4711 Disaster Recovery Plans

ForwardProgess.com is a huge future studies think tank. An exhaustive internal study indicates that the company is weak in disaster preparedness. A deep backlog of externally funded studies prevents the firm from allocating internal resources to prepare a Disaster Recovery Plan (DRP). As a result, ForwardProgess.com has contracted your team to publish a DRP and give a single-sided hard-copy to each employee in the corporation. Single-sided print publishing is expensive, but necessary because the computers might be down or the pages might get wet and bleed through during a disaster. Your plan must minimize the number of printed pages.

Within the company, each supervisor has been tasked to prepare a list of possible disasters, such as fire, earthquake, flood, or Jolt Cola shortage, and the appropriate responses that will ensure business continuity. For each event, the supervisor determines unique actions that individual employees should perform, and the order in which these actions must be performed. The actions must be ordered to ensure a proper reaction to the given event. Some actions require tests for completion and repeated actions. The person executing the steps in the plan is expected to determine when a cycle in the plan is complete.

There is one quirky rule that your team must implement in the DRP: true to its company name, the culture of ForwardProgess.com mandates that one may only turn pages forward in the plan, not backward.

Your program must read the set of actions for a given event and determine the minimum number of pages that produces a properly ordered set of actions, subject to the condition that one may never leaf backwards through the plan.

Input

Input to your program will be a series of DRPs. Each DRP will be represented as a series of input lines ending with an empty line. The first line of the DRP is the name of the disastrous event: up to 60 characters starting in the first column. The second line contains T, the maximum number of tasks per page, and N, the total number of unique tasks. These values will appear starting in the first column and be separated from each other by a single space. The remaining input lines contain DRP task dependency pairs. The DRP tasks are represented by integer values 1 through N. Each dependency pair represents a predecessor-successor relationship: the successor task cannot begin until the predecessor task has completed. The dependency pairs are given as integer pairs separated by a comma. For example, the pair "2,5" means that task 5 cannot begin until task 2 has completed.

Output

For each DRP in the input, your program is to print a single line containing the name of the disaster, followed by a colon, a single space, and the integer count of the minimum number of pages needed to print the plan. If the plan cannot be printed using the specified page size, print the string '`not printable`' in place of the minimum page count. No leading or trailing whitespace is to appear on an output line.

There will be no more than ten tasks per page and no more than forty tasks in any plan.

Sample Input

```
Jolt Cola Shortage
```

```
4 8
1,2
2,5
5,1
2,6
5,6
2,3
6,7
7,6
3,4
4,3
5,7
4,8
8,4
8,7

Pizza Strike
2 4
1,2
2,3
3,1
```

Sample Output

```
Jolt Cola Shortage: 3
Pizza Strike: not printable
```