



Princeton Computer Science Contest 2021

Problem 3: Swiping Swag [HackerRank]

By Henry Tang

Twelve, a lost alien from the planet of Gobtropp, has been roaming planet Earth and stumbles into Dillon Gym the day of Princeton's career fair. She is immediately captivated and makes it her mission (as is many of yours) to secure as many items of swag as possible.

The row of tables she will attempt to swipe swag from are in a single row and are numbered 1 to n . She knows that she can't just walk past the tables normally, because a recruiter might stop her and strike up a conversation, which could blow her cover. Fortunately, she is endowed with really long arms (invisible, of course) that can reach tables within k or fewer tables from where she is standing. In other words, if Twelve is standing at table j , then she can reach for swag from any table in the range $[j - k, j + k]$. Since she can't just walk normally past the tables, she resolves only to use teleportation. However, her teleportation skills are a little rusty, so she only feels comfortable teleporting from certain tables to others. She also decides never to teleport backward, lest she see the same someone twice and have her cover blown.

Twelve wants to get swag from at least t different tables, starting from table 1. What is the minimum range k that Twelve's arms need to have so that she can fulfill her desire?

Input

The first line contains three integers n , m , and t , which represent the number of tables, the number of teleportation paths Twelve feels comfortable executing, and the minimum number of tables she wants to get swag from, respectively. The next m lines each contain two integers a and b , indicating that Twelve feels comfortable teleporting from a to b .

Output

Your program should output one integer, representing the minimum arm range she must have to accomplish her goal.

Constraints

You can assume that $1 \leq t \leq n \leq 10^5$ and $0 \leq m \leq n$. Furthermore, you can assume that for each line after the first, $a < b$.

See the next page for an example.

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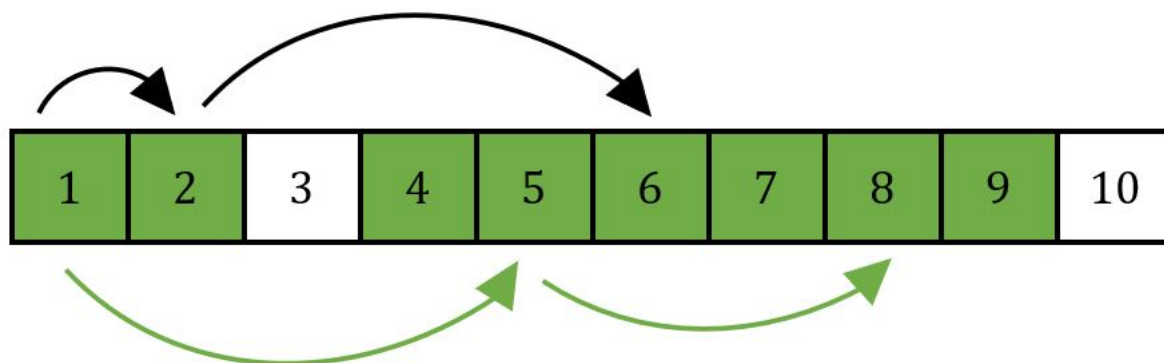
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Example 0



Input:

```
10 4 8
1 2
2 6
1 5
5 8
```

Output:

1

Explanation: If Twelve's arms only had range 0 (i.e. she could only take swag from the table where she was, like a normal person), then she would only be able to obtain swag from tables 1, 2, and 6 (or only from tables 1, 5, and 8). However, if her arms had range 1, then she could start at table 1 and obtain swag from tables 1 and 2, then teleport to table 5, obtain swag from tables 4, 5, and 6, and then finally teleport to table 8, where she can obtain swag from tables 7, 8, and 9. This is eight tables in total, and she is happy.

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