A group of Czech tourists is walking in a labyrinth of a strange self-similar shape. The ground plan of the labyrinth is a Sierpinski triangle - a fractal structure named after the Polish mathematician Wacław Sierpiński.

The labyrinth consists of a billion rows numbered from 0 to $10^{9}-1$ from top to bottom, and a billion columns numbered from 0 to $10^{9}-1$ from left to right. The fields in the labyrinth can be either free or blocked.

The field in row $X$ and column $Y$ is free if the result of the bitwise 'and' operation on the numbers $X$ and $Y$ is equal to zero, otherwise it is blocked. In other words, a field is blocked if, when $X$ and $Y$ are switched to binary, there is an integer $k$ such that the $k^{\text {th }}$ digit from the right of the number $X$ and the $k^{\text {th }}$ digit from the right of the number $Y$ are equal to 1.


The first 32 rows and columns of the labyrinth. The blocked fields are colored in black.
The Czech tourists are tired from a long day of wandering and would like to meet up in a free field and exchange experiences. In each step, one tourist can jump to one of the adjacent free fields (up, down, left or right).

Write a programme that will, based on the current tourists' locations, determine minimum total number of steps necessary in order for all the tourists to meet in the same field.

## INPUT

The first line of input contains an integer $N$ - the number of tourists. Each of the following $N$ lines contains two integers $R_{i}$ and $S_{i}$ - the row and column of the field where the $i^{\text {th }}$ tourist is located.

All the tourists are located in free fields, and it is possible that there are multiple tourists in the same field.

## OUTPUT

The first and only line of output must contain the required minimum number of steps.
Please note: We recommend that you use a 64-bit integer data type (int 64 in Pascal, long long in C/C ++ ).

SCORING

| subtask | subscore | constraints |
| :---: | :---: | :---: |
| 1 | 17 | $N=2$ |
| $0 \leqslant R_{K}, S_{K}<10^{9}$ |  |  |\(\left|\begin{array}{c}2 \leqslant N \leqslant 100 <br>

0 \leqslant R_{K}, S_{K}<10^{9}\end{array}\right|\)| $2 \leqslant N \leqslant 10^{5}$ |
| :---: |
| 2 |

## SAMPLE TESTS

| input | input |
| :---: | :---: |
| 2 | 6 |
| 21 | 25 |
| 43 | 34 |
|  | 87 |
|  | 96 |
|  | 105 |
|  | 114 |
| output | output |
| 6 | 50 |

Clarification of the first example: One of the fields where the brave Czech tourists could have met is (2, 0).
Clarification of the second example: One of the fields where the playful Czech tourists could have met is $(8,4)$.

