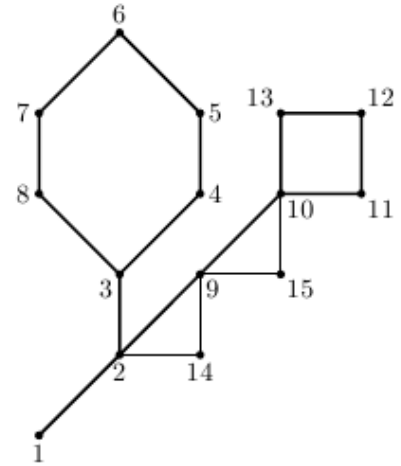


4045 Cactus Reloaded

Cactus is a connected undirected graph in which every edge lies on at most one simple cycle. Intuitively cactus is a generalization of a tree where some cycles are allowed. Your task is to find a *diameter* of the given cactus. Diameter is the maximal length of the shortest path between pairs of vertices.

For example, on the picture on the right the shortest path between vertices 6 and 12 goes through 8 edges and it is the maximal shortest path in this graph, thus its diameter is 8.



Input

Input consists of several datasets. The first line of each dataset contains two integer numbers n and m ($1 \leq n \leq 50000$, $0 \leq m \leq 10000$). Here n is the number of vertices in the graph. Vertices are numbered from 1 to n . Edges of the graph are represented by a set of edge-distinct paths, where m is the number of such paths.

Each of the following m lines contains a path in the graph. A path starts with an integer number k_i ($2 \leq k_i \leq 1000$) followed by k_i integers from 1 to n . These k_i integers represent vertices of a path. Adjacent vertices in a path are distinct. Path can go to the same vertex multiple times, but every edge is traversed exactly once in the whole input file. There are no multiedges in the graph (there is at most one edge between any two vertices).

The graph in the input file is a cactus.

Output

For each dataset, write to the output file a single integer number — the diameter of the given cactus.

Sample Input

```
15 3
9 1 2 3 4 5 6 7 8 3
7 2 9 10 11 12 13 10
5 2 14 9 15 10
```

Sample Output

```
8
```