ASSIGNMENT

Q1: 'JALIL AND CO' FOOD DELIVERY SERVICE

In Narail, Samrat Jalil has started new delivery company named "Jalil and Co" has started. Timely delivery is very important for them. They want to tell the customers an exact timing of their arrival so customers don't have to suffer. However, there are some challenges in their business.

There are several junctions in Narail connected by roads. There is at most one road between any pair of junctions. There is no road connecting a junction to itself. The travel time for a road is the same in both directions. At every junction there is a single traffic light. These traffic lights are a bit peculiar. Starting from time 0, each light flashes green once every T time units, where the value of **T** is different for each junction.`

A delivery vehicle that is at a junction can start moving along a road only when the light at the current junction flashes green. If a vehicle arrives at a junction between green flashes, it must wait for the next green flash before continuing in any direction. If it arrives at a junction at exactly the same time that the light flashes green, it can immediately proceed along any road originating from that junction. You are given a city map that shows travel times for all roads.

For each junction **i**, you are given $\mathbf{T_i}$, the time period between green flashes of the light at that junction. Your task is to find the minimum time taken from a given source junction to a given destination junction for a vehicle when the traffic starts.

Input

- There are **N** junctions and **M** roads. The junctions are identified by integers 1 through **N**.
- The first line of input contains two integers: the source junction and the destination junction.
- The second line contains two integers: **N** and **M**.
- The third line contains N integers, $\mathbf{T_1, T_2, \ldots T_N}$, describing the time periods at which the traffic lights flash green. The light at junction i flashes green at times $\mathbf{0, T_i, 2T_i, 3T_i, \ldots}$
- The next M lines contain information about the M roads. Each line has three integers **i, j,** $\mathbf{l_{ij}}$, where: **i** and **j** are the junctions connected by this road
- $\mathbf{l_{ij}}$ is the time required to move from junction i to junction j using this road

Output

A single line consisting of a single integer, the time taken by a minimum-time path from source to destination.

Example

Sample Input	Sample Output	Explanation
1 4 4 5 4 3 2 5 1 2 4 1 3 8 2 3 6 2 4 10 3 4 7	15	Four Possible Options are there to reach the destination 4: 1. 1 to 2 to 4 takes time 4 + 2 (wait till 6) + 10 = 16. 2. 1 to 3 to 4 takes time 8 + 0 (no wait) + 7 = 15. 3. 1 to 2 to 3 to 4 takes time 4 + 2 (wait till 6) + 6 + 0 (no wait) + 7 = 19. 4. 1 to 3 to 2 to 4 takes time 8 + 0 (no wait) + 6 + 1 (wait till 15) + 10 = 25

ASSIGNMENT

Q2: THE SECRET MAGIC TRIP

Marvel is a land with N cities (numbered 1 through N) connected by M bidirectional roads. Dr. Strange is on a mission to spread a secret Magic. He has a sequence $A_1,A_2,\ldots,A_K$ and he must visit cities in the following way: he starts in the city A_1, travels to the city A_2, then travels from there to the city A_3 and so on until he reaches the city A_K. Note that a city may appear in the sequence **A** for multiple times, but $A_i \neq A_{i+1}$ for each valid i. When travelling between two cities, Dr. Strange always follows one of the shortest paths between them (but not necessarily the same one if he travels between them again).

The government is trying to track which cities are targeted by Dr. Strange. However, they do not know the sequence A. Instead, they have tracked Dr. Strange's movement as a sequence B1, B2…,BL of cities visited by him during his mission. Formally, B1=A1 is the city where Dr. Strange starts, then for each valid i, he moves from the city Bi to the city Bi+1 using the direct road between them and finally, he ends his mission in the city BL=AK; Dr. Strange's sequence A is a subsequence of B, since the sequence B also contains all shortest paths which Dr. Strange followed. It is guaranteed that there is a direct road between cities Bi and Bi+1 for each valid i.

Help the government of Marvel find the minimum possible number of targeted cities, i.e. the minimum possible value of K for a sequence A that corresponds to the given sequence B, or determine that no such sequence A exists.

Input: The first line of the input contains a single integer T denoting the number of test cases. The description of T test cases follows.

- The first line of each test case contains three space-separated integers N, M and L.
- The second line contains L space-separated integers $B_1, B_2\ldots,B_L$
- Each of the following M lines contains three space-separated integers u, v and w describing a road between cities u and v with length w.

Output: For each test case, print a single line containing one integer — the minimum possible K, or −1 if a valid sequence A does not exist.

Input:	**Output:**
3 3 3 6 1 2 3 1 2 3 1 2 1 2 3 1 3 1 1 4 4 9 1 2 3 4 1 2 3 4 1 1 2 1 2 3 1 3 4 1 4 1 1 3 3 2 1 2 1 2 3 2 3 1 3 1 1	6 5 -1