Problem J5: Square Pool

Problem Description

Ron wants to build a square pool in his square N-by-N yard, but his yard contains T trees. Your job is to determine the side length of the largest square pool he can build.

Input Specification

The first line of input will be an integer N with $N \geq 2$. The second line will be the positive integer T where $T < N^2$. The remaining input will be T lines, each representing the location of a single tree. The location is given by two positive integers, R and then C, separated by a single space. Each tree is located at row R and column C where rows are numbered from top to bottom from 1 to N and columns are numbered from left to right from 1 to N. No two trees are at the same location.

The following table shows how the available 15 marks are distributed.

Marks Awarded	Length/Width of Yard	Number of Trees
3 marks	$N \leq 50$	$T = 1$
5 marks	$N \leq 50$	$T \leq 10$
4 marks	$N \leq 500\,000$	$T \leq 10$
3 marks	$N \leq 500\,000$	$T \leq 100$

Output Specification

Output one line containing M which is the largest positive integer such that some M-by-M square contained entirely in Ron's yard does not contain any of the T trees.

Sample Input 1

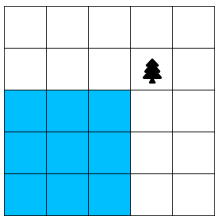
```
5
1
2 4
```

Output for Sample Input 1

3

Explanation of Output for Sample Input 1

A picture of the yard is below. The location of the tree is marked by 🌲 and one of several 3-by-3 squares that do not contain the tree is highlighted. All larger squares contain a tree.



La version française figure à la suite de la version anglaise.

Sample Input 2

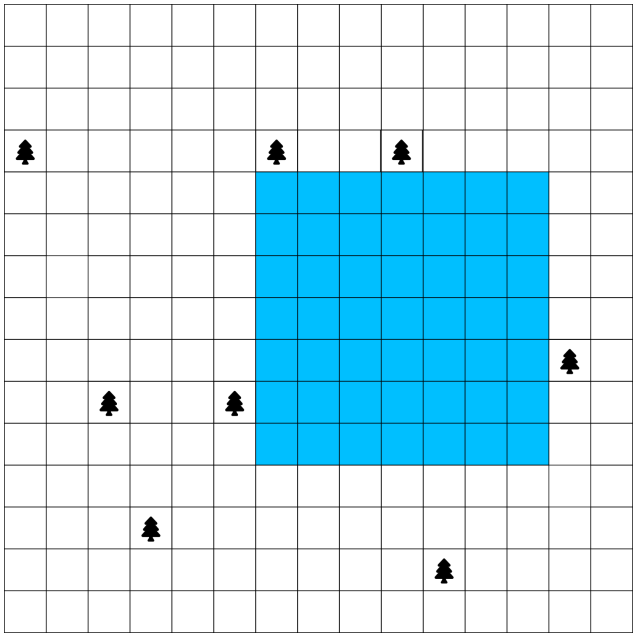
```
15
8
4 7
4 1
14 11
10 6
13 4
4 10
10 3
9 14
```

Output for Sample Input 2

7

Explanation of Output for Sample Input 2

A picture of the yard is below. The location of each tree is marked by 🌲 and one of several 7-by-7 squares that do not contain a tree is highlighted. All larger squares contain a tree.



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