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Day-31

Questions on Binary Search

* **First and Last Position of element in sorted array.**

Target = 8

0	1	2	3	4	5
5	7	7	8	8	10

First Approach

=> Start from the left side and find the index of target element.

=> Now, after that, start from right side, find the index of target element.

=> And return both the indexes.

=> Here, we are using Linear Search.

Second Approach

=> Now, we can also this by Binary Search because given array is sorted.

=> First, we find the element as we normally do in BS.

=> After finding the element, we check on the left side for the first occurence of that element.

Ex:

0	1	2	3	4	5	6	7
2	3	3	3	3	4	5	6

=> target = 3 start = 0, end = 7 (mid-1)

mid = $\frac{0+7}{2}$ = 3

2	3	3

First = ~~3~~ 1 end = mid-1

mid = $\frac{0+2}{2}$ = 1

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=> Use this same approach to find the last occurence.

start = mid+1

* Search Insert Position

	0	1	2	3	4	5	6	7	
arr	1	4	6	8	10	14	16	18	target = 4

=> First Approach

=> By using Linear search, we find the target element if it found then return the ~~elem~~ index of the element.

=> If it crosses the element bigger than that return that index.

=> But it takes O(n) Time.

=> Second Approach

=> By using Binary Search, we will find the element if it will find then return that index.

=> Otherwise, do according to binary search algo.

=> If the element is not present then in the last return start because in this condition start an end both on the same element and this element is greater than element we want to insert.

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* Sqrt(x)

⇒ Here we use the concept of BS for finding the sqrt of 'x'.

=⇒ Now, ~~we find~~ as we do in BS search, we will find a mid element.

=⇒ Then do the square of that element and do the procedure same as we do in BS.

=⇒ we go to the right then the mid element may be our potential answer so store it in a variable.

* Kth Missing positive Number:

⇒

2	3	4	7	11	12

=⇒ ① 2 3 4 ⑤ ⑥ 7 ⑧ ⑨ ⑩ 11 12

(kth, +ve)

=⇒ we have to find the ~~minimum~~ +ve missing number.

⇒ There is no missing element in

2	3	4	7	11	12

when array is →

1	2	3	4	5	6
1	1	1	3	6	6

⇒ First, we have to calculate the index of missing no. after that we can calculate missing no.

⇒ By using binary search, we will find find the element greater than the value of k in new array of difference.