

Problem K. Cocoa's homework

Syaro acted the role of the thief Lapin during Fleur du Lapin opening hours. But unfortunately, due to her lack of acting skills, all the attention was drawn away by other characters. So she made an appointment with Coco, Chino, Rize and Chiya to watch the Lapin TV series in the Rabbit House together at night. Syaro is watching TV while learning the movements of the thief Lapin.

After watching the TV series, Rize, Chiya and Syaro left. Cocoa and Chino watched them leave at the door of Rabbit House.

When returning to Chino's room, Cocoa suddenly remembered:



"I forgot to do my homework. Lapin stole my time!"

Cocoa's teacher gave two arrays of n numbers $A = [a_1, a_2, a_3, \dots, a_n]$, $B = [b_1, b_2, b_3, \dots, b_n]$ Then let her use these numbers and a number w to form a $n \times n$ matrix M (index started from 1):

$$M_{i,j} = \begin{cases} w + a_i b_j & \text{if } i + j - 1 = n \\ a_i b_j & \text{otherwise} \end{cases}$$

And let her find the determinant $\det(M)$ of this matrix M .

Cocoa's inspiration flashed, relying on her math skills, quickly calculated $\det(M)$. But Chino considered that Cocoa looks silly, she must be wrong. Because Cocoa always does Chino a disservice when Rabbit House is open, and Chino always helps her clean up the mess. She changed several numbers in the array A and B , and gave w arbitrarily, and let Cocoa do the calculation again to see if it was right. Can you help Chino calculate the value of $\det(M)$ so that she can quickly help Cocoa check whether it is correct? And Cocoa also wants to finish her homework and go to bed as soon as possible.

Input

The first line is two integers n, Q ($2 \leq n, Q \leq 100000$). Q means there are Q operations.

The n integers in the second line represent the array A , where each integer a_i satisfies $|a_i| \leq 10^9$.

The n integers in the third line represent the array B , where each integer b_i satisfies $|b_i| \leq 10^9$.

In the next Q line, there are three input types, representing three operations:

- 1 $p x$
It means that the number in the array A whose index is p is changed to an integer x , $1 \leq p \leq n, |x| \leq 10^9$.
- 2 $p x$
It means that the number in the array B whose index is p is changed to an integer x , $1 \leq p \leq n, |x| \leq 10^9$.
- 3 w
Represents the given integer $w, |w| \leq 10^9$.

Output

For each operation 3, output the value of $\det(M)$. Since the value of $\det(M)$ is too large, please output it after modulo $10^9 + 7$.

Example

standard input	standard output
2 4	
2 3	
1 5	
3 -1	12
1 2 4	999999972
2 1 6	
3 1	

Hint

The 1st operation 3: $M = \begin{bmatrix} 2 & 9 \\ 2 & 15 \end{bmatrix}$, $\det(M) = 2 \times 15 - 2 \times 9 = 12$.

The 2nd operation 3: $M = \begin{bmatrix} 12 & 11 \\ 25 & 20 \end{bmatrix}$, $\det(M) = 12 \times 20 - 25 \times 11 = -35$.