

# MISSING NUMBER

★ In this question, we are given a number  $N$  and an array of  $N-1$  unsorted numbers, we are supposed to find the missing number.

Brute force solution is performing a linear search for each number from 1 to  $N$ .  $\therefore$  Time complexity is  $O(N^2)$ . Better solution is to use a hash array, where we create a boolean array of size  $N+1$ . We hash it to 1 for each element of the array and then return the index where the element has been hashed to zero. This adds a space complexity of  $O(N)$ .

There are 2 possible optimal solns. One is to find sum of the array and compare it with sum of first  $N$  natural numbers.

Other is to XOR the first  $N$  natural numbers, XOR the entire array and return  $\text{XOR}_1 \wedge \text{XOR}_2$ . This works because XOR of same numbers is 0. So all numbers will find a pair except the one which is missing.