

SECTION - 1

Define Binary search in details with example.

Binary Search:- Binary search algorithm is used to search any element in an array which is sorted. The time complexity of this algorithm is $O(\log n)$. Unlike the linear search in which we compare each and every element of the array with the element which is to be searched, in binary search, we use the fact that array is sorted.

Let say we have to search for element x then! we basically ignore half of the elements. Just after one comparison.

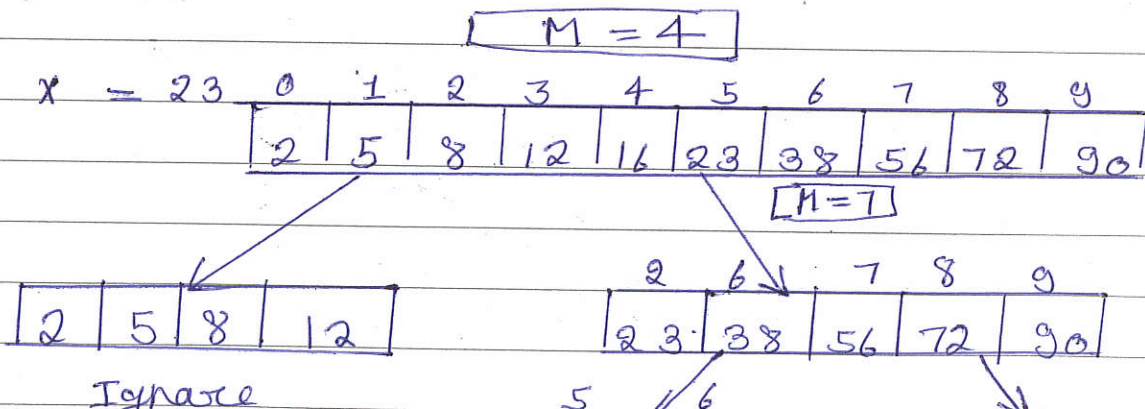
Compare x with the middle element.

If x matches with middle element, we return the mid index.

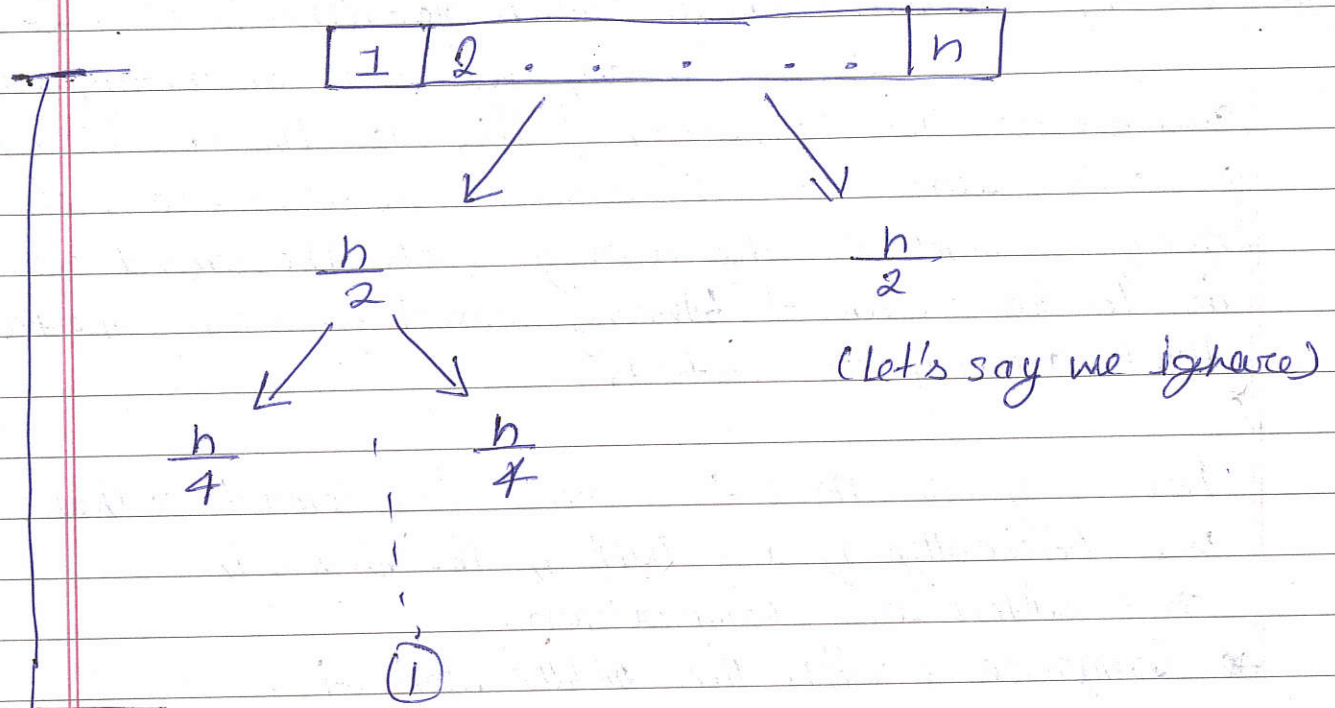
Else if x is greater than the mid element, then x can only lie in right half sub-array after the mid element so we recur for right half.

Else (x is smaller) recur for the left half

Example 1:-



for time complexity



$$\text{total time} = \log_2 n$$

in worst + case

so time complexity is $O(\log n)$