2020 SPYCRAFT

The spies of *Alpha Complex* have been practicing the art of surreptitiously meeting their contacts. The *Alpha Complex* training ground has been laid out as a grid and each contact has a rectangular area where they are prepared to engage in covert operations. Ever keen to show their superiority over other spies, given a sequence of contacts to visit, a spy will try to minimise the amount of time their training takes.

The area where a contact engages in covert operations is defined by the co-ordinates of two diagonally opposite corners. A spy will meet their contacts in a specified order at positions dictated by the spy (but within the contacts' engagement rectangles). Contacts remain in hiding until it is time to meet a spy, so a spy passing through their position will not meet them unless the time is right.

Spies move in mysterious ways — ducking behind lamp posts, hiding in shadows and shadowing ducks — so it always takes exactly 1 unit of time to travel to any of the 8 immediately adjacent locations (horizontally, vertically or diagonally). Training starts the moment they meet the first contact and finishes as soon as they meet the last contact.

For example, if the contacts' engagement rectangles are (in order): (2,2)-(4,4), (5,2)-(6,1) and (2,2)-(2,2):

- A spy could choose to meet the contacts at (2,2), (6,1) and (2,2). This would take 4+4=8 units of time;
- Choosing to meet the contacts at (4,2), (5,2) and (2,2) takes 1+3=4 units of time.

SAMPLE INPUT

```
3
2 2 4 4
5 2 6 1
2 2 2 2
```

The first line of input will consist of a single integer, c ($2 \leq c < 2^{16}$), indicating the number of contacts. The next c lines will contain four integers, p_i, q_i, r_i, s_i ($-2^{40} < p_i, q_i, r_i, s_i < 2^{40}$) in order, indicating that the i^{th} contact's region is defined by (p_i, q_i), (r_i, s_i).

You should output a single integer indicating the minimum amount of time required to visit the contacts *in the order given*.

SAMPLE OUTPUT

```
4
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