2231 Acid Containers

Company ACIDIC manufactures acid. The acid is filled into containers and sent out to different places. Sometimes, the containers start leaking. To handle such situations, the company has a room with several container holders. These holders are arranged in a rectangle grid. Each of these can hold one leaky container and absorb the acid leakage. After all the acid has leaked out, the containers are taken out and the leak point(s) are fixed. One day, the leaky containers were put in some of the holders. After a while, some more leaky containers were detected and brought to the room. The supervisor handling this then realized that all the containers that are present in the room are leaking very heavily. So heavily that they have corroded their holders and in a short time they would also corrode all the holders in the room in the directions of the leak. The containers are leaking either in the North-South direction or in the East-West direction.

The supervisor tried to remove containers from their holders but could not as they were stuck to the holders. However, he could rotate the containers so that the direction of leakage could be changed from North-South to East-West or vice-versa. The supervisor suspects that the current lot of leaky containers may also start to leak heavily. Help the supervisor find the rotations of existing containers and placement of current lot of containers so that the number of corroded holders is minimized.

Input

There are several test cases. The first line of the input contains the number of test cases T.

For each test case, the first line has four numbers R, C, N and M. Numbers R and C (between 10 and 100) give the number of rows and columns in the grid. Number N (between 1 and 20) gives the number of leaky containers in the room and number M (between 1 and 20) gives the number of leaky containers in the current lot. Each of the next N lines gives the placement and the leakage direction of an existing container. These are given as three numbers a, b, and c where a (between 1 and R) is the row number (counting from top), b (between 1 and C) is the column number (counting from left), and c is '1' if the leakage direction is North-South, '0' otherwise.

Output

For each test case, the output should be a number giving the smallest number of holders that will get corroded after rotating the existing containers and placing the containers in the current lot (assuming the all the current lot containers will also leak heavily). The output for different test cases should be on different lines.

Sample Input

```
2
4 6 4 4
1 2 0
2 4 0
3 2 1
3 5 1
50 50 5 10
1 35 1
17 44 0
```

```
17 46 1
42 35 1
42 46 0
```

Sample Output

```
12
148
```