Subway

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2.5 seconds
Memory limit:	1024 megabytes

In Pigeland, the subway system is quite advanced. It consists of n sites, numbered from 1 to n, and k directed subway lines, numbered from 1 to k. Subway line i travels through sites $x_{i,1}, x_{i,2}, \cdots, x_{i,p_i}$ in order, where $x_{i,j}$ is the j-th site visited by line i. It takes $w_{i,j}$ units of time to travel from site $x_{i,j}$ to site $x_{i,j+1}$ on line i.

When multiple lines meet at the same site, passengers can transfer between lines. If a passenger is at a site on line x, while line y also passes through this site, he/she can spend $a_y \times b_x$ units of time to transfer from line x to line y, where a_y and b_x are given coefficients for lines y and x. After transferring, the passenger is still at the same site, but on line y.

You start at site 1. Find the minimum time needed to reach site s for all $2 \le s \le n$. In particular, you can start by choosing any line at site 1 with no transfer time cost. It is guaranteed that all sites are reachable from site 1.

Input

There is only one test case in each test file.

The first line contains two integers n and k ($2 \le n \le 2 \times 10^5$, $1 \le k \le 2 \times 10^5$), indicating the number of sites and the number of subway lines.

The second line contains k integers $a_1, a_2, \cdots, a_k$ ($1 \le a_i \le 10^6$).

The third line contains k integers $b_1, b_2, \cdots, b_k$ ($1 \le b_i \le 10^6$).

For the following k lines, the i-th line first contains an integer p_i ($2 \le p_i \le n$), indicating the number of sites line i travels through. Then $(2p_i - 1)$ integers $x_{i,1}, w_{i,1}, x_{i,2}, \ldots, x_{i,p_i-1}, w_{i,p_i-1}, x_{i,p_i}$ follow ($1 \le x_{i,j} \le n$, $1 \le w_{i,j} \le 10^9$), where $x_{i,j}$ is the j-th site visited by line i, and $w_{i,j}$ is the travel time from site $x_{i,j}$ to site $x_{i,j+1}$ on line i. The sites traveled through by a subway line are distinct.

It is guaranteed that $\sum_{i=1}^{k}(p_i - 1) \le 2 \times 10^5$.

Output

Output one line containing $(n-1)$ integers $d_2, d_3, \cdots, d_n$ separated by a space, where d_i is the minimum time cost from site 1 to site i.

Examples

standard input	standard output
6 3 1 5 1 5 5 1 3 1 2 2 3 3 3 5 1 2 1 4 3 3 4 5 4 6	2 5 21 14 18
6 3 1 5 1 5 5 1 5 1 2 2 100 3 100 6 1 4 5 1 100 2 4 3 100 5 1 4 2 3 1 5	2 31 43 37 136