Perimeter Game

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	1024 megabytes

This is an interactive problem.

Chi and Ken will play a game with square tiles of dimensions 1×1.

Initially, there is a square tile on the plane, occupying $[0, 1] \times [0, 1]$. Here, $\times$ denotes the Cartesian product of two sets.

Chi and Ken will alternate moves, placing exactly one square tile on their move. Formally, the following happens on each player's move, and one turn consists of Chi's move and Ken's move.

- Select two integers i and j such that there is no square tile occupying $[i, i+1] \times [j, j+1]$, and **any one** of the following conditions holds;
  - There exists a square tile occupying $[i-1, i] \times [j, j+1]$.
  - There exists a square tile occupying $[i+1, i+2] \times [j, j+1]$.
  - There exists a square tile occupying $[i, i+1] \times [j-1, j]$.
  - There exists a square tile occupying $[i, i+1] \times [j+1, j+2]$.
- Then, they place a square tile occupying $[i, i+1] \times [j, j+1]$.

It can be shown that the square tiles cover a **connected region** at any point in time.

We define the **perimeter** of the connected region as follows:

- Let a be the number of pairs (i, j) such that there is a square tile occupying $[i, i+1] \times [j, j+1]$ but none for $[i, i+1] \times [j-1, j]$;
- Let b be the number of pairs (i, j) such that there is a square tile occupying $[i, i+1] \times [j, j+1]$ but none for $[i, i+1] \times [j+1, j+2]$;
- Let c be the number of pairs (i, j) such that there is a square tile occupying $[i, i+1] \times [j, j+1]$ but none for $[i-1, i] \times [j, j+1]$;
- Let d be the number of pairs (i, j) such that there is a square tile occupying $[i, i+1] \times [j, j+1]$ but none for $[i+1, i+2] \times [j, j+1]$;
- Then, the perimeter of the connected region is $a+b+c+d$. This value is always a positive integer.

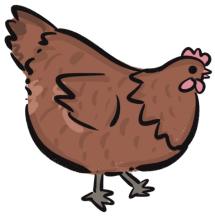
Chi and Ken will play the game for n turns, where **Chi goes first**. Chi's objective is to **maximize** the perimeter of the connected region, while Ken's objective is to **minimize** it.

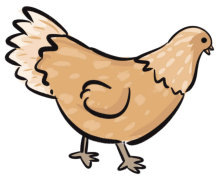
You are asked to **play as Ken** in this game. You must find the minimum integer x such that it is possible to make the perimeter never exceed x after n turns, and prove that you can make the perimeter never exceed x by playing against Chi.

Now, the game begins.

Input

The first line contains a single integer n ($1 \le n \le 10\,000$).





This area is *not intentionally blank*. Well, regardless, please enjoy the drawings of Chi and Ken.
What, are you asking why they are between the Input and the Output sections?
...Who said you can't do that?

Output

On the first line, you should output the minimum integer x such that it is possible to make the perimeter never exceed x after n turns.

Then, output the end of line, flush the output, and the interaction starts from the next line.

Interaction Protocol

On Chi's move, Chi selects two integers i and j satisfying the conditions stated above, and places a square tile on $[i, i+1] \times [j, j+1]$.

Then, you are given one line containing the two integers i and j.

On Ken's move, you must select two integers i and j satisfying the conditions stated above.

Then, you must output a line containing the two integers i and j, meaning that you will place a square tile on $[i, i+1] \times [j, j+1]$.

After you output a line, do not forget to output the end of line and flush the output. Otherwise, you may get an arbitrary verdict.

The turn stated above are repeated n times. After all n turns have been finished, you will receive an `Accepted` verdict if both conditions hold:

- The value of x is equal to the optimal objective value assuming Chi plays optimally (she might not play optimally in the interaction);
- The perimeter of the connected region after n turns is no greater than x.

Example

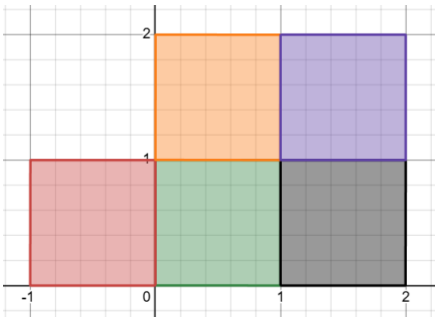
standard input	standard output
2 1 0 0 1	10 -1 0 1 1

Note

Do note that the example interaction might not contain the optimal strategy for either player.

For $n = 2$, it can be shown that it is possible to make the perimeter no greater than 10, regardless of Chi's strategy.

The connected region is as follows after $n = 2$ turns. This receives an `Accepted` verdict as the perimeter is exactly 10.



The connected region in the example interaction after $n = 2$ turns.