RDDCCD

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

Prof. Chen has invented a new data structure that supports "Reverse Diagonal Digits, Calculate Common Divisor" (RDDCCD) operation. This operation reverses the digits of every single number on some diagonal of a matrix and calculates the greatest common divisor of all numbers in the matrix.

Reversing the digits of a number means to write the number down in decimal form and read the number from right to left. For example, 12345 should be changed into 54321, and 2748 should be changed into 8472.

However, this data structure is currently a trade secret. To break through the technological blockade, you decided to reinvent the data structure. Please write a program that can process the query efficiently.

Input

The first line contains two integers n, q ($1 \leq n \leq 1000, 1 \leq q \leq 10^6$), denoting the size of the matrix and the number of operations.

Each of the following n lines contains n integers a_{ij} ($1 \leq a_{ij} < 10^9, 1 \leq i, j \leq n$), denoting the numbers in the matrix. It is guaranteed that none of the numbers ends with 0.

Each of the following q lines contains a single character op_k and a single integer t_k ($op_k \in \{+, -\}, -n < t_k < 2n$), denoting an operation. If op_k is $+$, then this operation flips the digits of all a_{ij} such that $i + j = t_k$. Otherwise, this operation flips the digits of all a_{ij} such that $i - j = t_k$. It is guaranteed that at least one number is flipped in each operation.

Output

Output q lines, each containing an integer denoting the answer to each query.

Example

standard input	standard output
3 5 202 4 6 8 12 21 32 44 82 + 2 + 5 - 0 + 4 - 2	1 2 1 1 2