Inverse Knapsack

Input file:	`standard input`
Output file:	`standard output`
Time limit:	3 seconds
Memory limit:	256 megabytes

For his number theory homework, Busy Beaver is given T pairs of a large prime p and an integer x. For each pair, Busy Beaver needs to find a subset of $\{1, \frac{1}{2}, \frac{1}{3}, \cdots, \frac{1}{5000}\}$ of size at most S whose sum is equal to x modulo p. Can you help him find such subsets?

A rational number $\frac{a}{b}$ is equal to x modulo p if $a \equiv bx \pmod{p}$.

Input

The first line contains two integers T and S ($1 \le T \le 1000$, $150 \le S \le 5000$), indicating the number of testcases and the maximum size of the subset.

Each of the next T lines contains two integers p and x ($10^8 \le p \le 10^{18}$, $0 \le x \le p-1$), where p is prime.

Output

For each testcase, output one line indicating the answer. Start with some integer k ($0 \le k \le S$), indicating the size of the subset, and then follow with k distinct integers $a_1, \ldots, a_k$ in increasing order ($1 \le a_1 < a_2 < \cdots < a_k \le 5000$).

Your output should satisfy $\frac{1}{a_1} + \frac{1}{a_2} + \cdots + \frac{1}{a_k} \equiv x \pmod{p}$.

It can be proven that for all p, x satisfying the input constraints, such a subset always exists.

Scoring

- (10 points) $T \le 10$, $p \le 10^9$.
- (20 points) $T \le 10$, $p \le 10^{15}$, $S = 5000$.
- (30 points) $S = 5000$.
- (40 points) No additional constraints.

Example

standard input	standard output
4 150 998244353 0 1000000007 1 1000000007 500000004 1000000007 642833014	0 1 1 1 2 3 1 19 2025

Note

In the first test case, the empty subset sums to $x = 0$ modulo $p = 998244353$.

In the second test case, $\frac{1}{1} \equiv 1 \pmod{1000000007}$.

In the third test case, $\frac{1}{2} \equiv 500000004 \pmod{1000000007}$.

In the fourth test case, $\frac{1}{1} + \frac{1}{19} + \frac{1}{2025} \equiv 642833014 \pmod{1000000007}$.