

Given an integer, your task is to find the number, sum and product of its divisors. As an example, let us consider the number 12:

- the number of divisors is 6 (they are 1, 2, 3, 4, 6, 12)
- the sum of divisors is $1 + 2 + 3 + 4 + 6 + 12 = 28$
- the product of divisors is $1 \cdot 2 \cdot 3 \cdot 4 \cdot 6 \cdot 12 = 1728$

Since the input number may be large, it is given as a prime factorization.

Input

The first line has an integer n : the number of parts in the prime factorization.

After this, there are n lines that describe the factorization. Each line has two numbers x and k where x is a prime and k is its power.

Output

Print three integers modulo $10^9 + 7$: the number, sum and product of the divisors.

Constraints

- $1 \leq n \leq 10^5$
- $2 \leq x \leq 10^6$
- each x is a distinct prime
- $1 \leq k \leq 10^9$

Example

Input:

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2
2 2
3 1
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Output:

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6 28 1728
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