Shashank and the Palindromic Strings

HackerRank

Shashank loves strings, but he loves palindromic strings the most. He has a list of n strings, $A = [a_0, a_1, \ldots, a_{n-1}]$, where each string, a_i, consists of lowercase English alphabetic letters. Shashank wants to count the number of ways of choosing non-empty subsequences $s_0, s_1, s_2, \ldots, s_{n-1}$ such that the following conditions are satisfied:

1. s_0 is a subsequence of string a_0, s_1 is a subsequence of string a_1, s_2 is a subsequence of string a_2, $\ldots$, and s_{n-1} is a subsequence of string a_{n-1}.
2. $s_0 + s_1 + s_2 + \ldots + s_{n-1}$ is a palindromic string, where `+` denotes the string concatenation operator.

You are given q queries where each query consists of some list, A. For each query, find and print the number of ways Shashank can choose n non-empty subsequences satisfying the criteria above, modulo $10^9 + 7$, on a new line.

Note: Two subsequences consisting of the same characters are considered to be different if their characters came from different indices in the original string.

Input Format

The first line contains a single integer, q, denoting the number of queries. The subsequent lines describe each query in the following format:

- The first line contains an integer, n, denoting the size of the list.
- Each line i of the n subsequent lines contains a non-empty string describing a_i.

Constraints

- $1 \leq q \leq 50$
- $1 \leq n \leq 50$
- $\sum_{i=0}^{n-1} |a_i| \leq 1000$ over a test case.

For 40% of the maximum score:

- $1 \leq n \leq 5$
- $\sum_{i=0}^{n-1} |a_i| \leq 250$ over a test case.

Output Format

For each query, print the number of ways of choosing non-empty subsequences, modulo $10^9 + 7$, on a new line.

Sample Input 0

```
3
3
aa
b
aa
3
a
b
c
2
abc
abc
```

Sample Output 0

```
5
0
9
```

Explanation 0

The first two queries are explained below:

1. We can choose the following five subsequences:
    1. $s_0 =$ **"a"**, $s_1 =$ **"b"**, $s_2 =$ **"a"**, where s_0 is the first character of a_0 and s_2 is the first character of a_2.
    2. $s_0 =$ **"a"**, $s_1 =$ **"b"**, $s_2 =$ **"a"**, where s_0 is the second character of a_0 and s_2 is the second character of a_2.
    3. $s_0 =$ **"a"**, $s_1 =$ **"b"**, $s_2 =$ **"a"**, where s_0 is the first character of a_0 and s_2 is the second character of a_2.
    4. $s_0 =$ **"a"**, $s_1 =$ **"b"**, $s_2 =$ **"a"**, where s_0 is the second character of a_0 and s_2 is the first character of a_2.
    5. $s_0 =$ **"aa"**, $s_1 =$ **"b"**, $s_2 =$ **"aa"**

    Thus, we print the result of $5 \bmod (10^9 + 7) = 5$ on a new line.
2. There is no way to choose non-empty subsequences such that their concatenation results in a palindrome, as each string contains unique characters. Thus, we print 0 on a new line.