G. Flip the Bits

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

You are given a positive integer n. Your task is to build a number m by flipping the minimum number of bits in the binary representation of n such that m is less than n ($m < n$) and it is as maximal as possible. Can you?

Input

The first line contains an integer T ($1 \le T \le 10^5$) specifying the number of test cases.

Each test case consists of a single line containing one integer n ($1 \le n \le 10^9$), as described in the statement above.

Output

For each test case, print a single line containing the minimum number of bits you need to flip in the binary representation of n to build the number m.

Example

input Copy

```
2
5
10
```

output Copy

```
1
2
```