Doubt Clearing Session

Course on C-Programming & Data Structures: GATE - 2024 & 2025

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Data Structure:
Doubts

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Hello!

I am Vishvadeep Gothi

I am here because I love to teach

DPP

Question 1

Consider an array of size n-1 elements which contains elements between 1 to n (all unique) but 1 number is missing. Find the missing number?

```
for(i=0; i<n; i++)
{
    B[i] = -1;
}
for(k=0; k<n-1; k++)
{
    B[A[k]-1] = A[k];
}
```

```
for(i=0; i<=n-1; i++)
{
    if(B[i] == -1)
    {
        return i+1;
    }
}
```

R.T. con = $\Theta(n)$

space $\Rightarrow \Theta(n)$

Sol² ②

$$1+2+3+\cdots+n = \frac{n(n+1)}{2}$$

Sum of array

```
Sum = 0;
for(i=0; i<n-1; i++)
{
   Sum = Sum + A[i];
}
return (n*(n+1))/2 - Sum;
```

1, 5, 6, 2, 4

⇓

Sum

18

$\frac{6(6+1)}{2} = 21$

21 − 18

3

Question 2

LB UB

Consider an array A[-6 ..... 15], which is stored in memory starting from location 1000. Assume each element in memory is stored on 4 locations. Then the location of element A[2] is?

$= 1000 + 4 * (2 - (-6))$

$= 1000 + 4 * 8$

$= 1032$

Question 3

There are n students in the class and the teacher is going to find the leader of the class. The teacher applies a simple strategy to find the leader as follows:
Teacher asked all students to stand in a single queue then given them numbering from 1 to n, starting from first student to last student. Then teacher has removed all students with odd numbering i.e. 1, 3, 5 ….
For remaining students teacher given numbering once again from 1 without changing their relative order and then removed the odd number students again from the queue. Teacher repeated the same till there is only 1 student remaining in the queue. That one student becomes leader of the class.
Assume you want to be the leader then in the initial queue of n students on which position you will stand so that you can become the leader?

1 2 ~~3~~ 4 5 - - - -

1 2 3 4 5 6 7 8 9 10

2 4 6 8 10

4 8

8

Ans:- Max value which is power of 2 and $\leq n$

if

n	Ans
100	64
50	32
25	16
200	128
256	256

```
x = ⌊log n / log 2⌋;
y = pow(2, x);
return y;
```

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

2 4 6 8 10 12 14

4 8 12

8

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

2 4 6 8 10 12 14 16 18 20

4 8 12 16 20

8 16

16

=

Question 1

Consider you are the commander in chief for march past event and to have a good uniform arrangement in the march past, you need to arrange the students in a very specific manner. To identify this arrangement, you want to find the height difference of the students against each other. If there are n number of students and if it takes 40 seconds of time to compare heights of 2 students then, total time required to get the maximum of the differences between the heights of any 2 students for n = 200 is?

Question 2

Consider an array of n elements. Rotate the array in left k positions where k is a non-negative integer?

Question 3

Consider an array of n elements. Total comparisons required to calculate second minimum element of array if n = 64?

$$n + \lceil \log_2 n \rceil - 2$$

$$64 + \log_2 64 - 2$$

$$68$$ Ans

Question 4

Consider an array of size n-1 elements which contains elements between 1 to n (all unique) but 1 number is missing. Find the missing number?

Question 5

Consider an array which contains n elements. Arrange the array elements in such a way that all zeros in array are moved in the starting of the array, while maintaining the relative order of other elements.

Example:

Input: 1, 5, 7, 0, 2, 0, 4, 8, 0

Output: 0 , 0, 0, 1, 5, 7, 2, 4, 8

Question 6

Consider an array A[-6 ..... 15], which is stored in memory starting from location 1000. Assume each element in memory is stored on 4 locations. Then the location of element A[2] is?

