

WINTER II

Elsa has accidentally frozen the entire planet, plunging it into winter! The planet can be represented as an infinite 2D grid where each position has integer coordinates (x, y) , with x -coordinates increasing from west to east and y -coordinates increasing from south to north.

The planet has N patches of land, the i th of which is located at cell (x_i, y_i) . All other grid cells used to be ocean and are now covered in ice. Elsa is currently at the 1st patch of land and needs to return to Arendelle at the N th patch of land for her coronation. With the ocean frozen, the most efficient method of travel is ice skating.

Elsa can move by choosing a *cardinal direction* (north, south, east, or west) to skate in. She will then travel in that direction until she reaches another patch of land. Elsa will then keep selecting cardinal directions to skate until she arrives at Arendelle. However, if she chooses a direction without a patch of land, she will skate endlessly and miss her coronation!

The distance between two cells (x_i, y_i) and (x_j, y_j) is defined as $|x_i - x_j| + |y_i - y_j|$ ¹. What is the minimum total distance that Elsa must skate to get from patch 1 to patch N , or is it impossible? Partial marks will be awarded for just determining whether Elsa can reach patch N . See the scoring section for details.

Subtasks and Constraints

For all subtasks:

- $2 \leq N \leq 200\,000$.
- $0 \leq x_i, y_i \leq 30\,000$ for all i .
- All patches of land are at different locations.

Additional constraints for each subtask are given below.

Subtask	Points	Additional constraints
1	50	$N \leq 1\,000$. Additionally, $x_i, y_i \leq 1\,000$ for all i .
2	50	No additional constraints.

Input

- The first line of input contains the integer N .
- The next N lines describe the patches of land. The i th line contains two integers x_i and y_i .

Output

Output a single integer, the minimum total distance that Elsa must skate to get from patch 1 to patch N . If it is impossible for Elsa to reach patch N , you should output -1 instead.

¹The notation $|a|$ denotes the absolute value of a . The absolute value of a number is equivalent to its distance from 0. For example, $|a| = |-a| = a$.

Scoring

You will receive 50% for just determining whether or not Elsa can reach patch N . In particular:

- If your output is correct, you will receive 100% for that test case. Otherwise,
- If the correct output is -1 and your output is incorrect, you will receive 0% for that test case. Otherwise,
- If the correct output is not -1 and your output is -1 , you will receive 0% for that test case. Otherwise,
- You will receive 50% for that test case.

Note that you must output a single integer, or you will receive 0%.

Your score for a subtask will be the **minimum** score of all test cases in the subtask, multiplied by the number of points you can score in the subtask.

Sample Input 1

```
6
1 0
0 1
3 2
2 1
3 0
0 2
```

Sample Output 1

```
7
```

Sample Input 2

```
6
0 3
1 0
3 1
0 0
1 2
4 2
```

Sample Output 2

```
9
```

Sample Input 3

```
3
3 2
1 3
1 0
```

Sample Output 3

```
-1
```

Explanation

In the following diagrams, Elsa's starting patch of land is denoted by a circle, and Arendelle is denoted by a cross. Elsa's movements are denoted by red arrows. Each arrow contains an integer representing the distance that Elsa travels while following the arrow.

In the first sample case, Elsa should skate between the patches as follows for a total distance of $2 + 2 + 3 = 7$.

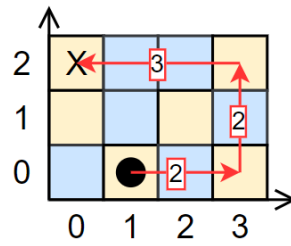


Figure 1: Sample Case 1

In the second sample case, Elsa should skate between the patches as follows for a total distance of $3 + 1 + 2 + 3 = 9$.

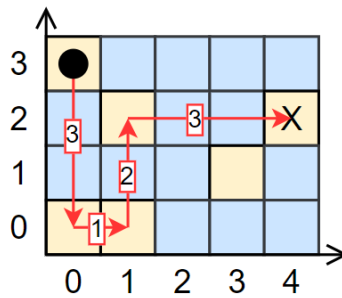


Figure 2: Sample Case 2

In the third sample case, if Elsa skates in any of the cardinal directions from the first patch of land, she will end up skating endlessly. Therefore, it is impossible for her to reach Arendelle and the answer is -1 .

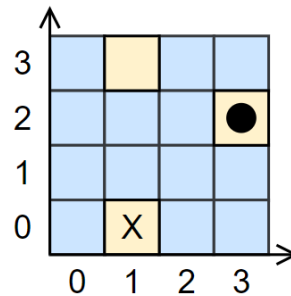


Figure 3: Sample Case 3