

# USA Computing Olympiad



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## USACO 2023 DECEMBER CONTEST, SILVER PROBLEM 1. BOVINE ACROBATICS

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Contest has ended.

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English (en) ▼

Farmer John has decided to make his cows do some acrobatics! First, FJ weighs his cows and finds that they have  $N$  ( $1 \leq N \leq 2 \cdot 10^9$ ) distinct weights. In particular, for each  $i \in [1, N]$ ,  $a_i$  of his cows have a weight of  $w_i$  ( $1 \leq a_i \leq 10^9, 1 \leq w_i \leq 10^9$ ).

His most popular stunt involves the cows forming *balanced towers*. A *tower* is a sequence of cows where each cow is stacked on top of the next. A tower is *balanced* if every cow with a cow directly above it has weight at least  $K$  ( $1 \leq K \leq 10^9$ ) greater than the weight of the cow directly above it. Any cow can be part of at most one balanced tower.

If FJ wants to create at most  $M$  ( $1 \leq M \leq 10^9$ ) balanced towers of cows, at most how many cows can be part of some tower?

### INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains three space-separated integers,  $N$ ,  $M$ , and  $K$ .

The next  $N$  lines contain two space-separated integers,  $w_i$  and  $a_i$ . It is guaranteed that all  $w_i$  are distinct.

### OUTPUT FORMAT (print output to the terminal / stdout):

Output the maximum number of cows in balanced towers if FJ helps the cows form towers optimally.

### SAMPLE INPUT:

```
3 5 2
9 4
7 6
5 5
```

### SAMPLE OUTPUT:

```
14
```

FJ can create four balanced towers with cows of weights 5, 7, and 9, and one balanced tower with cows of weights 5 and 7.

### SAMPLE INPUT:

```
3 5 3
5 5
7 6
9 4
```

### SAMPLE OUTPUT:

```
9
```

FJ can create four balanced towers with cows of weights 5 and 9, and one balanced tower with a cow of weight 7. Alternatively, he can create four balanced towers with cows of weights 5 and 9, and one balanced tower with a cow of weight 5.

### SCORING:

- In inputs 3-5,  $M \leq 5000$  and the total number of cows does not exceed 5000.
- In inputs 6-11, the total number of cows does not exceed  $2 \cdot 10^5$ .
- Inputs 12-17 have no additional constraints.

Problem credits: Eric Hsu

Contest has ended. No further submissions allowed.

