

# Manipulative Numbers

Suppose that  $A$  is a list of  $n$  numbers  $\{A_1, A_2, A_3, \dots, A_n\}$  and  $B = \{B_1, B_2, B_3, \dots, B_n\}$  is a permutation of these numbers, we say  $B$  is  $K$ -Manipulative if and only if:

$M(B) = \text{minimum}(B_1 \oplus B_2, B_2 \oplus B_3, B_3 \oplus B_4, \dots, B_{n-1} \oplus B_n, B_n \oplus B_1)$  is not less than  $2^K$ , where  $\oplus$  represents the  $XOR$  operator.

You are given  $A$ . Find the largest  $K$  such that there exists a  $K$ -manipulative permutation  $B$ .

## Input:

The first line is an integer  $N$ . The second line contains  $N$  space separated integers -  $A_1 A_2 \dots A_n$ .

## Output:

The largest possible  $K$ , or  $-1$  if there is no solution.

## Constraints:

- $1 < n \leq 100$
- $0 \leq A_i \leq 10^9$ , where  $i \in [1, n]$

## Sample Input #00

```
3
13 3 10
```

## Sample Output #00

```
2
```

## Explanation

Here the list  $A$  is  $\{13, 3, 10\}$ . One possible permutation  $B = \{10, 3, 13\}$ . Here

$$M(B) = \text{minimum}\{B_1 \oplus B_2, B_2 \oplus B_3, B_3 \oplus B_1\} = \text{minimum}\{10 \oplus 3, 3 \oplus 13, 13 \oplus 10\} = \text{minimum}\{9, 14, 7\} = 7.$$

So there exists a permutation  $B$  of  $A$  such that  $M(B)$  is not less than  $4 = 2^2$ . However there does not exist any permutation  $B$  of  $A$  such that  $M(B)$  is not less than  $8 = 2^3$ . So the maximum possible value of  $K$  is 2.

## Sample Input #01

```
4
1 2 3 4
```

## Sample Output #01

```
1
```

