Problem C. Covert Actions

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

Ostania is a country consisting of n cities and m one-way roads connecting them. The cities are numbered from 1 to n, and the i-th road (where $1 \le i \le m$) is a one-way road from city u_i to city v_i. Traveling by the i-th road takes w_i units of time. For any two distinct cities u and v, there is at most one road from u to v. For convenience, let $w(u, v)$ denote the time it takes to travel from city u to city v by the respective road.

Westalis is a country in a cold war relationship with Ostania. Westalis has obtained k pieces of information about Ostania through various spies. Each piece of information is represented as a simple path. Specifically, the j-th piece of information (where $1 \le j \le k$) consists of a sequence of s_j distinct cities $(p_{j,1}, p_{j,2}, \ldots, p_{j,s_j})$, where there is a road from city $p_{j,t}$ to city $p_{j,t+1}$ for $(1 \le t < s_j)$. No city belongs to more than one piece of information simultaneously.

Westalis's spy with code name "Twilight" is currently in city 1 of Ostania. The Westalis government has instructed Twilight to move to city x. To maximize the efficiency of information gathering, Twilight decided to travel through a path that does not include any of the k simple paths that are already known. Specifically, let the sequence of cities visited by Twilight be $(q_1, q_2, \ldots, q_\ell)$. The following conditions must all be satisfied:

1. There exists a road from city q_i to city q_{i+1} for $(1 \le i < \ell)$.
2. There are no integers i and z such that $(p_{z,1}, p_{z,2}, \ldots, p_{z,s_z}) = (q_i, q_{i+1}, \ldots, q_{i+s_z-1})$.
3. While satisfying conditions 1 and 2, the time it takes Twilight to reach city x, which is $\sum_{i=1}^{\ell-1} w(q_i, q_{i+1})$, must be minimized.

You need to determine, for each x from 1 to n, whether Twilight can get from city 1 to city x, and if so, calculate the time it would take.

Input

The first line of the input contains three integers: n, m, and k ($2 \le n \le 2 \cdot 10^5$; $1 \le m \le 3 \cdot 10^5$; $0 \le k \le \frac{n}{2}$).

The next m lines describe the roads. The i-th of these lines contains three integers: u_i, v_i, and w_i ($1 \le u_i, v_i \le n$; $1 \le w_i \le 10^9$; $u_i \ne v_i$). For any two distinct cities u and v, there is at most one road from u to v.

The next k lines describe the paths. The j-th of these lines starts with an integer s_j, the length of the path, followed by s_j integers $p_{j,1}, \ldots, p_{j,s_j}$: the path itself ($s_j \ge 2$; $\sum_{j=1}^{k} s_j \le n$). In all given paths, each city appears at most once. It is guaranteed that the roads can be traversed in the given order.

Output

Output a single line with n integers: the time it takes Twilight to reach cities $1, 2, \ldots, n$ under the given conditions. If a city is unreachable, output -1 for that city instead.

Examples

standard input	*standard output*
4 4 1 1 2 2 1 3 1 2 4 2 3 4 5 2 2 4	0 2 1 6
4 4 2 1 2 2 1 3 1 2 4 2 3 4 5 2 1 3 2 2 4	0 2 -1 -1
11 12 3 1 2 40 2 3 40 3 1 40 2 4 20 3 6 10 9 1 1 10 11 1 3 7 1 7 6 2 6 7 3 7 8 4 4 5 3 4 1 2 4 5 3 3 7 8 2 10 11	0 40 80 60 -1 83 81 90 -1 -1 -1