

Sequence Operations

Input file: **standard input**
Output file: **standard output**
Time limit: **2 seconds**
Memory limit: **512 megabytes**

Given a sequence of n non-negative integers a_1, a_2, \dots, a_n , and two sequences of length m , c_1, c_2, \dots, c_m and x_1, x_2, \dots, x_m . **It is guaranteed that all x_i are positive integers.**

You need to perform m operations in order from 1 to m . In the i -th operation, you modify the current sequence a based on the value of c_i :

- If $c_i = 1$, you must perform $a_j \leftarrow \text{mex}(a_j, x_i)$ for all a_j .
- If $c_i = 2$, you must perform $a_j \leftarrow \text{gcd}(a_j, x_i)$ for all a_j .
- If $c_i = 0$, you can **freely choose** to perform either of the two operations mentioned above.

After all m operations are completed, determine whether it is possible to make all elements in sequence a equal.

Additional notes regarding the mex and gcd operations are as follows:

- The binary operation $\text{mex}(u, v)$ is defined as the smallest non-negative integer that is not equal to u and not equal to v . For example: $\text{mex}(0, 1) = 2$, $\text{mex}(2, 2) = 0$.
- For the greatest common divisor gcd, it is specifically defined that $\text{gcd}(0, x) = x$.

Input

The input contains multiple test cases. The first line contains an integer T ($1 \leq T \leq 10^4$), the number of test cases.

For each test case:

- The first line contains two integers n, m ($1 \leq n, m \leq 3 \times 10^5$), representing the length of sequence a and the number of operations.
- The second line contains n non-negative integers a_1, a_2, \dots, a_n ($0 \leq a_j \leq 10^9$), representing the initial sequence.
- The next m lines each contain two integers c_i, x_i ($0 \leq c_i \leq 2$, $1 \leq x_i \leq 10^9$), representing the type parameter and value parameter of the i -th operation.

It is guaranteed that across all test cases, $\sum n \leq 3 \times 10^5$ and $\sum m \leq 3 \times 10^5$.

Output

For each test case, output one line. If it is possible to make all numbers equal after all operations are finished, output “Yes”; otherwise, output “No”.

Example

standard input	standard output
3	Yes
8 6	No
3 1 4 1 5 9 2 6	Yes
0 1	
0 1	
0 4	
0 5	
0 1	
0 4	
3 1	
0 1 2	
1 1	
3 1	
0 1 2	
2 1	

Note

For the first test case: in the first operation, choose to apply the gcd operation, and the sequence becomes $[1, 1, 1, 1, 1, 1, 1, 1]$. In the following 5 operations, no matter which operation you choose, the elements of the sequence will always remain equal, so output “Yes”.

For the second test case: the only operation is $c_1 = 1, x_1 = 1$, so you can only choose the mex operation.

- $a_1 \leftarrow \text{mex}(0, 1) = 2$
- $a_2 \leftarrow \text{mex}(1, 1) = 0$
- $a_3 \leftarrow \text{mex}(2, 1) = 0$

The final sequence becomes $[2, 0, 0]$, and it is impossible to make all numbers equal, so output “No”.