7539 Antichains

Given an integer N, let F_N be the set of factors of N. e.g., $F_6 = \{1, 2, 3, 6\}$.

The radical of an integer N, denoted by $rad(N)$, is defined as the product of the distinct prime factors of N. E.g., $rad(12) = 2 * 3 = 6$.

Define an *antichain* of a set S of integers to be a subset of S such that for any two elements x and y in the antichain, $rad(x)$ and $rad(y)$ do not divide each other. e.g., antichains in F_6 are $\{\}$, $\{1\}$, $\{2\}$, $\{3\}$, $\{6\}$ and $\{2, 3\}$.

Given N, find the size of the largest antichain of F_N, and the number of antichains of F_N of that size. Since the answers can be large, print both of them modulo $(10^9 + 7)$. E.g., if $N = 6$, the largest antichain is of size 2, and there is only 1 antichain of that size.

Since N can be large, the input is the prime factorization of N. The input has two arrays of size M: $base$ and $power$, and

$$N = base_1^{power_1} * base_2^{power_2} * \ldots * base_M^{power_M}$$

Input

- The first line contains T, the number of test cases. Description of the T test cases follows.
- Each test case starts with a single integer M.
- The next M lines each contain 2 integers separated by a space. The i-th line contains $base_i$ and $power_i$.

Output

- For each test case, output one line containing two space-separated integers, respectively the size of the largest antichain modulo $(10^9 + 7)$ and the number of antichains of that size, again modulo $(10^9 + 7)$.

Constraints:

- $1 \leq M \leq 10^9$
- $2 \leq base_i \leq 10^9$
- $1 \leq power\_i \leq 10$
- $base_i$ is a prime number for all $1 \leq i \leq M$
- For any $1 \leq i \neq j \leq M$, $base_i \neq base_j$

Explanation:

Example case 1. The largest antichain size is 2, and there is only one of it {2,3}

Example case 2. The largest antichain size is 2, and there are two of those: {2,3} and {4,3}

Sample Input

```
2
2
2 1
3 1
2
2 2
3 1
```

Sample Output

```
2 1
2 2
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