Dinner

Description

There are N people going to the restaurant, "ICPC". There is only one chef, Yen-Jen, in this restaurant. Since Yen-Jen is so strong and dian, he can prepare meals continuously without any rest. However, like most people, his brain has only one core, so he can prepare only one meal at one time.

Yen-Jen knows the i^{th} person's meal needs preparation time p_i, and he can finish his meal in e_i unit time. These N people will leave as long as all people finish their meals.

But now, things are going to be changed!

Q events will happen. The i^{th} is that some people's p_i or e_i will be changed.

Please tell them when is the earliest time all the N people can leave after each change happens.

Input

The first line in the input contains two integers N, Q, denotes the number of people, and the number of events, respectively.

The next line contains N space-separated integers $p_1, p_2, \ldots, p_N$, p_i denotes the preparation time of the i^{th} person initially.

The next line contains N space-separated integers $e_1, e_2, \ldots, e_N$, e_i denotes the unit time i^{th} person can finish his meal initially.

In the next Q lines, the i^{th} line contains three integers t, x, y. If $t = 1$, then change p_x to y, and if $t = 2$, then change e_x to y.

- $1 \leq N, Q \leq 2 \times 10^5$
- $1 \leq p_i, e_i, y \leq 10^9$
- $1 \leq t \leq 2$
- $1 \leq x \leq n$

Output

The output contains $Q + 1$ lines.

In the first line, please output the earliest time the all N people can leave can leave without happening any events.

Then, in the next Q lines, please output the earliest time the all N people can leave when happening event 1 to i in chronological order on the i^{th} line.

Sample Input

```
3 2
1 2 3
1 2 3
2 3 1
1 1 3
```

Sample Output

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7
7
9
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