \\ c \\ b \\ a \end{matrix} \right] \rightarrow \left[\begin{matrix} c \\ b \\ a \end{matrix} \right]$

ans = cb a \rightarrow reverse \rightarrow abc.

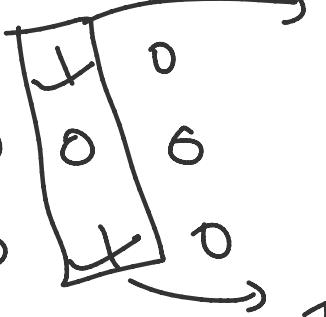
aba $\left[\begin{matrix} a \\ b \\ a \end{matrix} \right]$

abba $\left[\begin{matrix} a \\ b \\ b \\ a \end{matrix} \right] \rightarrow \left[\begin{matrix} . \\ . \\ . \\ . \end{matrix} \right] \rightarrow \left[\begin{matrix} . \\ . \\ . \\ . \end{matrix} \right]$

aba 

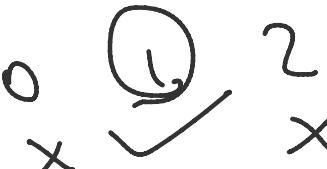
abba  \rightarrow  \rightarrow 

Q).

$m(i)(i) = 0$ 

$$m[0](i) \\ m(i)(j) = 1$$

$m[2](i)$

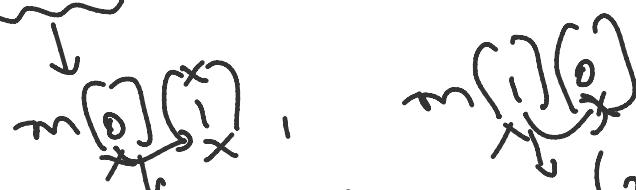


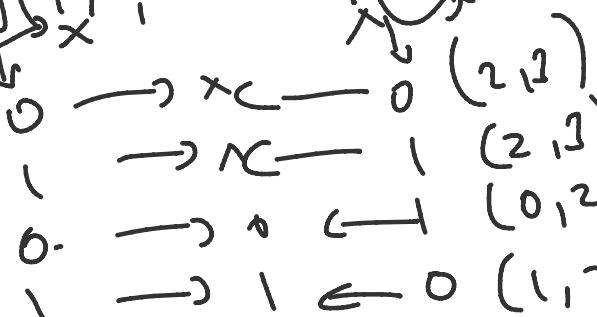
ith row  ith row
ith col \rightarrow all i's except ith row

