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Senior Group

Task A3. RAIN AGAIN

Elly is really proud of her terrace, because she has an L by L pot of beautiful flowers there. The girl and Stancho often sit and watch the flowers while talking. Whenever it starts raining, though, Elly stops listening to the boy and concentrates on where the water drops fall. If at any time during the rain at least one rain drop has fallen *strictly* inside each W by H rectangle within the pot, the girl considers the flowers well-watered and again starts paying attention to Stancho. Please note that the rectangle should have sides parallel to the sides of the flower pot. More precisely, the side of the rectangle with length W should be parallel to the abscissa (X-coordinate) and the one with length H should be parallel to the ordinate (Y-coordinate). Now Stancho is interested when the girl will start again to listen to him. Help him by finding when this will happen.

It is assumed that the upper surface of the flower pot (a square with dimensions $L \times L$) is situated in a coordinate system, and its corners are with coordinates $(0,0)$, $(0,L)$, (L,L) and $(L,0)$. During the rain in the flower pot fall N rain drops in total.

Write a program **ragain**, which defines, whether the flowers will be watered and, if yes, after which drop will this happen.

Input:

On the first line of the standard input will be given the integers N , L , W , and H – the number of rain drops that have fallen inside the pot during the rain, the length of the sides of the pot, and the lengths of the rectangles Elly is interested in. Each of the following N lines will contain two integers X_i and Y_i , giving the coordinates of the rain drops, in the order they have fallen.

Output:

On a single line of the standard output print one integer – the number of rain drops that fall before Elly considers her flowers well-watered. If even after all N drops there is a rectangle with the described properties that has no water drop *strictly* inside it, print -1 instead.

Constraints:

- ❖ $1 \leq N \leq 100\,000$
- ❖ $1 \leq L \leq 1\,000\,000\,000$
- ❖ $1 \leq W, H \leq L$
- ❖ $0 \leq X_i, Y_i \leq L$

Grading:

Each test case is scored separately.

- ❖ In test cases worth approximately 30 points $L \leq 500$
- ❖ In test cases worth approximately 50 points $N \leq 2\,000$
- ❖ In test cases worth approximately 70 points $N \leq 20\,000$

Example:

Input	Output
14 10 5 4 3 4 0 2 5 1 10 10 4 0 8 7 2 7 6 5 9 2 7 3 5 8 6 5 4 2 3 6	13

Explanation: After the 13-th drop falls in $(4, 2)$ no more sub-rectangles of size 5 by 4 remain without a drop strictly inside them.