Contest time extended! There were a few configuration issues with the server. So we had to restart it. We appologize for the inconvenience and are extending the contest time for an hour.

C. Coloring Graphs

Score: 1

CPU: 1s
Memory: 1024MB

The problem is very simple. You will be told the rules of coloring the nodes in an undirected graph and you need to determine the final coloring of nodes in a given graph. Before mentioning the rules, we need to go through few definitions and terminology.

- color(u,t) – this denotes the color of node u at t sec.
- adjacent(u,k) – this denotes a set of nodes. Say v is an element of this set. It must be true that, the shortest path between u and v is equal to k.
- reach – this is an integer value (specific to graph). This denotes how far a node can reach to get its color.

Now, the rule for coloring. Suppose, current time is t sec. Then,

$$color(u,t) = color(u,t-1) + \sum_{v} color(v,t-1) \ , v \in adjacent(u, ((t-1) \ mod \ reach) + 1)$$

Now given initial color (color(u,0)) of the nodes and P sec, you need to find the color of every nodes in a graph after P second.

Input

First line of input contains a single integer, T ($T \leq 15$), the number of test cases. T lines follows. Each consists of an integer N ($1 \leq N \leq 100$), number of nodes in the graph, M ($0 \leq M \leq N*(N-1)/2$), number of edges, R ($1 \leq R \leq 10$), reach of the nodes in that graph and P ($0 \leq P \leq 10^9$), the time in sec. Next line contains N integers, the value of color(u,0) for every node in the order 0 to N−1, $0 \leq$ color(u,0) < 2^31. Next M lines each consists of two integers U and V ($0 \leq U, V < N$), which denotes there is an undirected edge between U and V.

Output

For each case print one line "Case X: " (without the quotes), where X is the case number. Next print N numbers denoting color(u,P) where u is from 0 to N−1 in the same line. As color(u,P) can be large, print modulo 1000000007.

Sample

Input	Output
1 5 4 3 5 1 2 2 1 3 0 1 1 2 2 3 3 4	Case 1: 90 102 129 102 90

Explanation

Here,

```
adjacent(0,1) ={1},        adjacent(0,2)={2},      adjacent(0,3)={3}
adjacent(1,1) ={0,2},         adjacent(1,2)={3},      adjacent(1,3)={4}
adjacent(2,1) ={1,3},         adjacent(2,2)={0,4},        adjacent(2,3)={}
adjacent(3,1) ={2,4},         adjacent(3,2)={1},      adjacent(3,3)={0}
adjacent(4,1) ={3},         adjacent(4,2)={2},      adjacent(4,3)={1}
```

So, color of each node after each second is given below:

- 0 sec => 1 2 2 1 3
- 1sec => 3 5 5 6 4 (colors come from adjacent(u,1))
- 2sec => 8 11 12 11 9 (colors come from adjacent(u,2))
- 3 sec => 19 20 12 19 20 (colors come from adjacent(u,3))
- 4 sec => 39 51 51 51 39 (colors come from adjacent(u,1))
- 5 sec => 90 102 129 102 90 (colors come from adjacent(u,2))

NCPC 2014 Preliminary

2:53:36

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