Finding Coach Academy

Input file:	`finding.in`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	64 megabytes

Coach Academy, which is a training center for both problem solving and robotics, and a training partner for the ACPC, its headquarters and Cairo branch is located in Smart Village, which is a bit far outside the city of Cairo, and since most students live far from Smart Village, participating students were offered transportation to Coach Academy, so some contestants formed groups and met at a certain location and started moving to the bus station using the shortest path, all groups at the same time. Whenever a group arrived at the bus station they would select the first available bus that can take all of them. If all available buses don't fit their group they will enter a new empty bus. If two groups arrived at the same time, the group with lower ID would get on the bus first.

Coach Fegla, the scientific consultant of Coach Academy, was talking with Nourhene about this method of transportation and she wanted to measure the effectiveness of it by finding the time each group took from arriving the station till its bus moved. Each bus moves under one of two conditions:

- When it is completely full.
- If all groups that can arrive already arrived.

Given the city map, gathering points, number of people in a group, the location of the bus station, and the capacity of a bus, can you calculate the total time each group took? You may assume that each street takes one unit of time to be traversed.

Input

The input file contains T $(1 \leq T \leq 256)$ − the number of test cases.

The city map is represented as an undirectional graph with N nodes and M edges.

First line has 5 integers: N $(1 \leq N \leq 1000)$, M $(0 \leq M \leq (N * (N-1)/2)$, G $(1 \leq G \leq 1000)$, C $(1 \leq C \leq 1000)$, S $(1 \leq S \leq N)$ − number of nodes, number of edges, number of groups, bus capacity, and index of the location of the bus station, respectively.

M lines follow, each line with 2 integers, describing an edge between the 2 nodes. A line follows containing G integers, each representing the gathering points of the i_{th} group. A line follows containing G integers, each representing the number of people in the i_{th} group.

Output

G space-separated integers on one line, each representing the required answer. If a group can't reach the bus station, print -1 for this group.

Examples

finding.in	standard output
1 5 6 4 5 2 3 2 4 1 5 2 3 1 2 1 4 2 5 1 2 4 2 2 5 4	0 0 0 0