A. Permutations

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Happy PMP is freshman and he is learning about algorithmic problems. He enjoys playing algorithmic games a lot.

One of the seniors gave Happy PMP a nice game. He is given two permutations of numbers 1 through n and is asked to convert the first one to the second. In one move he can remove the last number from the permutation of numbers and inserts it back in an arbitrary position. He can either insert last number between any two consecutive numbers, or he can place it at the beginning of the permutation.

Happy PMP has an algorithm that solves the problem. But it is not fast enough. He wants to know the minimum number of moves to convert the first permutation to the second.

Input

The first line contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the quantity of the numbers in the both given permutations.

Next line contains n space-separated integers — the first permutation. Each number between 1 to n will appear in the permutation exactly once.

Next line describe the second permutation in the same format.

Output

Print a single integer denoting the minimum number of moves required to convert the first permutation to the second.

Examples

input
```
3
3 2 1
1 2 3
```
output
```
2
```

input
```
5
1 2 3 4 5
1 5 2 3 4
```
output
```
1
```

input
```
5
1 5 2 3 4
1 2 3 4 5
```
output
```
3
```

Note

In the first sample, he removes number 1 from end of the list and places it at the beginning. After that he takes number 2 and places it between 1 and 3.

In the second sample, he removes number 5 and inserts it after 1.

In the third sample, the sequence of changes are like this:

- 1 5 2 3 4
- 1 4 5 2 3
- 1 3 4 5 2
- 1 2 3 4 5

So he needs three moves.

B. AlgoRace

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

PMP is getting a warrior. He is practicing a lot, but the results are not acceptable yet. This time instead of programming contests, he decided to compete in a car racing to increase the spirit of victory. He decides to choose a competition that also exhibits algorithmic features.

AlgoRace is a special league of car racing where different teams compete in a country of n cities. Cities are numbered 1 through n. Every two distinct cities in the country are connected with one bidirectional road. Each competing team should introduce one driver and a set of cars.

The competition is held in r rounds. In i-th round, drivers will start at city s_i and finish at city t_i. Drivers are allowed to change their cars at most k_i times. Changing cars can take place in any city in no time. One car can be used multiple times in one round, but total number of changes should not exceed k_i. Drivers can freely choose their path to destination.

PMP has prepared m type of purpose-built cars. Beside for PMP's driving skills, depending on properties of the car and the road, a car traverses each road in each direction in different times.

PMP Warriors wants to devise best strategies of choosing car and roads in each round to maximize the chance of winning the cup. For each round they want to find the minimum time required to finish it.

Input

The first line contains three space-separated integers n, m, r ($2 \le n \le 60, 1 \le m \le 60, 1 \le r \le 10^5$) — the number of cities, the number of different types of cars and the number of rounds in the competition, correspondingly.

Next m sets of $n \times n$ matrices of integers between 0 to 10^6 (inclusive) will follow — describing the time one car requires to traverse different roads. The k-th integer in j-th line of the i-th set is the time that i-th car requires to traverse the road from j-th city to k-th city. These matrices are not necessarily symmetric, but their diagonal is always zero.

Next r lines contain description of the rounds. The i-th of these lines contains space-separated integers s_i, t_i, k_i ($1 \le s_i, t_i \le n, s_i \ne t_i, 0 \le k_i \le 1000$) — the number of starting city, finishing city and the number of possible car changes in i-th round, correspondingly.

Output

For each round you should print the minimum required time to complete the round in a single line.

Examples

input

```
4 2 3
0 1 5 6
2 0 3 6
1 3 0 1
6 6 7 0
0 3 5 6
2 0 1 6
1 3 0 2
6 6 7 0
1 4 2
1 4 1
1 4 3
```

output

```
3
4
3
```

input

```
4 2 3
0 7 3 3
8 0 10 5
1 1 0 4
8 9 2 0
0 3 3 9
7 0 4 9
3 8 0 4
4 8 9 0
2 3 3
2 1 3
1 2 2
```

output

```
4
```

```
5
3
```

Note

In the first sample, in all rounds PMP goes from city #1 to city #2, then city #3 and finally city #4. But the sequences of types of the cars he uses are (1, 2, 1) in the first round and (1, 2, 2) in the second round. In the third round, although he can change his car three times, he uses the same strategy as the first round which only needs two car changes.

