

We are going to generate a sequence of integers in binary. Start with the sequence

```

0
1
—

```

Reflect it in the horizontal line, prepend a zero to the numbers in the top half and a one to the numbers on the bottom and you will get

```

00
01
11
10

```

Repeat this again, and you will have 8 numbers

```

000 0
001 1
011 3
010 2
110 6
111 7
101 5
100 4

```

The corresponding decimal values are shown on the right.

These sequences are called Reflected Gray Codes for 1, 2 and 3 bits respectively. A Gray Code for  $n$  bits is a sequence of  $2^n$  different  $n$ -bit integers with the property that every two neighbouring integers differ in exactly one bit. A Reflected Gray Code is a Gray Code constructed in the way shown above.

## Input

The first line of input gives the number of cases,  $N$  (at most 250000).  $N$  test cases follow. Each one is a line with 2 integers:  $n$  ( $1 \leq n \leq 30$ ) and  $k$  ( $0 \leq k < 2^n$ ).

## Output

For each test case, output the integer that appears in position  $k$  of the  $n$ -bit Reflected Gray Code.

## Sample Input

```

14
1 0
1 1
2 0
2 1
2 2
2 3
3 0
3 1
3 2
3 3
3 4
3 5
3 6
3 7

```

## Sample Output

```

0
1
0
1
3
2
0
1
3
2
6
7
5
4

```