Extended Fermat Theorem

In number theory, Fermat's Last Theorem (sometimes called Fermat's conjecture) states that no three positive integers a, b and c satisfy the equation $a^n + b^n = c^n$ for any integer value of n greater than 2. This problem had been unsolved for 358 years until the first successful proof was released in 1994 by Andrew Wiles.

In this problem, we are going to solve an extended version of the Fermat's Last Theorem:

Given a sequence of $n + 1$ **distinct primes** $a_1, a_2, \ldots, a_n, a_{n+1}$ and an integer p. You need to find $n + 1$ **positive** integers $x_1, x_2, \ldots, x_n, x_{n+1}$ such that:

- $x_i < p$,
- $\sum_{i=1}^{n} x_i^{a_i} \equiv x_{n+1}^{a_{n+1}} \pmod p$.

Input

Each test contains multiple test cases. The first line contains the number of test cases τ ($1 \leq \tau \leq 100$). The description of the test cases follows.

- The first line contains two integers n and p ($1 \leq n \leq 10^5$, $10^9 \leq p \leq 10^{18}$).
- The second line contains $n + 1$ integers $a_1, a_2, \ldots, a_n, a_{n+1}$ ($1 \leq a_i \leq 10^9$).

It is guaranteed that the sum of n over all test cases does not exceed 10^5.

Output

For each test case, print one line containing $n + 1$ integers $x_1, x_2, \ldots, x_n, x_{n+1}$ ($0 < x_i < p$).

If there is no solution, print `NO SOLUTION` instead.

If there are multiple solutions, you can output any of them.

Sample Input 1	Sample Output 1
1 4 1000000009 3 5 7 11 2	1 1 1 1 2

Sample Explanation

$1^3 + 1^5 + 1^7 + 1^{11} \equiv 2^2 \pmod{1000000009}$

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