Taman is excited to announce that he has learnt bitwise **AND** operation. His Big Sister Titly has given him a sequence of non-negative integers $x_1, x_2, \ldots, x_n$ as key. To test that whether Taman knows bitwise **AND** operation or not, Taman is asked to find maximum value among all (a **AND** x_i) where $1 \leq i \leq N$. But their youngest sister Tamanna is not happy with this. She adds another condition that for a given sequence, Taman has to answer Q queries instead of just one. Can you help poor Taman?

Note: Expression x **AND** y means applying the operation of bitwise **AND** to numbers x and y. This operation exists in all modern programming languages, for example, in language C++ and Java it is marked as "&".

Input

First line of input will contain the number of test cases, $T \leq 5$. Then T test cases follow. First line of each test case contains two integers N ($1 \leq N \leq 100000$) and Q ($1 \leq Q \leq 30000$) separated by a single space. Next line contains N integers $x_1, x_2, \ldots, x_n$ separated by a single space ($0 \leq x_i < 10^9$). Each of next Q lines describes a query which consists of a single integer a ($0 \leq a < 230$).

Output

For each query output a single integer, the maximum value of (a **AND** x_i) where $1 \leq i \leq N$.

Sample Input

```
1
3 3
1 2 3
10
11
12
```

Sample Output

```
2
3
0
```