Task: CAT
Catventure

AACPP SuSe 2025 Round 4 Memory: 128MiB 2025.06.03 – 2025.06.17

Dexter is having a little adventure in the city. In the city there are n parks, and he wants to get from park 1 to park n. Dexter can travel between any two parks but, due to the city grid, he can only move in principal directions, i.e. **north**, **south**, **west** and **east**. If he wants to change direction he needs to take a $90°$ turn.

When travelling, Dexter alternates between a majestic stroll and a graceful sprint. Dexter loves to sprint, unfortunately he cannot maintain a sprint through a $90°$ turn. He leaves a park either sprinting or strolling, and then alternates to the other mode of travel at each turn until he reaches another park.

Dexter find sprinting fun and exciting, while strolls are kind of boring. Therefore, he wants to find a route to park n that **minimises the distance spent strolling**. He doesn't care about the overall length of the route or the number of visited parks. Help Dexter find this minimal distance!

Input

The first line of input contains one integer n the number of parks in the city.

The next n lines contain the coordinates of the parks. The i-th line contains two integers x_i, y_i defining the position of the park as a point on the city grid.

Output

Your program should write one line to the standard output – the minimal distance Dexter has to spend strolling while travelling from park 1 to park n.

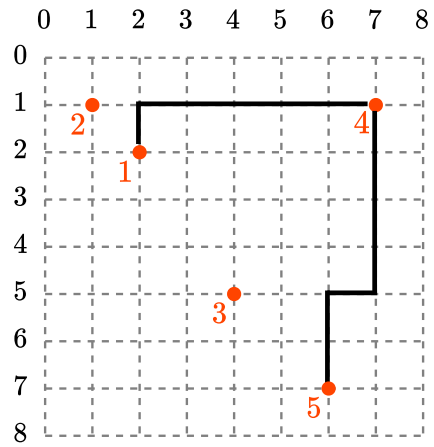
Example

For the input:

```
5
2 2
1 1
4 5
7 1
6 7
```

the correct output is:

```
2
```



Dexter first travels to park 4. He strolls *north* for 1 unit of distance and then turns *east*, changing to a sprint and covering the remaining 5 units of distance. He rests in the park and can choose any mode of travel when departing, so he decides to sprint *south* for 4 units, then turns and strolls *west* 1 unit, and turns for the last time to sprint 2 units *south*, reaching the destination. He strolled for a total of 2 units. There are other routes that achieve the same result, but no routes that allow him to stroll for fewer than 2 units of distance.

Additional examples

The following initial tests are also available:

- `0b` – small sample, $n = 6$;
- `0c` – $n = 100$, $x_i = y_i = i$;
- `0d` – $n = 1\,996$, parks are located on a square with 1 on top-left and n on bottom-right corner;
- `0e` – $n = 200\,000$, $x_i = 21i, y_i = 37i$ for even i, $x_i = 37i, y_i = 21i$ for odd i.

Limits

Your solution will be evaluated on a number of hidden test cases divided into groups. Points for a group are awarded if and only if the submission returns the correct answer for each of the tests in the group within the allotted time limit. These groups are organised into subtasks with the following limits and points awarded.

Subtask	Limits	Points
1.	$1 \le n \le 100$, $0 \le x_i, y_i \le 10\,000$	1
2.	$1 \le n \le 2\,000$, $1 \le x_i, y_i \le 1\,000\,000\,000$	3
3.	$1 \le n \le 200\,000$, $1 \le x_i, y_i \le 1\,000\,000\,000$	6