Magic Bits

Time limit: 2.0s **Memory limit:** 256M

Consider two integers, X and Y. There are two operations which you can perform any number of times:

- Set X to $X + 1$.
- Set X to X OR Y.

For each of the T test cases, you must calculate the fewest operations needed to make X equal to Y or determine that no such sequence of operations exists.

Constraints

$1 \leq T \leq 10^6$

$0 \leq X, Y < 2^{60}$

Subtask 1 [30%]

$T = 1$

$0 \leq X, Y \leq 10^6$

Subtask 2 [70%]

No additional constraints.

Input Specification

The first line contains an integer, T, the number of test cases.

Each of the next T lines contains two space-separated integers, X and Y.

Output Specification

For each test case, on its own line, output the fewest operations needed to make X equal to Y. If no sequence of operations exists, output `-1` instead.

Sample Input

```
2
1 2
3 6
```

Sample Output

```
1
2
```