

Interval Xor

Input file: **standard input**
Output file: **standard output**
Time limit: 0.5 seconds
Memory limit: 64 megabytes

Mr. X enjoys solving and especially talking a lot about bitwise operations, even at the New Year's Day party. While drinking with his friends, he came up with the following challenge:

There are q queries, and in each query you are given a positive integer a_i ($i = 0 \dots q-1$). You are required to answer the following question:

What is the bitwise XOR of the integers in the interval $[0, a_i]$ and what is the maximum bitwise XOR we can get by removing **exactly** one integer from that interval?

Your task is to solve the challenge of Mr. X.

Input

The first line of the input will contain q , the number of queries ($1 \leq q \leq 2 * 10^5$).

Each of the next q lines contains a positive integer a_i , describing a query. ($1 \leq a_i \leq 10^9$).

For tests worth 15 points, ($1 \leq q, a_i \leq 1000$).

For tests worth 15 more points, ($1 \leq a_i \leq 10^4$).

For tests worth 20 more points, ($1 \leq a_i \leq 10^6$), ($1 \leq q \leq 50$).

Output

You need to write q lines, the answers to each query. Every line should contain two numbers, namely, the bitwise XOR of the integers in the interval $[0, a_i]$, and the maximum bitwise XOR we can get by removing one integer from the interval.

Example

standard input	standard output
5	1 29
29	15 15
14	1 9
9	12 15
12	0 31
31	