

# A

# Recurrence

**Input:** Standard Input  
**Output:** Standard Output



Consider a tuple  $P_1, P_2, P_3, \dots, P_n$ . Now consider the following recurrence function.

- $F(P_1, P_2, P_3, \dots, P_n) = 0$  if any of the  $P_i$  is negative or the tuple  $P$  is not sorted in non-increasing order.
- $F(P_1, P_2, P_3, \dots, P_n) = 1$  if all of the  $P_i$ s is zero.
- $F(P_1, P_2, P_3, \dots, P_n) = F(P_1 - 1, P_2, P_3, \dots, P_n) + F(P_1, P_2 - 1, P_3, \dots, P_n) + F(P_1, P_2, P_3 - 1, \dots, P_n) + \dots + F(P_1, P_2, P_3, \dots, P_n - 1)$  otherwise

For example if  $n$  is 4 then the value

$F(4, 3, 2, -1)$  is 0 because the last parameter is negative.

$F(4, 3, 2, 5)$  is 0 because the tuple is not sorted from the largest to smallest.

$F(3, 3, 2, 1) = F(3, 3, 2, 1) + F(4, 2, 2, 1) + F(4, 3, 1, 1) + F(4, 3, 2, 0)$

$F(1, 1, 0, 0) = F(0, 1, 0, 0) + F(1, 0, 0, 0) + F(1, 1, -1, 0) + F(1, 1, 0, -1) = 2$

Given the tuple  $P$  your task is to calculate the value of  $F(P_1, P_2, P_3, \dots, P_n)$ . The result can be very big so output the result mod 1,000,000,009 (this is a prime number).

## Input

Input starts with an integer  $T (\leq 50)$ , denoting the number of test cases.

Each test case consists of two lines. First line contains  $n$ . Second line contains  $n$  integers separated by a single space. These are the tuple  $P$ .  $n$  is between 1 and 1000 inclusive. Each of the numbers in tuple  $P$  is between 1 and 1000 inclusive.  $P$  will be sorted in non-increasing order.

## Output

For each test case output contains a line in the format Case  $x$ :  $R$  where  $x$  is the case number (starting from 1) and  $R$  is the value of  $F(P_1, P_2, P_3, \dots, P_n) \bmod 1,000,000,009$ .

## Sample Input

```
8
3
7 5 4
6
7 7 5 3 2 1
2
4 2
3
7 4 4
4
8 7 5 5
5
7 7 6 5 5
2
8 7
3
6 3 1
```

## Output for Sample Input

```
Case 1: 100100
Case 2: 398009117
Case 3: 9
Case 4: 25025
Case 5: 923714728
Case 6: 311516464
Case 7: 1430
Case 8: 315
```