



# The Great XOR

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Problem

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Given a long integer,  $x$ , count the number of values of  $a$  satisfying the following conditions:

- $a \oplus x > x$
- $0 < a < x$

where  $a$  and  $x$  are long integers and  $\oplus$  is the [bitwise XOR](#) operator.

You are given  $q$  queries, and each query is in the form of a long integer denoting  $x$ . For each query, print the total number of values of  $a$  satisfying the conditions above on a new line.

## Input Format

The first line contains an integer,  $q$ , denoting the number of queries.

Each of the  $q$  subsequent lines contains a long integer describing the value of  $x$  for a query.

## Constraints

- $1 \leq q \leq 10^5$
- $1 \leq x \leq 10^{10}$

## Subtasks

For **50%** of the maximum score:

- $1 \leq q \leq 10^3$
- $1 \leq x \leq 10^4$

## Output Format

For each query, print the number of values of  $a$  satisfying the given conditions on a new line.

## Sample Input 0

```
2
2
10
```

## Sample Output 0

```
1
5
```

## Explanation 0

We perform the following  $q = 2$  queries:

1. For  $x = 2$  the only value of  $a$  satisfying  $0 < a < x$  is  $1$ . This also satisfies our other condition, as  $1 \oplus 2 = 3$  and  $3 > x$ . Because we have one valid  $a$  and there are no more values to check, we print  $1$  on a new line.

2. For  $x = 10$ , the following values of  $a$  satisfy our conditions:

$$1 \oplus 10 = 11$$

$$4 \oplus 10 = 14$$

$$5 \oplus 10 = 15$$

$$6 \oplus 10 = 12$$

$$7 \oplus 10 = 13$$

Because there are five valid values of  $a$ , we print  $5$  on a new line.

[f](#) [t](#) [in](#)

Submissions: [2917](#)

Max Score: 25

Difficulty: Medium

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Current Buffer (saved locally, editable)  

Java 7



```
1 import java.io.*;
2 import java.util.*;
3 import java.text.*;
4 import java.math.*;
5 import java.util.regex.*;
6
7 public class Solution {
8
9     static long theGreatXor(long x){
10         // Complete this function
11     }
12
13     public static void main(String[] args) {
14         Scanner in = new Scanner(System.in);
15         int q = in.nextInt();
16         for(int a0 = 0; a0 < q; a0++){
17             long x = in.nextLong();
18             long result = theGreatXor(x);
19             System.out.println(result);
20         }
21     }
22 }
23
```

Line: 1 Col: 1

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