Question 7

There are n students in the class and the teacher is going to find the leader of the class. The teacher applies a simple strategy to find the leader as follows:
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Assume you want to be the leader then in the initial queue of n students on which position you will stand so that you can become the leader?

Question

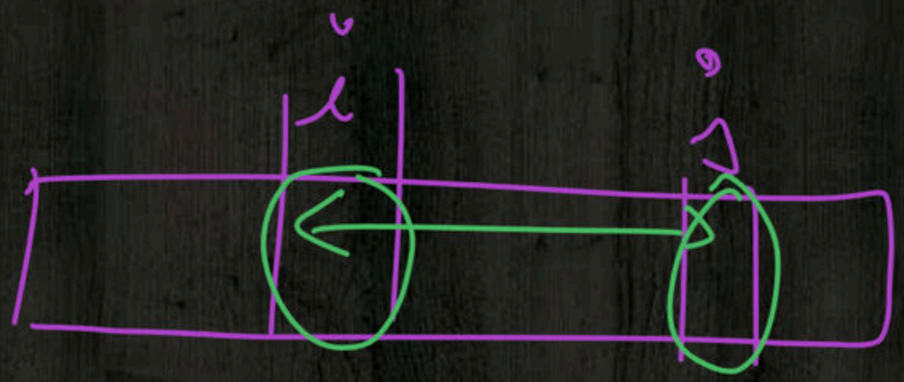
Consider a sorted array of size n with duplicate elements. You have been given an element k, what is the time complexity to find the frequency of element k in the array?

(A) $\theta(1)$

(B) $\theta(\log n)$

(C) $\theta(n)$

(D) None



Question

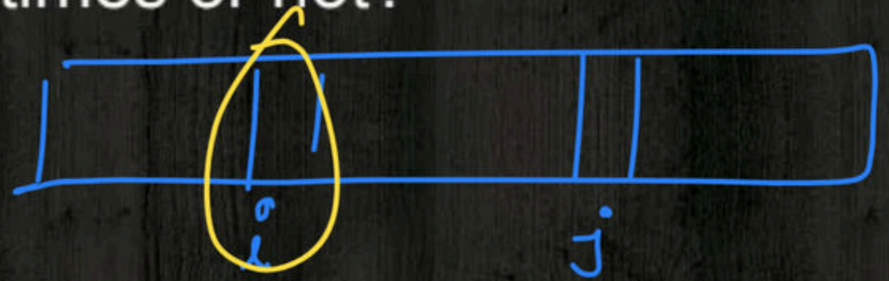
Consider a sorted array of size n with duplicate elements. You have been given an element k, what is the time complexity to find that the element k is appeared atleast n/3 times or not?

(A) O (1)

(B) O (log n)

(C) O (n)

(D) None



freq. = j - i + 1

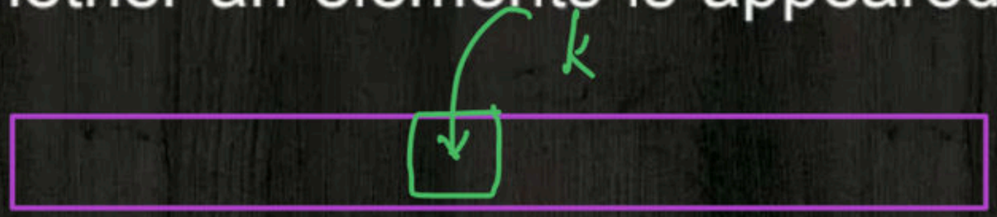
if (freq ≥ n/3) return true

else ~~false~~

if (A[i + n/3 - 1] == k)
return True

Question

Consider a sorted array of size n with duplicate elements. Find the time complexity to find whether an elements is appeared more than n/2 times or not in the array?



(A) O (1)

(B) O (log n)

(C) O(n)

(D) None

find i => first appearance in array

if (A [i + n/2 - 1] == k)

return True

else returns False

Happy Learning