

12810 Sumthing

Has it ever happened to you that, having worked on a problem for a long time, it starts to pop up in your conscious mind when you least expect it? Just the other day I was singing that old song that goes “*Something in the way she moves...*”, but before I knew it, I replaced part of the lyrics with “*Sum-thing in the way she woos me...*”. The only explanation I have for this is that I had been working recently on a curious mathematical problem concerning sums. It goes something like this:

Consider a list A with n positive integers, $A_1, A_2, A_3, \dots, A_n$. A function S is defined as follows, for $1 \leq k \leq n$:

$$S(k) = 2^{k-1} \sum_{i_1=1}^n \sum_{i_2=i_1+1}^n \sum_{i_3=i_2+1}^n \cdots \sum_{i_k=i_{k-1}+1}^n A_{i_1} A_{i_2} A_{i_3} \cdots A_{i_k}$$

For example, if $A = (1, 2, 3)$, then the possible values of S are:

$$\begin{aligned} S(1) &= 1 + 2 + 3 = 6 \\ S(2) &= 2 \cdot ((1 \cdot 2) + (1 \cdot 3) + (2 \cdot 3)) = 2(2 + 3 + 6) = 22 \\ S(3) &= 4 \cdot (1 \cdot 2 \cdot 3) = 4 \cdot 6 = 24 \end{aligned}$$

What the problem asks is, given the list A , find the sum:

$$\Phi = \sum_{k=1}^n S(k)$$

Input

Input starts with an integer T , the number of test cases. Each test case starts with an integer n in the first line. The second line of each case contains n positive integers, separated by spaces, that form the set A .

$T \leq 10$; $1 \leq n \leq 10^5$; $1 \leq A_i \leq 10^9$ for $1 \leq i \leq n$

Output

For each test case, print the value of Φ , modulo 1000000009 ($10^9 + 9$) on a single line.

Sample Input

```
2
3
1 2 3
5
2 3 5 7 11
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Sample Output

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52
66412
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