

XOR Game

Time Limit: 3.0s **Memory Limit:** 256M

Sinan and Fahri are playing an XOR game. Initially, Sinan has an empty set of integers. Then a sequence of N events happens. There are two types of events:

- Sinan chooses integer A and adds it to the set;
- Fahri chooses integer A and passes it to Sinan who finds integer B in the set such that integer $A \oplus B$ contains minimal possible number of 1s in its binary representation. Here \oplus is a bitwise exclusive or operation, for more details check Wikipedia page.

Your task is to help Sinan finding minimal possible number of 1 bits in binary representation of $A \oplus B$.

Input

The first line contains integer N . Each of the following N lines describes an event as two integers T and A separated by a single space. Here T is an event type.

Output

For each event of the second type print the corresponding minimal number of 1 bits in a separate line.

Constraints

- $2 \leq N \leq 2 \cdot 10^5$,
- $1 \leq T \leq 2$,
- $0 \leq A \leq 10^6$,
- in the first event $T = 1$.

Example

Input

```
4
1 2
2 1
1 1
2 3
```

Output

```
2  
1
```

Input

```
5  
1 2  
1 4  
1 8  
2 3  
2 14
```

```
1  
2
```