# 57. Insert Interval

## Brute force

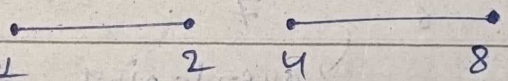
i/p → newInterval (4,8) n = 5

[(1,2), (3,5), (6,7), (8,10), (12,18)]

i=0 i=1

for every index we check what we can do here.

for → i=0 (1,2)

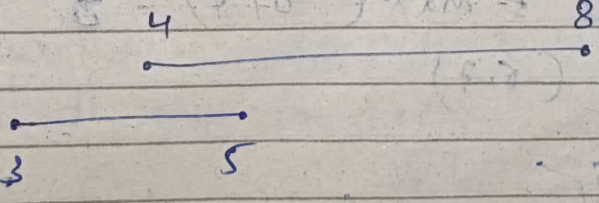



if (intervals[i][1] < newInterval[0])

{ i++; // do nothing.

}

for → i=1




overlaps interval so merge them & erase (3,5)

newInterval[0] = min(intervals[i][0], newInt[0]);

newInt[1] = max(intervals[i][1], newInt[1]);

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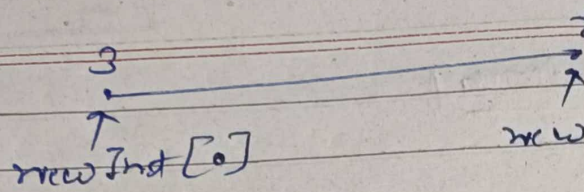



erase (3,5)

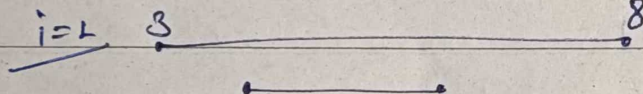
so

intervals → [(1,2), (6,7), (8,10), (12,16)]

i=1

↳ size of array reduced so don't use n' use intervals.size();

↳ don't update the i;




↳ overlaping so merge them & erase (6,7)

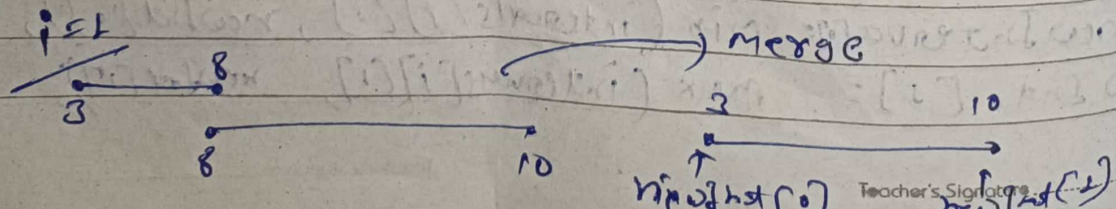
newInt[0] = min(newInt[0], intervals[i][0])
= 3

newInt[1] = max(8,7) = 8

erase (6,7)

intervals → [(1,2), (8,10), (12,16)]

i=1

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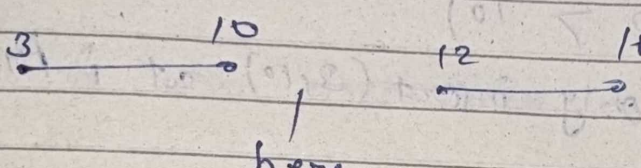
erase (8,16)

intervals → [(1,2), (12,16)]

i=1

i=2




```
if (intervals[i][0] > newInterval[1])
{
    intervals.insert(intervals.begin()+i, NewInterval[1]);
    return intervals;
}
```

↓

((1,2), (3,10), (12,16))

Note :- Here are Three cases which you should consider.

case :- 1. → अगर newinterval[0] का starting current intervals[i] के ending से बड़ा हो तो only do i++;

eg. (1,2) & (3,8)

2 < 3 ⟶ i++

case :- 2 → अगर current intervals[i] का starting newInterval[1] के ending से बड़ा हो तो

तब newInterval को i-th index में insert

~~x~~ दो तरह |

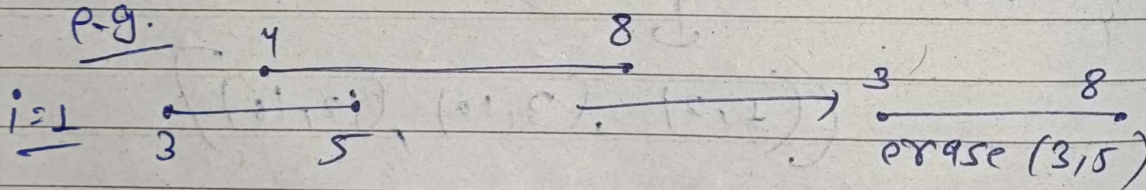
Eg. (12, 16) ↑ current intervals[i]  (3, 10) ↑ new interval

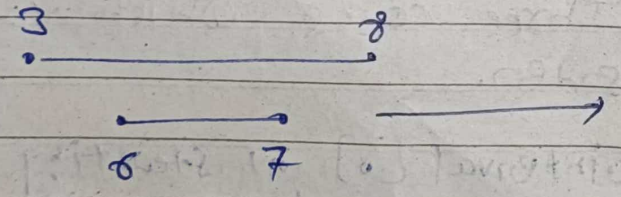
(12 > 10)

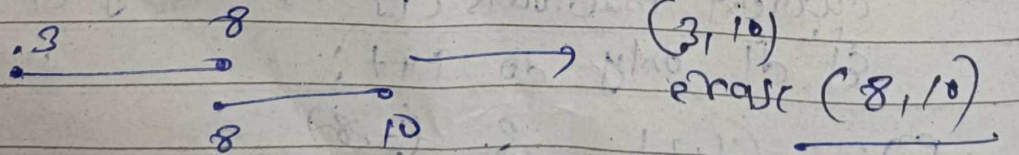
only insert (3,10) at i-th idx

case-3 :- जब current intervals[i] & new interval overlap करते हो current intervals[i] को erase करते intervals vectors से end new interval को update कर दो.

e.g.




T.C. = $O(n^2)$

S.C. = $O(1)$

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## Optimal Approach

newInterval = (4,8)  n=5

Intervals = [(1,2),(3,5),(6,7),(8,10),(12,16),(20,50)]

Here is also three case

case-1 intervals[i][1] < newInterval[0]
↳ then result में intervals[i] को डाल दो & i++

case-2 newInterval[1] < intervals[i][0]
then
newInterval[] को result में डाल दो और बचे सभी i to n intervals को भी result में डाल दो और break कर दो।

case-3 for any other conditions merge the intervals.

res. [(1,2) | (3,10) | (12,16) | (20,50)]

i=1 → (1,2)  (4,8) → case 1
2 < 4 → insert → (1,2)

i=2 → (3,5)  (4,8) → case 3
newInterval = (3,8)

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i=3 → (6,7) (3,8) case=3

newInterval = (3,8)

i=4 → (8,10) (3,8) case=3

(3,10)

i=5 → (12,16) (3,10) case=2

insert (3,10) into ~~intervals~~

& also insert rest all

T.C. = O(n)

S.C. = O(n)

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