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HS 2012
Exercise Sheet BGL Week IV

Algorithms Lab

Exercise 1 – *Knights*

After the Black Beast of Aaauugh has met its untimely demise in the middle of the cave of Caerbannog, the knights of the round table needed to leave the cave in order to continue their journey to the Castle of Uugggggh.

As in any proper movie however, the cave was quickly collapsing; every hallway segment *and intersection* collapsed after a single knight ran through it. On the way to the Gorge of Eternal Peril, Sir Bedevere was wondering why only so few knights made it out of the cave alive and if they couldn't have ran through the hallways in such a way that more of them would have survived.

Figure 1: A situation with three vertical and three horizontal hallways and 5 knights depicted by shields. (Second sample input)

Problem   Surprisingly, the cave of Caerbannog has a grid graph layout, where all the north-south (vertical when drawn on paper) hallways are numbered 0 to $m-1$ (from west to east), while the west-east (horizontal) hallways are numbered 0 to $n-1$ (from north to south). All hallways are connected to the outside on their ends. Knights start at the intersections given in the input file.

Every segment and intersection of a hallway that a knight passes through will collapse immediately behind him, in a movie-like fashion. Because two knights never arrive at an intersection at exactly the same time, every hallway intersection and hallway segment can only be used by a single knight. Note that the hallway intersection the knight starts in also collapses immediately. Find out how many knights can get to safety.

Input   The first line of the input contains t, the number of test cases. The first line for each test case will contain three numbers: m, n – the dimensions of the cave, and k, the number of knights in the cave. The next line will contain $2k$ numbers, with the $2i$-th and $(2i+1)$-th numbers denoting the x (column) and y (row) coordinates of the starting position of the knight i in the cave. You can expect each value t, m, and n to be less than 50.

Output   For every test case output a single line containing the maximum number of knights that can escape from the cave.
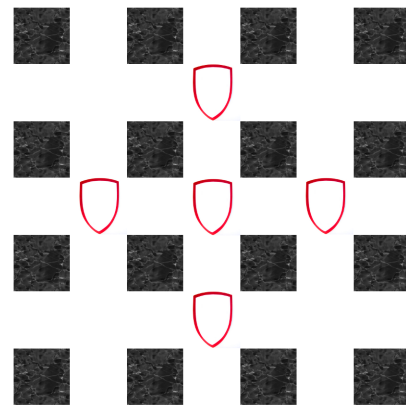
Sample Input

```
2
3 3 3
1 1 2 1 0 0
3 3 5
0 1 1 0 1 1 2 1 1 2
```

Sample Output

```
3
4
```