Problem I. Optimal Assortment

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

Potato is a toy retailer. He has n types of toys in his warehouse. Selling the i-th toy can make a profit v_i. He has conducted market research in advance. He knows that a customer buys at most one toy and customer's preference w_i for toy i will be in range $[l_i, r_i]$.

When potato offers a toy set S to the customer, the probability of a customer buying toy $i \in S$ is $\frac{w_i}{w_0+\sum_{i\in S} w_i}$ and the probability of a customer not making a purchase is $\frac{w_0}{w_0+\sum_{i\in S} w_i}$. Specifically, $w_i = 0$ indicates that the customer prefers not to buy such toy. When $w_i = 0$ for $i = 0$ and all $i \in S$, potato gains nothing. Potato wants to choose an optimal set of toys to maximize the mathematic expectation of his profit in the worst case, where w_i can be arbitrarily chosen within the ranges.

Potato is a smart guy and he can easily solve the above problems by himself. He raises a harder question. If there are two kinds of modification operations, the first modification operation will change the range of customer's preference and the second modification operation will change the profit of the toy i. Here one operation will effect all follow-up calculations. Can you quickly answer the the maximum profit after each modification?

Input

The first line contains two integers n and m $(1 \le n, m \le 2 \times 10^5)$ - the number of types of toys and the number of modification operations.

The second line contains n integers $v_1, v_2, \cdots, v_n$ $(1 \le v_i \le 10^6)$ - the profit of each type of toys.

The third line contains $n+1$ integers $l_0, l_1, \cdots, l_n$ - the lower bounds of customer's preference to buy toys.

The fourth line contains $n+1$ integers $r_0, r_1, \cdots, r_n$ $(0 \le l_i \le r_i \le 10^6)$ - the upper bounds of customer's preference to buy toys.

The next m line contains m modification operations, which is in one of the following two types:

- $1\ x\ y\ z$ $(0 \le x \le n, 0 \le y \le z \le 10^6)$ - change range of customer's preference to buy toy x to $[y, z]$
- $2\ x\ y$ $(1 \le x \le n, 1 \le y \le 10^6)$ - change the profit of toy x to y

Output

Print $m+1$ irreducible fraction (in the form of a/b, where the greatest common divisor of a and b is 1) — the initial profit and the profit after each modification.

Example

standard input	standard output
2 5 4 2 4 3 2 4 3 2 2 1 2 1 1 2 3 1 0 0 0 1 1 0 0 1 2 0 0	16/9 10/9 1/1 2/1 2/1 0/1