

Monotonic Stack for Stack leet code concept

08 February 2022 08:07 PM

Find Monotonic Stack: \Rightarrow We use this when problem like next greater/next smaller/previous smaller.

find next greater

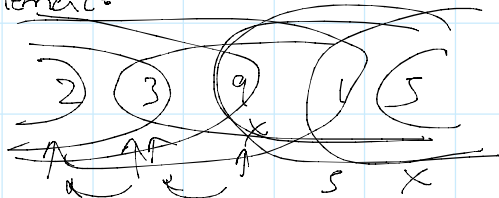
2 3 9 1 5

O/P \rightarrow [3, 9, x, 5, x]

Brute force

\rightarrow
2 3 9 1 5

* Start traversing for each element which we have come on we can traverse the left over element and stop as soon as we get greater element.



Worst case: $O(n^2)$

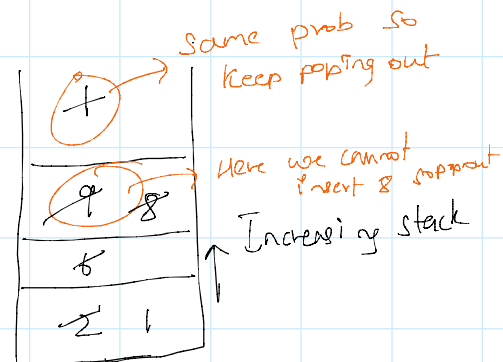
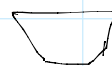
i/p \Rightarrow 5 4 3 2 1

O/p \Rightarrow x x x x x

Monotonic Stack: If's stack we maintain greater or smaller stack

2 6 9 8 1

finally stack will contain only one element.

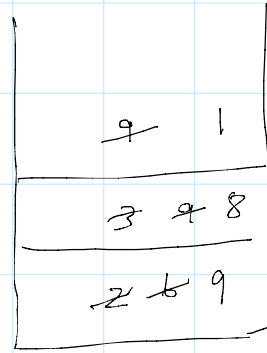


Increasing Stack

Decreasing Stack: (next greater)

2 6 9 8 1

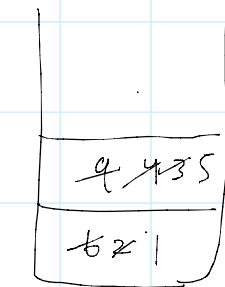
3 elements in stack



6 we cannot as it
violating so pop out 2.

Next smaller : (we use increasing stack)

→ 6 2 9 4 3 1 5
⇒ 2 1 4 3 1 x x



Increasing

⇒

5
1

 } answer for this doesn't exit

So as soon as we pop out 6 answer for 6 is 2.

ans
⑥ → 2

⑨ → 4

④ → 3

③ → 1

② → 1

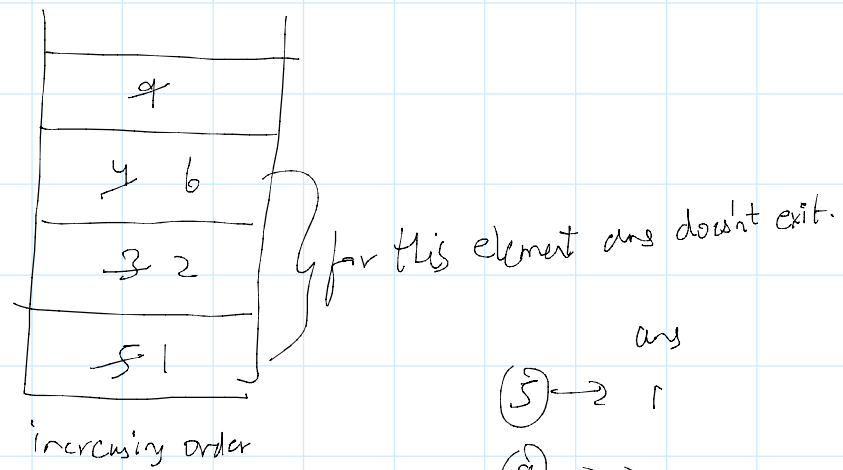
T.C ⇒ $O(n)$

S.C ⇒ $O(n)$

Previous smaller element

6 2 9 4 3 1 5
o/p x x 2 2 2 x 1

Using increasing stack we can find but traverse from right to left.



ans

(5) → 1

(4) → 2

(3) → 2

(2) → 2

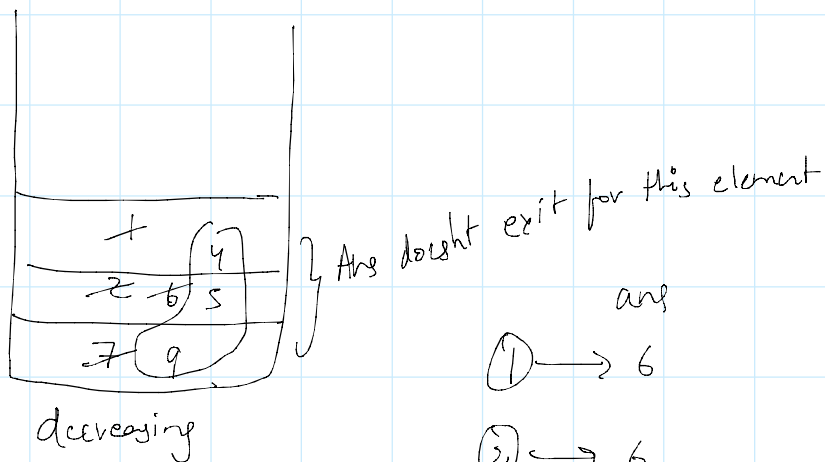
* Next larger :

We use decreasing concept

→

7 2 1 6 9 5 4

o/p 9 6 6 9 x x x



ans

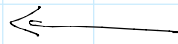
(1) → 6

(2) → 6

(6) → 9

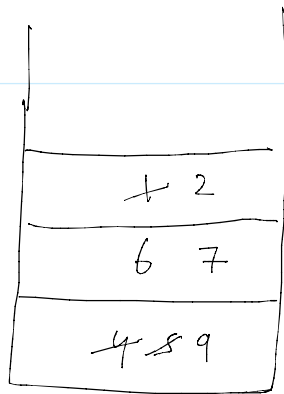
$$⑦ \rightarrow 9$$

* previous larger:



7 2 1 6 9 5 4

O/p x 7 2 7 x 9 5



} ans doesn't a -

Decreasing

$$④ \xrightarrow{\text{ans}} 5$$

$$⑤ \rightarrow$$

$$① >$$

$$\rightarrow 7$$

$$⑦ \rightarrow -$$