C. Weak Memory

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Zart PMP is qualified for ICPC World Finals in Harbin, China. After team excursion to Sun Island Park for snow sculpture art exposition, PMP should get back to buses before they leave. But the park is really big and he does not know how to find them.

The park has n intersections numbered 1 through n. There are m bidirectional roads that connect some pairs of these intersections. At k intersections, ICPC volunteers are helping the teams and showing them the way to their destinations. Locations of volunteers are fixed and distinct.

When PMP asks a volunteer the way to bus station, he/she can tell him the whole path. But the park is fully covered with ice and snow and everywhere looks almost the same. So PMP can only memorize at most q intersections after each question (excluding the intersection they are currently standing). He always tells volunteers about his weak memory and if there is no direct path of length (in number of roads) at most q that leads to bus station, the volunteer will guide PMP to another volunteer (who is at most q intersections away, of course). ICPC volunteers know the area very well and always tell PMP the best way. So if there exists a way to bus stations, PMP will definitely find it.

PMP's initial location is intersection s and the buses are at intersection t. There will always be a volunteer at intersection s. Your job is to find out the minimum q which guarantees that PMP can find the buses.

Input

The first line contains three space-separated integers n, m, k ($2 \le n \le 10^5$, $0 \le m \le 2 \cdot 10^5$, $1 \le k \le n$) — the number of intersections, roads and volunteers, respectively. Next line contains k distinct space-separated integers between 1 and n inclusive — the numbers of cities where volunteers are located.

Next m lines describe the roads. The i-th of these lines contains two space-separated integers u_i, v_i ($1 \le u_i, v_i \le n, u_i \ne v_i$) — two intersections that i-th road connects. There will be at most one road between any two intersections.

Last line of input contains two space-separated integers s, t ($1 \le s, t \le n, s \ne t$) — the initial location of PMP and the location of the buses. It might not always be possible to reach t from s.

It is guaranteed that there is always a volunteer at intersection s.

Output

Print on the only line the answer to the problem — the minimum value of q which guarantees that PMP can find the buses. If PMP cannot reach the buses at all, output -1 instead.

Examples

input

```
6 6 3
1 3 6
1 2
2 3
4 2
5 6
4 5
3 4
1 6
```

output

```
3
```

input

```
6 5 3
1 5 6
1 2
2 3
3 4
4 5
6 3
1 5
```

output

```
3
```

Note

The first sample is illustrated below. Blue intersections are where volunteers are located. If PMP goes in the path of dashed line, it can reach the buses with $q = 3$:

In the second sample, PMP uses intersection 6 as an intermediate intersection, thus the answer is 3.

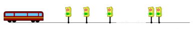
D. BRT Contract

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

In the last war of PMP, he defeated all his opponents and advanced to the final round. But after the end of semi-final round evil attacked him from behind and killed him! God bless him.

Before his death, PMP signed a contract with the bus rapid transit (BRT) that improves public transportations by optimizing time of travel estimation. You should help PMP finish his last contract.

Each BRT line is straight line that passes n intersecting on its ways. At each intersection there is traffic light that periodically cycles between green and red. It starts illuminating green at time zero. During the green phase which lasts for g seconds, traffic is allowed to proceed. After the green phase the light changes to red and remains in this color for r seconds. During the red phase traffic is prohibited from proceeding. If a vehicle reaches the intersection exactly at a time when the light changes to red, it should stop, but the vehicle is clear to proceed if the light has just changed to green.



All traffic lights have the same timing and are synchronized. In other words the period of red (and green) phase is the same for all of traffic lights and they all start illuminating green at time zero.

The BRT Company has calculated the time that a bus requires to pass each road segment. A road segment is the distance between two consecutive traffic lights or between a traffic light and source (or destination) station. More precisely BRT specialists provide $n+1$ positive integers l_i, the time in seconds that a bus needs to traverse i-th road segment in the path from source to destination. The l_1 value denotes the time that a bus needs to pass the distance between source and the first intersection. The l_{n+1} value denotes the time between the last intersection and destination.

