Vinu and Quantum Entanglement-1

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Vinu has dicovered quantum entanglement! To prove his work to the world, he decides to set up an experiment. He takes n objects, allotting each with a certain *special* value. According to Vinu's understanding of quantum physics, if there are two objects i and j which are entangled and have special values v_i and v_j respectively and the objects spin with velocities w_i and w_j, then they follow the following formula:

$w_i \cdot v_i + w_j \cdot v_j = 0$

It can be easily seen from the formula that two objects which are entangled spin with velocities which are opposite in nature. However, there might be a case when an object can't spin at all. This might occur when it is entangled with a body which has no velocity, or when it is entangled with possibly two other objects which force it to rotate in different directions (See example below).

In the end, to prove that his theories are correct, Vinu performs the following type of experiments:

1. Change the special value of an object
2. Connect two objects which then follow the above rules of entanglement
3. If body i theoretically spins with velocity w_i, state the velocity of body j.

Can you help him answer all queries?

Input

The first line contains two space separated integers n ($1 \leq n \leq 2 \cdot 10^3$) and q ($1 \leq q \leq 5 \cdot 10^3$), the number of objects and the number of queries respectively.
The next line contain n space separated integers denoting the initial special values ($6 \leq v_i \leq 10^6$).
The following q lines contain the queries. Each query follows the following format:

1. 1 i v, Change the special value of an object i ($1 \leq i \leq n$) to v ($1 \leq v \leq 10^6$).
2. 2 i j, Connect objects i and j ($1 \leq i, j \leq n$).
3. 3 i j w, If body i were to spin with velocity w, state the velocity of body j ($1 \leq i, j \leq n$, $1 \leq w \leq 10^6$).

Output

You only need to answer queries of type 3, each in a new line. Suppose the velocity can be expressed as a fraction $\frac{p}{q}$, where the fraction can't be reduced any further. Answer the query in the format p/q, where p is the numerator, q is the denominator and / is a forward slash. In case the velocity is negative, add a - (minus) sign in the beginning.

Example

standard input	standard output
4 10 6 8 10 13 3 1 2 2 2 1 2 3 1 2 3 2 2 3 1 1 7 3 1 3 10 2 3 1 3 1 3 2 2 1 4 3 1 4 6	0 -9/4 7/1 0 0

Note

Explanation of test case:
For first query of type 3, objects are not entangled, so velocity is 0.
For second query of type 3, the spin velocity is $-3 \cdot \frac{6}{8} = \frac{-9}{4}$.
For third query of type 3, the spin velocity is -$(-10 \cdot \frac{7}{8}) \cdot \frac{8}{10} = \frac{7}{1}$.
For the fourth query, the system is locked (conflicting directions), so no object can spin.
Before the fifth query of type 3, Vinu tried connecting an object to a already blocked system. Hence, the velocity of the new system is still 0, and no body can spin.

To reduce the fraction, you will have to compute the gcd of the numerator and denominator in an efficient manner. You can consult the following link: https://www.geeksforgeeks.org/euclidean-algorithms-basic-and-extended/.