Demonstrational sequences

Input file:	standard input
Output file:	standard output
Time limit:	3 seconds
Memory limit:	1024 megabytes

Little Desprado2 learned how to calculate the Greatest Common Divisor (GCD) of two positive numbers a few days ago. One of the most famous algorithm in the history is the Euclidean Algorithm, which takes two positive integers x, y as input, calls itself recursively, and finally returns the GCD of them:

- If $y \neq 0$, return $\gcd(y, x \bmod y)$;
- Otherwise, return x.

Little Desprado2 doesn't think it is interesting enough since everybody knows it. Now, he wants demonstrate some properties of the GCD by generating some infinite sequences. He has two positive integers P and Q, and $Q|P$ is satisfied. Here $a|b$ means that a is a factor of b, that is, $b \bmod a = 0$. And he has k candidate pairs of **positive** numbers $\{(a_1, b_1), (a_2, b_2), ..., (a_k, b_k)\}$ to generate k infinite sequence, where the i-th sequence $\{x_{i,0},\ x_{i,1},\ x_{i,2},\ ...\}$ is generated by the following rules:

- $x_{i,0} = a_i$
- $x_{i,j} = x_{i,j-1}^2 + b_i\ (j > 0)$

He thinks that an infinite sequence $\{x_0,\ x_1,\ x_2,\ ...\}$ is *demonstrational*, if and only if there exists two integers u and v $(0 \leq v < u)$ such that $\gcd(x_u - x_v, P) = Q$. Here $\gcd(a, b)$ denotes the greatest common divisor of a and b.

For each infinite sequences, Little Desprado2 wants you to tell him whether it is *demonstrational*.

Input

The first line contains three integers P, Q, k $(1 \leq P \leq 2^{32} - 1,\ 1 \leq Q \leq 2^{20},\ 1 \leq k \leq 200)$. It's guaranteed that $Q|P$ is satisfied.

Then follows k lines. The i-th line contains two integers a_i and b_i $(1 \leq a_i,\ b_i \leq 2^{64} - 1)$, denoting the i-th pair of numbers.

Output

Print a 0/1 string of length k. The i-th character is 1 if the i-th infinite sequence is *demonstrational*, 0 otherwise.

Examples

standard input	standard output
15 5 5 1 1 1 2 2 4 4 8 8 16	11010
998244352 1048576 3 2022 924 12345678 1234567 23333333 6666666	001

Note

In the first example,

- The first infinite sequence $\{x_{1,0}, x_{1,1}, x_{1,2}, \dots\}$ is $\{1, 2, 5, 26, \dots\}$, so there is $u = 3, v = 0$ satisfied $\gcd(x_u - x_v, P) = \gcd(26 - 1, 15) = 5 = Q$. Therefore, the first sequence is *demonstrational*.
- The second infinite sequence is *demonstrational*, and one of the solutions is $u = 2, v = 0$.
- The fourth infinite sequence is also *demonstrational*, and one of the solutions is $u = 2, v = 1$.
- It can be proved that the third and the fifth infinite sequence is not *demonstrational*.