MIUP'14

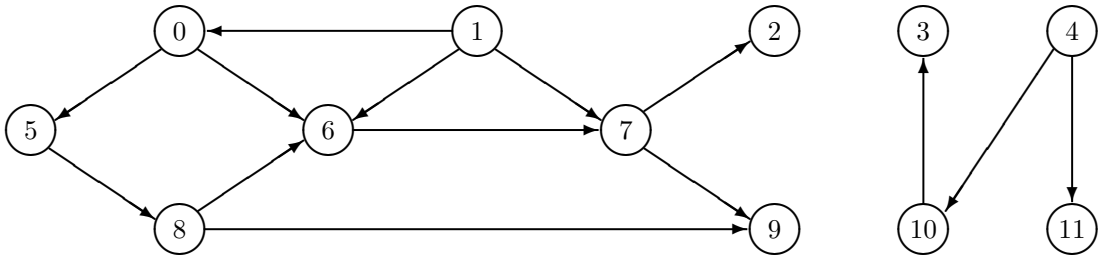
MARATONA INTER-UNIVERSITÁRIA DE PROGRAMAÇÃO

http://miup2014.github.io/

Problem H: Hard Weeks

A well-known high-tech company is starting a huge project. A detailed plan has already been done: it contains all tasks to be undertaken and specifies the precedence relation among them. Each task takes exactly one week to be performed. In order to shorten the duration of the whole project, every task will start as soon as possible, that is, immediately after all precedent tasks have been completed. Consequently, there may be weeks with several tasks to carry out. If the number of tasks to be performed in a single week is above a given *limit*, that week will be *hard* to everyone. So, employees want to know the maximum number of tasks to be performed in a single week and how many hard weeks will come.

In the project whose plan is depicted in the figure, there are 12 tasks. An arrow from task t_1 to task t_2 means that t_1 has to be concluded before t_2 starts.



The tasks to carry out in each week are shown in the table below. The maximum number of tasks to be performed in a single week is **3** (tasks 0, 10 and 11 in the second week). Besides, if the definition of hard week was a week with more than **1** task, there would be **4** hard weeks (the first three weeks and the last one).

Week	**Tasks**
1	1 and 4
2	0, 10 and 11
3	3 and 5
4	8
5	6
6	7
7	2 and 9

Task

Given a (consistent) plan of the project (with its tasks and the precedence relation among them) and a number L of tasks, the goal is to find out the maximum number of tasks to be performed in a single week and the number of hard weeks (i.e., the number of weeks with more than L tasks to carry out).

Input

The first line of the input has three integers: T, P, and L. T is the number of tasks, P is the number of (distinct) direct precedences among tasks, and L is the limit used in the definition of hard week. Tasks are identified by integers, ranging from 0 to $T - 1$.

Each of the following P lines contains two different integers, t_1 and t_2, which indicate that task t_1 has to be completed before task t_2 starts.

Integers in the same line are separated by a single space.

Constraints

$2 \leq T \leq 5\,000$	Number of tasks.
$1 \leq P \leq 300\,000$	Number of direct precedences.
$1 \leq L < T$	Limit used in the definition of hard week.

Output

The output has a single line with two integers, separated by a single space, which are the maximum number of tasks to be performed in a single week and the number of hard weeks, respectively.

Input example

```
12 14 1
0 5
0 6
1 0
1 6
1 7
7 2
5 8
8 9
10 3
8 6
4 10
7 9
4 11
6 7
```

Output example

```
3 4
```