Problem K. Do you know who wrote this problem?

Source file name:	Know.c, Know.cpp, Know.java, Know.py
Input:	standard input
Output:	standard output
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The leader students of the UFPS competitive programming study group won the ICPC Regional Contest and will go to the ICPC World Finals in Europe. The graduates of that group now have a lot of money, so they donated money for the students to travel. Then the leader students will be able to visit n different tourist places numbered from 1 to n.

Although the graduates have a lot of money, their donation only covers food, hotel and admission ticket, but does not include the cost of transportation. The students found on a website some cheap transport alternatives:

- Basic alternatives: that allow you to travel from a tourist place u to a tourist place v for a cost of w, but they are dangerous.

- Alternatives with fixed origin and variable destination: they allow traveling from a fixed origin tourist place u to any destination in the range $[l, r]$.

- Alternatives with fixed destination and variable origin: they allow traveling from any tourist place in the range $[l, r]$ to a fixed destination u.

However, the limitation of the the cheap transport alternatives is that they can be used only once.

The three students are excellent programmers and solve various types of problems. So they decided to write a computer program to estimate the minimum amount of money they will have to spend and make a budget that would allow them to visit as many tourist places as possible in Europe.

Do you want to qualify for the ICPC World Finals? If you solve this problem, you will be in the ICPC World Finals.

Input

The first line of the input contains three 3 integers n, p and g ($1 \leq n, p \leq 10^5; 1 \leq g \leq n$):

- n: Number of tourist places.

- p: Number of cheap transport alternatives.

- g: Initial position of the students.

The following p lines contain the description of the cheap transport alternatives. Each line begins with a string s, which defines the type of alternative ($basic$, $fixed-origin$, $fixed-destination$). If the alternative is of type $basic$, then three 3 integers v, u and w will follow where w is the cost ($1 \leq v, u \leq n, 1 \leq w \leq 10^9$). Otherwise four integer 4 will follow u, l, r and w where w is the cost ($1 \leq u \leq n, 1 \leq l \leq r \leq n, 1 w 10^9$).

Output

Print a single line with n integers separated by a space. The ith number is the cost to go from the students initial position to the ith destination, or -1 if it is impossible to get there.

Examples

Input	Output
6 8 1 fixed-origin 4 3 6 95 fixed-destination 3 1 3 24 fixed-destination 6 4 4 12 fixed-origin 5 1 2 9 basic 3 3 20 fixed-destination 4 2 6 32 basic 1 6 25 fixed-origin 6 1 5 6	0 31 24 31 31 25
5 4 1 fixed-origin 2 3 4 10 basic 2 4 16 fixed-destination 4 1 3 12 basic 2 5 25	0 -1 -1 12 -1

Note

This problem is an unauthorized adaptation of an old problem. I hope you like it and solve it.

Image source Wikipedia