13081   XOR Sequence Revisited

Jerry loves XOR sequence. He has an array A. The array is described below:

- $A_0 = 1$

- $A_x = A_{x-1} \oplus x$ for $x > 0$ ($\oplus$ is symbol of XOR)

First few elements of the array are $[1, 0, 2, 1, 5, 0, 6, 1, 9]$.

Given a range $[L, R]$, find the **AND** of all the elements between A_L and A_R (inclusive), i.e. You need to find $A_L \& A_{L+1} \& A_{L+2} \& \ldots \& A_R$ where $\&$ is the symbol of bitwise **AND** operator.

Input

First line will contain an integer number T ($1 \le T \le 100000$), denoting number of test cases. Each of the next T lines contains one test case. Each test case will contain two integers L and R ($0 \le L \le R \le 10^{15}$).

Output

For each case, print the answer in a single line.

Sample Input

```
2
2 4
2 2
```

Sample Output

```
0
2
```