

PROBLEMS SUBMIT STATUS STANDINGS CUSTOM TEST

E. Mr. Kitayuta vs. Bamboos

time limit per test: 2 seconds
 memory limit per test: 256 megabytes
 input: standard input
 output: standard output

Mr. Kitayuta's garden is planted with n bamboos. (Bamboos are tall, fast-growing tropical plants with hollow stems.) At the moment, the height of the i -th bamboo is h_i meters, and it grows a_i meters at the end of each day.

Actually, Mr. Kitayuta hates these bamboos. He once attempted to cut them down, but failed because their stems are too hard. Mr. Kitayuta have not given up, however. He has crafted Magical Hammer with his intelligence to drive them into the ground.

He can use Magical Hammer at most k times during each day, due to his limited Magic Power. Each time he beat a bamboo with Magical Hammer, its height decreases by p meters. If the height would become negative by this change, it will become 0 meters instead (it does not disappear). In other words, if a bamboo whose height is h meters is beaten with Magical Hammer, its new height will be $\max(0, h - p)$ meters. It is possible to beat the same bamboo more than once in a day.

Mr. Kitayuta will fight the bamboos for m days, starting today. His purpose is to minimize the height of the tallest bamboo after m days (that is, m iterations of "Mr. Kitayuta beats the bamboos and then they grow"). Find the lowest possible height of the tallest bamboo after m days.

Input

The first line of the input contains four space-separated integers n, m, k and p ($1 \leq n \leq 10^5$, $1 \leq m \leq 5000$, $1 \leq k \leq 10$, $1 \leq p \leq 10^9$). They represent the number of the bamboos in Mr. Kitayuta's garden, the duration of Mr. Kitayuta's fight in days, the maximum number of times that Mr. Kitayuta beat the bamboos during each day, and the power of Magic Hammer, respectively.

The following n lines describe the properties of the bamboos. The i -th of them ($1 \leq i \leq n$) contains two space-separated integers h_i and a_i ($0 \leq h_i \leq 10^9$, $1 \leq a_i \leq 10^9$), denoting the initial height and the growth rate of the i -th bamboo, respectively.

Output

Print the lowest possible height of the tallest bamboo after m days.

Examples

input

Copy

```
3 1 2 5
10 10
10 10
15 2
```

output

Copy

```
17
```

input

Copy

```
2 10 10 1000000000
0 10
0 10
```

output

Copy

```
10
```

input

Copy

```
5 3 3 10
9 5
9 2
4 7
```

Codeforces Round #286 (Div. 2)

Finished

Practice



→ Virtual participation

Virtual contest is a way to take part in past contest, as close as possible to participation on time. It is supported only ACM-ICPC mode for virtual contests. If you've seen these problems, a virtual contest is not for you - solve these problems in the archive. If you just want to solve some problem from a contest, a virtual contest is not for you - solve this problem in the archive. Never use someone else's code, read the tutorials or communicate with other person during a virtual contest.

Start virtual contest

→ Clone Contest to Mashup

You can clone this contest to a mashup.

Clone Contest

→ Submit?

Language: GNU G++11 5.1.0

Choose file: 未选择任何文件

Be careful: there is 50 points penalty for submission which fails the pretests or resubmission (except failure on the first test, denial of judgement or similar verdicts). "Passed pretests" submission verdict doesn't guarantee that the solution is absolutely correct and it will pass system tests.

Submit

→ Problem tags

No tag edit access

→ Contest materials

- Announcement
- Tutorial

9 10
3 8

output

Copy

14

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