Number of shortest paths P77353_en

Examen extraordinari d'Algorísmia, FME (2011-07-01)

Given a directed graph, compute in how many ways every vertex is reachable from the vertex 0 making the minim number of steps.

Input

Input consists of several cases, each one with the number of vertices n (between 1 and 10^4), the number of arcs m (between 0 and $10n$), and m pairs x y to indicate an arc from x to y. There are no repeated arcs, nor of the kind x x. Vertices are numbered from 0 to $n-1$.

Output

For every case, and for every vertex x, print its number, the minimum number of steps to reach x starting from 0, and in how many different ways this can be done. Print a -1 if a vertex is unreachable from 0. Print an empty line after every case.

Sample input

```
4 3
     0 1
     1 2
     2 3

2 0

8 15
     0 1
     0 2
     1 3
     1 4
     2 3
     2 4
     3 5
     3 6
     4 5
     4 6
     5 7
     5 1
     6 7
     6 2
     1 0
```

Sample output

```
0: 0 1
1: 1 1
2: 2 1
3: 3 1

0: 0 1
1: -1

0: 0 1
1: 1 1
2: 1 1
3: 2 2
4: 2 2
5: 3 4
6: 3 4
7: 4 8
```

Problem information

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