In one day q buses leave the source station. The i-th bus starts from source at time t_i (in seconds). Decision makers of BRT Company want to know what time a bus gets to destination?

The bus is considered as point. A bus will always move if it can. The buses do not interfere with each other.

Input

The first line of input contains three space-separated positive integers n, g, r ($1 \le n \le 10^5, 2 \le g + r \le 10^9$) — the number of intersections, duration of green phase and duration of red phase. Next line contains $n+1$ integers l_i ($1 \le l_i \le 10^9$) — the time to pass the i-th road segment in the path from source to destination.

Next line contains a single integer q ($1 \le q \le 10^5$) — the number of buses in a day. The i-th of next q lines contains a single integer t_i ($1 \le t_i \le 10^9$) — the time when i-th bus leaves the source station.

Output

In the i-th line of output you should print a single integer — the time that i-th bus gets to destination.

Please do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use `cin`, `cout` streams or the `%I64d` specifier.

Examples

input

```
1 3 2
5 2
5
1
2
3
4
5
```

output

```
8
9
12
12
12
```

input

```
5 3 7
10 1 1 8 900000005 1000000000
3
1
10
1000000000
```

output

```
1900000040
1900000040
2900000030
```

Note

In the first sample, buses #1, #2 and #5 will reach the destination without waiting behind the red light. But buses #3 and #4 should wait.

In the second sample, first bus should wait at third, fourth and fifth intersections. Second and third buses should wait only at the fifth intersection.

E. Heaven Tour

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The story was not finished as PMP thought. God offered him one more chance to reincarnate and come back to life. But before he can come back, God told him that PMP should ask n great men including prominent programmers about their life experiences.

The men are standing on a straight line. They are numbered 1 through n from left to right. The coordinate of the i-th man is x_i $(x_i < x_{i+1}, i < n)$. PMP should visit all these people one by one in arbitrary order. Each men should be visited **exactly once**. At the beginning of his tour, he starts at location of s-th man and asks him about his experiences.

Each time PMP wants to change his location, he should give a ticket to an angel and the angel carries him to his destination. Angels take PMP from one location, fly to his destination and put him down there. Nobody else is visited in this movement. Moving from i-th man to j-th man, takes $|x_i - x_j|$ time. PMP can get back to life as soon as he visits all men.

There are two types of angels: Some angels are going to the right and they only accept right tickets. Others are going the left and they only accept left tickets. There are an unlimited number of angels of each type. PMP has l left tickets and $n - 1 - l$ right tickets.

PMP wants to get back to life as soon as possible to be able to compete in this year's final instead of the final he missed last year. He wants to know the quickest way to visit all the men exactly once. He also needs to know the exact sequence moves he should make.

Input

The first line of input contains three space-separated integers n, l, s ($2 \le n \le 10^5, 0 \le l < n, 1 \le s \le n$) — the number of people to visit, the number left tickets PMP got, and initial location of PMP. Next line contains n space-separated integers. The i-th integer in this line is x_i ($0 = x_1 < x_2 < \ldots < x_n \le 10^9$) — the location of i-th man.

Output

If PMP cannot visit all men with the tickets he got print -1 in the only line of output. Otherwise, in the first line you should print the minimum time PMP can visit all men. In the second line you should print $n - 1$ integers that are the numbers of the men that PMP should visit in order in one optimal solution. If there are multiple answers, output any of them.

Please do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use `cin`, `cout` streams or the `%I64d` specifier.

Examples

input

```
5 2 2
0 10 11 21 22
```

output

```
33
1 3 5 4
```

input

```
4 3 1
0 1 2 3
```

output

```
-1
```

input

```
7 3 2
0 100 200 201 301 303 305
```

output

```
409
1 3 4 7 6 5
```

Note

Let us remind here, a great contestant of all times, who left us about a year ago. May Renat Mullakhanov rest in peace.