Eg:- Let's suppose there are 2 celebrities $\frac{i}{x}, \frac{j}{x}$

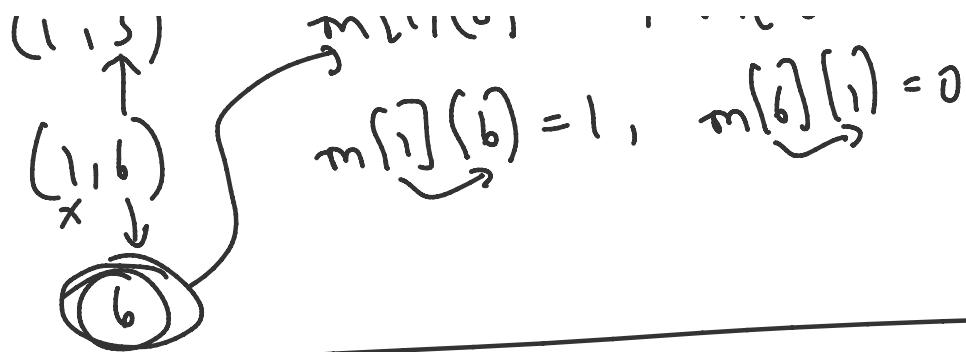
$$m(j)(i) = 1$$

0, 1, 2, 3, 4

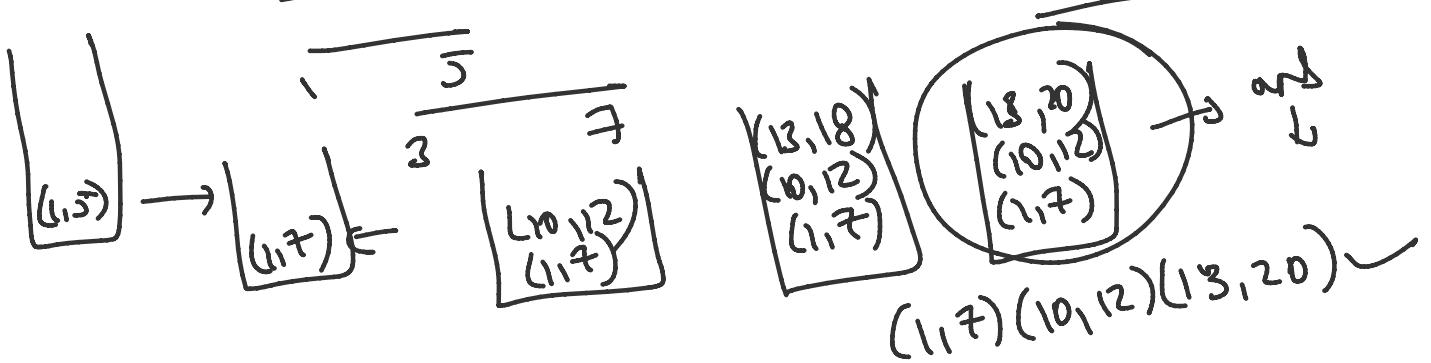
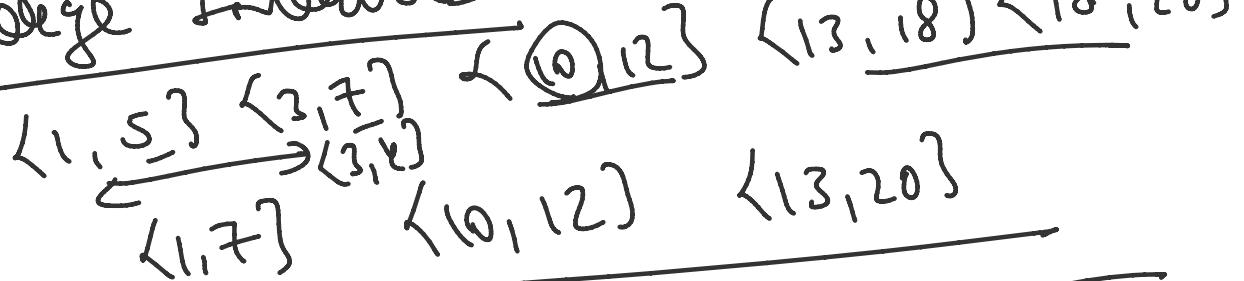




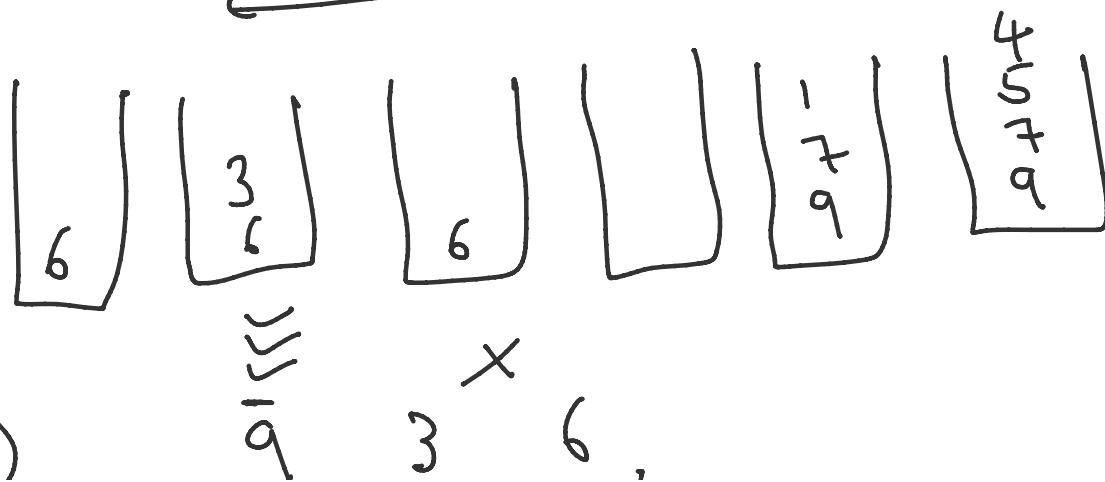
$(1, 3)$ $m[1](3) = 0, m[3](1) = 1$
 $m[2](1) = 0$



