The Equation

Problem

The laws of the universe can be represented by an array of **N** non-negative integers. The i-th of these integers is A_i.

The universe is *good* if there is a non-negative integer k such that the following equation is satisfied: $(A_1$ xor k$) + (A_2$ xor k$) + ... (A_N$ xor k$) \le$ **M**, where xor denotes the [bitwise exclusive or](#).

What is the largest value of k for which the universe is good?

Input

The first line of the input gives the number of test cases, **T**. **T** test cases follow. Each test case begins with a line containing the two integers **N** and **M**, the number of integers in **A** and the limit on the equation, respectively.

The second line contains **N** integers, the i-th of which is A_i, the i-th integer in the array.

Output

For each test case, output one line containing `Case #x: y`, where `x` is the test case number (starting from 1) and `y` is the largest value of k for which the universe is good, or `-1` if there is no such k.

Limits

Time limit: 15 seconds per test set.
Memory limit: 1GB.
$1 \le$ **T** ≤ 100.
$1 \le$ **N** ≤ 1000.

Test set 1 (Visible)

$0 \le$ **M** ≤ 100.
$0 \le$ **A$_i$** ≤ 100, for all i.

Test set 2 (Hidden)

$0 \le$ **M** $\le 10^{15}$.
$0 \le$ **A$_i$** $\le 10^{15}$, for all i.

Sample

Sample Input	Sample Output

```
4
3 27
8 2 4
4 45
30 0 4 11
1 0
100
6 2
5 5 1 5 1 0
```

```
Case #1: 12
Case #2: 14
Case #3: 100
Case #4: -1
```

In sample case #1, the array contains **N** = 3 integers and **M** = 27. The largest possible value of k that gives a good universe is 12 ((8 xor 12) + (2 xor 12) + (4 xor 12) = 26).

In sample case #2, the array contains **N** = 4 integers and **M** = 45. The largest possible value of k that gives a good universe is 14 ((30 xor 14) + (0 xor 14) + (4 xor 14) + (11 xor 14) = 45).

In sample case #3, the array contains **N** = 1 integer and **M** = 0. The largest possible value of k that gives a good universe is 100 (100 xor 100 = 0).

In sample case #4, there is no value of k that gives a good universe, so the answer is -1.