Crossing the Border

Input file: *standard input*
Output file: *standard output*
Time limit: 5 seconds
Memory limit: 512 mebibytes

Kostya F. is crossing the border of a certain country, carrying n taxable items with him. Each item is characterized by two integers w_i and c_i: the weight of the item and the amount of tax that must be paid for transporting this item across the border.

Kostya needs to distribute all his items among several knapsacks. He can use any number of knapsacks. According to the airline's rules, the weight of each knapsack is limited, so the total weight of items inside each knapsack cannot exceed W.

There are special rules for customs fees. When customs officers are checking the luggage, they open each knapsack, and set the tax for it equal to the **maximum** tax rate among the items inside this knapsack. The total tax is the sum of individual taxes for all knapsacks.

For purely practical reasons, Kostya wants to know what is the minimum total tax he can pay in order to cross the border with all his items. Also, out of pure curiosity, he wants to know in how many different ways this minimum can be achieved. Help him. Since the number of ways can be very large, you should find it modulo 998 244 353.

Two ways to put items into knapsacks are considered the same if there is a bijection between knapsacks such that the corresponding knapsacks have exactly the same sets of items.

Input

The first line contains two integers: the number of items n and the maximum weight of one knapsack W ($1 \le n \le 22$; $1 \le W \le 5 \cdot 10^7$).

The next n lines describe the items. The i-th of them contains two integers: the weight w_i and tax c_i for item i ($1 \le w_i \le W$; $1 \le c_i \le 5 \cdot 10^7$).

Output

Print a line with two integers. The first must be the minimum total tax Kostya can pay. The second must be the number of ways to achieve that minimum, taken modulo 998 244 353.

Example

standard input	*standard output*
5 5 3 5 1 4 2 3 2 2 2 1	9 4

Note

In the example, there are 4 different ways to distribute items among knapsacks with total tax equal to 9 (items are numbered from 1 to 5):

- $[1, 3], [2, 4, 5]$: tax $5 + 4 = 9$
- $[1, 4], [2, 3, 5]$: tax $5 + 4 = 9$
- $[1, 5], [2, 3, 4]$: tax $5 + 4 = 9$
- $[1, 2], [3, 4], [5]$: tax $5 + 3 + 1 = 9$