11173   Grey Codes

Gray hair is God's graffiti.

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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
```