A huge international event is being held every year. There is a long and wide street in front of the event hall. At the beginning of the event, the organizers set up flagpoles beside the street. They raise national flags on the flagpoles and rearrange them every year. This has became the symbol of the event.

The flagpoles are arranged on a line, with flagpole f_i at location ℓ_i. The locations ℓ_i's have integer coordinates and they are all distinct. For the set of nations $\aleph$, the flag of a nation in $\aleph$ is raised on a flagpole. In the last year, the flag of nation a_i was raised on flagpole f_i. At the first day of the new year, the nation b_i whose flag is newly raised on the flagpole f_i is determined.

The flag raised on the flagpole f_i should be changed from a_i to b_i. This work is performed by a robot $\Re$ which lowers and raises the flags. The robot $\Re$ can carry an almost infinite number of flags. It may lower the flag of the nation a_i on a flagpole f_i and carry it. Then it may move to the location ℓ_j of flagpole f_j such that $b_j = a_i$ and raise the flag on f_j. This work is always possible because the following condition is satisfied:

> For each nation $c \in \aleph$, the number of flagpoles f_i with $a_i = c$ is equal to the number of flagpoles f_j with $b_j = c$.

There is a special location A different from all ℓ_i's such that the robot $\Re$ should always start and end at A. At the location A, there is no flagpole. Therefore $\Re$ starts at A, delivers all flags of a_i to flagpoles f_j with $b_j = a_i$, and ends at A.

Given the location A and the locations of the flagpoles, and also given the nations a_i and b_i for each flagpolef_i, write a program that computes the minimal travel distance of the robot $\Re$ to deliver all the flags.

For example, in Figure 1, there are six points, representing the flagpoles, and the special point A where the robot $\Re$ starts and ends. The nations of flags correspond to integers in the set {1, 2, 3}. At each point, a pair of integers (a, b) is given, where a and b are the nations of flags in the last year and in the new year, respectively. The arrows represent a movement of $\Re$ to minimize the travel distance. $\Re$ moves right from A to 5 to load the flag of the nation 2 of the point at 5. While moving left from 5 to 1, it delivers the flags of points at 3 and 5 to the points at 1 and 2, respectively. Then it moves right from 1 to 7 and delivers the flags of points at 1, 2, and 6 to the points at 3, 5, and 7, respectively. Finally, it delivers the flag of the point at 7 to the point at 6 and ends at A, while moving left from 7 to A. The travel distance of $\Re$ is 14.

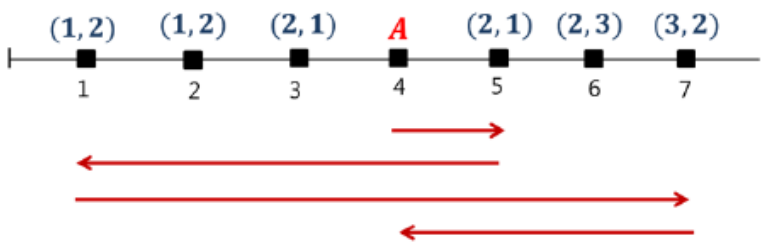

Figure 1.

Input

Your program is to read from standard input. The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with an integer N ($2 \le N \le 100,000$), the number of points representing the flagpoles (not including A). The second line contains an integer α ($1 \le \alpha \le 1,000,000$), the coordinate of A. The third line contains an integer M ($1 \le M \le 1,000$), representing the set of nations $\{1, 2, \ldots, M\}$. For each integer $i = 1, \ldots, M$, at least one flag of the nation i is raised on a flagpole. The i-th line of the following N lines contains three integers ℓ_i, a_i, and b_i, the coordinate and the nation of the flag of flagpole f_i in the last year and in the new year, respectively. Here $1 \le \ell_i \le 1,000,000$ ($\ell_i \ne \alpha$) and $1 \le a_i, b_i \le M$ ($a_i \ne b_i$). Also all ℓ_i's are distinct and given in a nondecreasing order.

Output

Your program is to write to standard output. Print exactly one line for each test case. The line should contain the minimum of the travel distance of the robot $\Re$.

The following shows sample input and output for two test cases.

Sample Input

```
2
6
4
3
1 1 2
2 1 2
3 2 1
5 2 1
6 2 3
7 3 2
12
12
3
1 2 3
4 1 2
5 2 3
7 1 2
8 2 3
10 1 2
15 2 1
16 2 1
19 3 2
20 2 1
24 3 2
26 3 2
```

Sample Output

```
14
62
```