

BALTIC OLYMPIAD IN INFORMATICS

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ENG

wormup

Cheer The Worm Up

Willi Worm has suffered from a lack of attention since Knut, the little polar bear, was born. His owner wants to cheer him up, so he surprises him by putting some of Willi's favourite stones in his cave. Unfortunately, the stones are quite big and Willi wants to know how long he may grow so that he still fits in his cave. Help him.

Willi's cave is a grid of 5×5 fields, some of which are occupied by stones. Each field can be denoted by a pair of coordinates (x, y) with (1, 1) in the upper left corner.

When grown to length n he needs to fit in his cave a sequence of fields x_1, \ldots, x_n with the following properties:

- Willi's favourite position is the lower left field of his cave, so he puts his head there: $x_1 = (1, 5)$.
- Fields x_i and x_{i+1} have one border in common for all $i = 1 \dots n 1$.
- $x_i \neq x_j$ for all $i \neq j$, which means that Willi does not intersect himself.
- Of course no field x_i is occupied by a stone.

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Figure 1: Willi and three stones in the cave.

Write a program that calculates for a given number of stones and their positions the maximum length Willi may grow to, so that he still fits in his cave.

Input

The input is read from a text file named wormup.in. The first line contains the number of stones M ($M \le 24$). The following M lines contain pairs of coordinates x y ($1 \le x, y \le 5$), giving the positions of the stones. You can assume that the lower left field (1, 5) is always empty and no two stones are placed on the same field.



Output

The output is written into a text file named wormup.out. The only line to be written contains the maximum length Willi may grow to, so that he still fits in his cave.

Example

wormup.in	wormup.out		
3	21		
2 2			
3 4			
4 3			