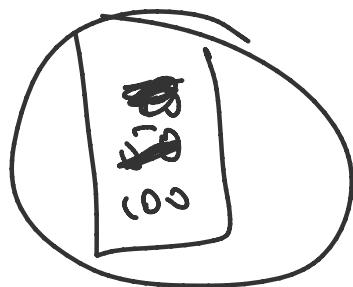
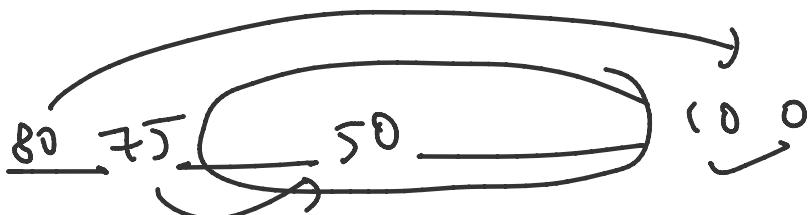
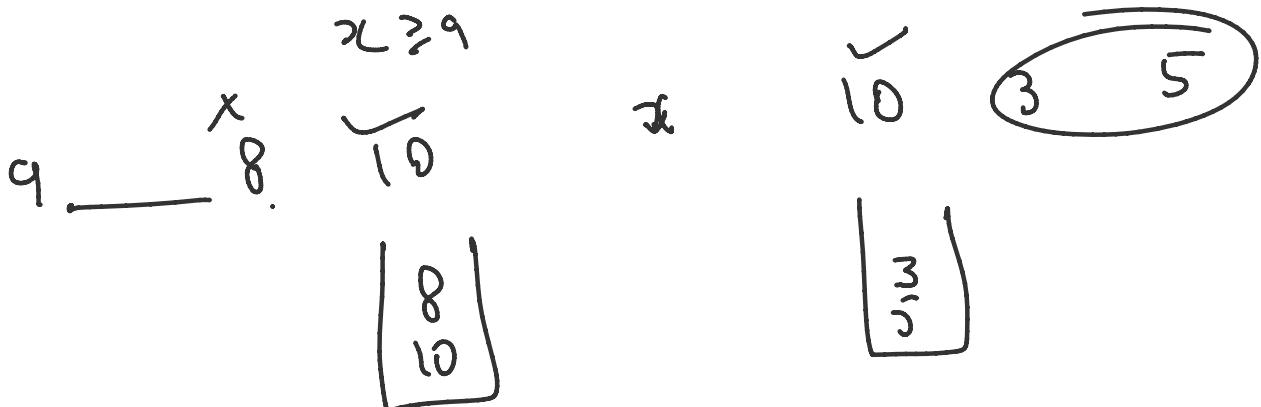
Q) Merge Intervals



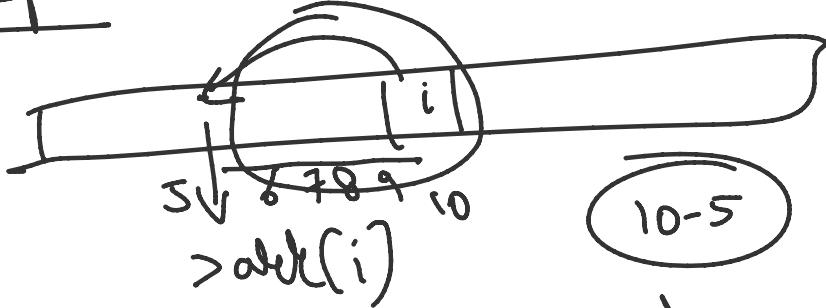
$$Q. \quad a = \left(\begin{array}{ccccccc} 4 & \overbrace{5}^{\rightarrow} & 1 & \overbrace{7}^{\rightarrow} & 9 & 3 & 6 \\ 5 & 7 & 7 & 9 & -1 & 6 & -1 \\ 5 & 7 & 7 & 9 & -1 & 6 & -1 \end{array} \right)$$



