5006 Binary Number

For 2 non-negative integers x and y, $f(x, y)$ is defined as the number of different bits in the binary format of x and y. For example, $f(2, 3) = 1$, $f(0, 3) = 2$, $f(5, 10) = 4$.

Now given 2 sets of non-negative integers A and B, for each integer b in B, you should find an integer a in A such that $f(a, b)$ is minimized. If there are more than one such integers in set A, choose the smallest one.

Input

The first line of the input is an integer T $(0 < T \leq 100)$, indicating the number of test cases. The first line of each test case contains 2 positive integers m and n $(0 < m, n \leq 100)$, indicating the numbers of integers of the 2 sets A and B, respectively. Then follow $(m + n)$ lines, each of which contains a non-negative integers no larger than 1000000. The first m lines are the integers in set A and the other n lines are the integers in set B.

Output

For each test case you should output n lines, each of which contains the result for each query in a single line.

Sample Input

```
2
2 5
1
2
1
2
3
4
5
5 2
1000000
9999
1423
3421
0
13245
353
```

Sample Output

```
1
2
1
1
1
9999
```

```
0
```