

Contest Duration: 2025-11-29(Sat) 23:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251129T2100&p1=248>) - 2025-11-30(Sun) 00:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251129T2240&p1=248>) (local time) (100 minutes)

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F - Concat (2nd)

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 575 points

Problem Statement

You are given N strings S_i consisting of lowercase English letters.

For all possible permutations $P = (P_1, P_2, \dots, P_N)$ of $(1, 2, \dots, N)$, write down the string generated as follows:

- Concatenate $S_{P_1}, S_{P_2}, \dots, S_{P_N}$ in this order.

Let $A_1, A_2, \dots, A_{N!}$ be the sequence of the $N!$ written strings sorted in lexicographical order.

Output A_2 .

You are given T test cases; solve each of them.

Constraints

- $1 \leq T \leq 1.5 \times 10^5$
- $2 \leq N \leq 3 \times 10^5$
- T, N are integers.
- S_i is a string consisting of lowercase English letters with length between 1 and 10^6 – 1, inclusive.
- For a single input, the sum of N does not exceed 3×10^5 .
- For a single input, the sum of $|S_i|$ does not exceed 10^6 .

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Input

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

```
T  
case1  
case2  
:  
:  
caseT
```

Each test case is given in the following format:

```
N  
S1  
S2  
:  
:  
SN
```

Output

Output T lines.

The i -th line should contain the answer for the i -th test case.

Sample Input 1

CopyCopy

```
3
3
abc
ac
ahc
4
aaa
a
aaaa
a
15
ks
sy
k
ysk
yks
ky
ksy
sk
syk
s
kys
sky
ys
yk
y
```

Sample Output 1

[Copy](#)

```
abcahcac
aaaaaaaaaa
kksksykykysskskyssyksyyksykysskyys
```

[Copy](#)

This input contains three test cases.

For the first test case, $S = (\text{abc}, \text{ac}, \text{ahc})$.

We have $A = (\text{abcacahc}, \text{abcahcac}, \text{acabcahc}, \text{acahcabc}, \text{ahcabcac}, \text{ahcacabc})$, so output $A_2 = \text{abcahcac}$.

```
/#telegram)
```

```
#url=https%3A%2F%2Fcoder.jp%2Fcontests%2Fabc434%2Ftasks%2Fabc434_f%3Flang%3Den&title=F%20-
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