

# Shuffle and Max Bracket Score

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            4 seconds  
Memory limit:         1024 megabytes

Aoba-san came up with the following problem.

## Max Bracket Score

You are given an integer sequence  $A = (A_1, A_2, \dots, A_{2N})$  of length  $2N$ .  
For a correct parentheses sequence  $s$  of length  $2N$ , its score is defined as follows:

- The sum of  $A_i$  for all indices  $i$  where  $s_i$  is (.

Find the maximum possible score among all correct parentheses sequences of length  $2N$ .

Hirose-san thought it was too easy, and came up with the following problem.

## Shuffle and Max Bracket Score

You are given an integer sequence  $A = (A_1, A_2, \dots, A_{2N})$  of length  $2N$ .  
After shuffling  $A$  uniformly at random, compute the expected value of the answer to Max Bracket Score problem modulo 998244353.

Solve **Shuffle and Max Bracket Score**.

## Definition of a correct parentheses sequence

A string is said to be a correct parentheses sequence if one of the following conditions is satisfied.

- It is an empty string.
- It is a concatenation of  $(, s, )$ , for some correct parentheses sequence  $s$ .
- It is a concatenation of  $s$  and  $t$ , for some correct parentheses sequences  $s$  and  $t$ .

## Definition of the expected value modulo 998244353

It can be proven that the sought expected value is always a rational number. Also, in the constraints of this problem, it is guaranteed that when the sought expected value is expressed in the form of an irreducible fraction  $\frac{y}{x}$ ,  $x$  is not divisible by 998244353. In this case, there exists a unique integer  $0 \leq z < 998244353$  satisfying  $y \equiv xz \pmod{998244353}$ , so output  $z$ .

## Input

The input is given from Standard Input in the following format:

```
N  
A1 A2 ... A2N
```

- $1 \leq N \leq 10^5$
- $1 \leq A_i \leq 10^9$
- All input values are integers.

## Output

Print the answer in a single line.

## Examples

standard input	standard output
1 1 2	499122178
2 1 2 3 4	831870300
4 31415 92653 58979 32384 62643 38327 95028 84197	420993474

## Note

For the first example,

- When  $A = (1, 2)$ , the answer to the Max Bracket Score problem is 1.
  - When  $s$  is  $()$ , the score is 1.
- When  $A = (2, 1)$ , the answer to the Max Bracket Score problem is 2.
  - When  $s$  is  $()$ , the score is 2.

The expected value is  $\frac{1}{2}(1 + 2) = \frac{3}{2}$ .

For the second example,

- For example, when  $A = (1, 2, 3, 4)$ , the answer to the Max Bracket Score problem is 4.
  - When  $s$  is  $()()$ , the score is  $1 + 3 = 4$ .
  - When  $s$  is  $(())$ , the score is  $1 + 2 = 3$ .
- Similarly, when  $A = (4, 3, 2, 1)$ , the answer to the Max Bracket Score problem is 7.
  - When  $s$  is  $()()$ , the score is  $4 + 2 = 6$ .
  - When  $s$  is  $(())$ , the score is  $4 + 3 = 7$ .

The expected value is  $\frac{35}{6}$ .