

## F. Banners

time limit per test: 5 seconds  
memory limit per test: 512 megabytes  
input: standard input  
output: standard output

All modern mobile applications are divided into free and paid. Even a single application developers often release two versions: a paid version without ads and a free version with ads.

Suppose that a paid version of the app costs  $p$  ( $p$  is an integer) rubles, and the free version of the application contains  $c$  ad banners. Each user can be described by two integers:  $a_i$  — the number of rubles this user is willing to pay for the paid version of the application, and  $b_i$  — the number of banners he is willing to tolerate in the free version.

The behavior of each member shall be considered strictly deterministic:

- if for user  $i$ , value  $b_i$  is at least  $c$ , then he uses the free version,
- otherwise, if value  $a_i$  is at least  $p$ , then he buys the paid version without advertising,
- otherwise the user simply does not use the application.

Each user of the free version brings the profit of  $c \times w$  rubles. Each user of the paid version brings the profit of  $p$  rubles.

Your task is to help the application developers to select the optimal parameters  $p$  and  $c$ . Namely, knowing all the characteristics of users, for each value of  $c$  from 0 to  $(\max b_i) + 1$  you need to determine the maximum profit from the application and the corresponding parameter  $p$ .

### Input

The first line contains two integers  $n$  and  $w$  ( $1 \leq n \leq 10^5$ ;  $1 \leq w \leq 10^5$ ) — the number of users and the profit from a single banner. Each of the next  $n$  lines contains two integers  $a_i$  and  $b_i$  ( $0 \leq a_i, b_i \leq 10^5$ ) — the characteristics of the  $i$ -th user.

### Output

Print  $(\max b_i) + 2$  lines, in the  $i$ -th line print two integers:  $pay$  — the maximum gained profit at  $c = i - 1$ ,  $p$  ( $0 \leq p \leq 10^9$ ) — the corresponding optimal app cost. If there are multiple optimal solutions, print any of them.

### Examples

input
2 1 2 0 0 2
output
0 3 3 2 4 2 2 2

input
3 1 3 1 2 2 1 3
output
0 4 3 4 7 3

