**https://atcoder.jp/contests/abc245/tasks/abc245\_g**

[**Problem Statement**](https://atcoder.jp/contests/abc245/tasks/abc245_g)

There are *NN* people and *KK* nations, labeled as Person *11*, Person *22*, *\ldots…*, Person *NN* and Nation *11*, Nation *22*, *\ldots…*, Nation *KK*, respectively.  
Each person belongs to exactly one nation: Person *ii* belongs to Nation *A\_iAi​*. Additionally, there are *LL* popular people among them: Person *B\_1B1​*, Person *B\_2B2​*, *\ldots…*, Person *B\_LBL​* are popular. Initially, no two of the *NN* people are friends.

For *MM* pairs of people, Takahashi, a God, can make them friends by paying a certain cost: for each *1\leq i\leq M1≤i≤M*, he can pay the cost of *C\_iCi​* to make Person *U\_iUi​* and Person *V\_iVi​* friends.

Now, for each *1\leq i\leq N1≤i≤N*, solve the following problem.

Can Takahashi make Person *ii* an indirect friend of a popular person belonging to a nation different from that of Person *ii*? If he can do so, find the minimum total cost needed. Here, Person *ss* is said to be an indirect friend of Person *tt* when there exists a non-negative integer *nn* and a sequence of people *(u\_0, u\_1, \ldots, u\_n)(u0​,u1​,…,un​)* such that *u\_0=su0​=s*, *u\_n=tun​=t*, and Person *u\_iui​* and Person *u\_{i+1}ui+1​* are friends for each *0\leq i < n0≤i<n*.

**Constraints**

* *2 \leq N \leq 10^52≤N≤105*
* *1 \leq M \leq 10^51≤M≤105*
* *1 \leq K \leq 10^51≤K≤105*
* *1 \leq L \leq N1≤L≤N*
* *1 \leq A\_i \leq K1≤Ai​≤K*
* *1 \leq B\_1<B\_2<\cdots<B\_L\leq N1≤B1​<B2​<⋯<BL​≤N*
* *1\leq C\_i\leq 10^91≤Ci​≤109*
* *1\leq U\_i<V\_i\leq N1≤Ui​<Vi​≤N*
* *(U\_i, V\_i)\neq (U\_j,V\_j)(Ui​,Vi​)=(Uj​,Vj​)* if *i \neq ji=j*.
* All values in input are integers.

**Input**

Input is given from Standard Input in the following format:

*NN* *MM* *KK* *LL*

*A\_1A1​* *A\_2A2​* *\cdots⋯* *A\_NAN​*

*B\_1B1​* *B\_2B2​* *\cdots⋯* *B\_LBL​*

*U\_1U1​* *V\_1V1​* *C\_1C1​*

*U\_2U2​* *V\_2V2​* *C\_2C2​*

*\vdots⋮*

*U\_MUM​* *V\_MVM​* *C\_MCM​*

**Output**

Let *X\_iXi​* defined as follows: *X\_iXi​* is *-1−1* if it is impossible to make Person *ii* an indirect friend of a popular person belonging to a nation different from that of Person *ii*; otherwise, *X\_iXi​* is the minimum total cost needed to do so. Print *X\_1, X\_2, \ldots, X\_NX1​,X2​,…,XN​* in one line, with spaces in between.

**Sample Input 1**Copy

Copy

4 4 2 2

1 1 2 2

2 3

1 2 15

2 3 30

3 4 40

1 4 10

**Sample Output 1**Copy

Copy

45 30 30 25

Person *11*, *22*, *33*, *44* belong to Nation *11*, *11*, *22*, *22*, respectively, and there are two popular people: Person *22* and *33*. Here,

* For Person *11*, the only popular person belonging to a different nation is Person *33*. To make them indirect friends with the minimum cost, we should pay the cost of *1515* to make Person *11* and *22* friends and pay *3030* to make Person *22* and *33* friends, for a total of *15+30=4515+30=45*.
* For Person *22*, the only popular person belonging to a different nation is Person *33*. The minimum cost is achieved by making Person *22* and *33* friends by paying *3030*.
* For Person *33*, the only popular person belonging to a different nation is Person *22*. The minimum cost is achieved by making Person *22* and *33* friends by paying *3030*.
* For Person *44*, the only popular person belonging to a different nation is Person *22*. To make them indirect friends with the minimum cost, we should pay the cost of *1515* to make Person *11* and *22* friends and pay *1010* to make Person *11* and *44* friends, for a total of *15+10=2515+10=25*.

**Sample Input 2**Copy

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3 1 3 1

1 2 3

1

1 2 1000000000

**Sample Output 2**Copy

Copy

-1 1000000000 -1

Note that, for Person *11*, Person *11* itself is indeed an indirect friend, but it does not belong to a different nation, so there is no popular person belonging to a different nation.