Problem H. Sugar Sweet II

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

Sugar is sweet.

There are n children asking for sugar. Prof. Chen gives out sugar to the children. The i-th child initially has a_i bags of sugar. There are n events happening in **uniformly randomized order**. The i-th event is:

- If the i-th child has **strictly less** bags of sugar than the b_i-th child, then the i-th child will get extra w_i bags of sugar. Otherwise, nothing happens.

Now, since the events happen in random order, Randias, which is the assistant of Prof. Chen, wants to know the expected number of bags of sugar each child will have after all the events happen.

It can be shown that the answer can be expressed as an irreducible fraction $\frac{x}{y}$ where x and y are integers and $y \not\equiv 0 \pmod{10^9+7}$. Output the integer equal to $x \cdot y^{-1} \pmod{10^9+7}$. In other words, output such an integer a that $0 \le a < 10^9+7$ and $a \cdot y \equiv x \pmod{10^9+7}$.

Input

Each test contains multiple test cases. The first line contains a single interger t ($1 \le t \le 5 \cdot 10^5$) denoting the number of test cases. For each test case:

The first line contains a single integer n ($1 \le n \le 5 \cdot 10^5$) denoting the number of children.

The second line contains n integers a_i ($1 \le a_i \le 10^9$): the initial number of bags of sugar each child has.

The third line contains n integers b_i ($1 \le b_i \le n$).

The fourth line contains n integers w_i ($1 \le w_i \le 10^9$).

It is guaranteed that the sum of n over all test cases does not exceed $5 \cdot 10^5$.

Output

For each test case, output n integers in a line: the expected number of bags of sugar each child will get. Output the answers as integers modulo 10^9+7, as described above.

Example

standard input	*standard output*
4 4 2 5 5 2 4 2 1 3 3 2 1 4 3 5 4 3 1 1 1 6 6 6 3 5 4 3 2 3 1 1 2 3 5 2 1 3 2 1 5 1 1 3 4 1 3 4 2 4	500000007 5 5 6 5 10 9 166666673 5 6 500000006 4 3 4 5