Social Network Community

Your friend came up with an idea of starting a social network-SOCNET. Since,he is not as good a programmer as you are he needs your help to build certain features.

You need to build an ADD friend feature. if 'x' sends a friend request to 'y',he may accept it or deny it.

SOCNET has a special feature called 'community'.When two people 'x' and 'y' becomes friends,the communities of two are merged together.(If 'x' has no friends,it's community consist of only himself,size-1)

Since,your friend is low on funds,the data center he uses has a restriction-the MAXIMUM size of any community cannot exceed 'm'.

You need to work on following three types of queries-

- A x y - x sends a friend request to y
- E x y - check whether x and y are present in same community(print 'Yes' or 'No')
- S x - prints the size of the community 'x' belongs to.

NOTE- A friend requested is accepted only if the merger of the two communities results in a community not greater than 'm'.

Input

The first line of input consists of two positive integers - n and m(n is the number of registered users and m is the maximum size of any community).

Next line consist of a positive integer q(number of queries).

q lines follows(Each line consist of a query as described in the problem statement).

The queries follows 1-indexing.

Constraints

1<=n,m<=100000, 1<=q<=200000

Output

For each query of Type - 'E',output in a single line-'Yes' or 'No'. For each query of Type - 'S',output the size of the community to which 'x' belongs. For further clarification,read the example given.

Example

Input:
5 3
8
S 2
A 2 3
E 2 3
S 2
A 4 5
A 3 5
E 3 5
S 3

Output:
1
Yes
2
No
2

Explanation-Initially no one has any friend.So community of '2' consist of only '2' i.e size-1. Then '2' and '3' becomes friends .This forms a community of 2 people. '4' and '5' also becomes friends