

USA Computing Olympiad



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USACO 2024 US OPEN CONTEST, GOLD PROBLEM 3. SMALLER AVERAGES

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Contest has ended.

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English (en) ▼

Bessie has two arrays of length N ($1 \leq N \leq 500$). The i -th element of the first array is a_i ($1 \leq a_i \leq 10^6$) and the i -th element of the second array is b_i ($1 \leq b_i \leq 10^6$).

Bessie wants to split both arrays into **non-empty** subarrays such that the following is true.

1. Every element belongs in exactly 1 subarray.
2. Both arrays are split into the same number of subarrays. Let the number of subarrays the first and second array are split into be k (i.e. the first array is split into exactly k subarrays and the second array is split into exactly k subarrays).
3. For all $1 \leq i \leq k$, the average of the i -th subarray on the left of the first array is **less than or equal to** the average of the i -th subarray on the left of the second array.

Count how many ways she can split both arrays into non-empty subarrays while satisfying the constraints modulo $10^9 + 7$. Two ways are considered different if the number of subarrays are different or if some element belongs in a different subarray.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains N .

The next line contains a_1, a_2, \dots, a_N .

The next line contains b_1, b_2, \dots, b_N .

OUTPUT FORMAT (print output to the terminal / stdout):

Output the number of ways she can split both arrays into non-empty subarrays while satisfying the constraints modulo $10^9 + 7$.

SAMPLE INPUT:

```
2
1 2
2 2
```

SAMPLE OUTPUT:

```
2
```

The two valid ways are:

1. Split the first array into $[1], [2]$ and the second array into $[2], [2]$.
2. Split the first array into $[1, 2]$ and the second array into $[2, 2]$.

SAMPLE INPUT:

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

SAMPLE OUTPUT:

```
3
```

The three valid ways are:

1. Split the first array into $[1, 3], [2]$ and the second array into $[2, 2], [2]$.
2. Split the first array into $[1, 3], [2]$ and the second array into $[2], [2, 2]$.
3. Split the first array into $[1, 3, 2]$ and the second array into $[2, 2, 2]$.

SAMPLE INPUT:

```
5
2 5 1 3 2
```

2 1 5 2 2

SAMPLE OUTPUT:

1

The only valid way is to split the first array into [2], [5, 1, 3], [2] and the second array into [2], [1, 5], [2, 2].

SAMPLE INPUT:

7

3 5 2 3 4 4 1

5 3 5 3 3 4 1

SAMPLE OUTPUT:

140

SCORING:

- Inputs 5-6: $N \leq 10$
- Inputs 7-9: $N \leq 80$
- Inputs 10-17: $N \leq 300$
- Inputs 18-20: $N \leq 500$

Problem credits: Alex Liang

Contest has ended. No further submissions allowed.