x -- g 3 6
 $x \leq g$ $x = 7, 5, 1$



Q/ Stock span



i - index of previous greater element

0 1 2 3 .. $\frac{5}{n}$ n

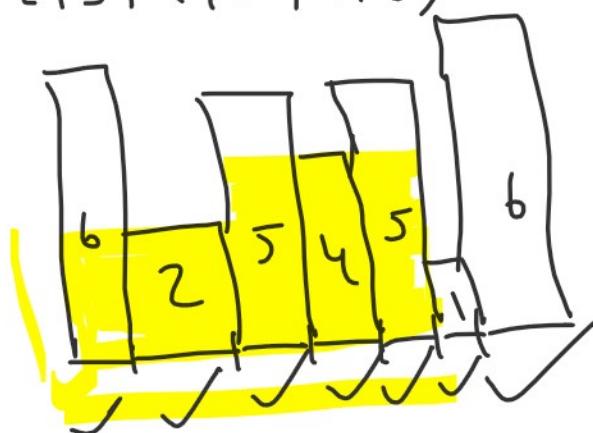
0	1	2	3	4	5
10	4	5	90	80	120
40	40	-			

(4-3)



$\text{price}(s.\text{top}()) \leq \text{price}(i)$

Q1. $(6, 2, 5, 4, 5, 1, 6)$

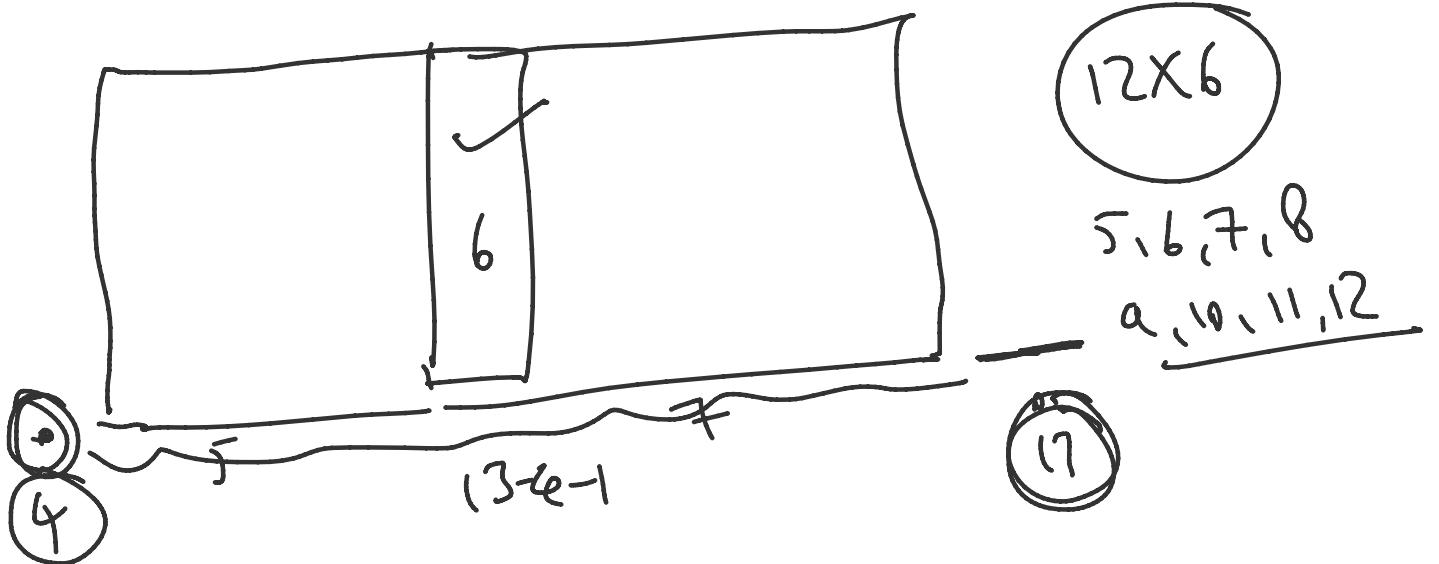


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for (i = 0; i < n; i++)
    // i-th block wt = ht of rectangle
    ans = max (ans,
                ht[i] * max_width);

```

3



$$\frac{\text{next}(i) - \text{prev}(i) - 1}{10 - 1} = 10$$

Below the equation, the numbers 10, 10 - (, and 10 are written.

