2969 Optimal Keypad

Optimus Mobiles produces mobile phones that support SMS messages. The Mobiles have a keypad of 12 keys, numbered 1 to 12. There is a character string assigned to each key. To type in the n-th character in the character string of a particular key, one should press the key n times. Optimus Mobiles wishes to solve the problem of assigning character strings to the keys such that for typing a random text out of a dictionary of common words, the average typing effort (i.e. the average number of keystrokes) is minimal.

Figure 1

To be more precise, consider a set of characters {a, b, c,. . . , z, +, *, /, ?} printed on a label tape as in Fig. 2. We want to cut the tape into 12 pieces each containing one or more characters. The 12 labels are numbered 1 to 12 from left to right and will be assigned to the keypad keys in that order.

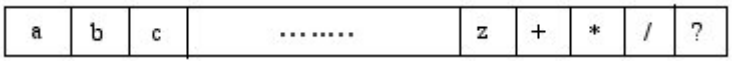

Figure 2

You are to write a program to find the 11 cutting positions for a given dictionary of common words. The cutting positions should minimize the average number of keystrokes over all common words in the dictionary. Your output should be a string of 11 characters, where character i in this string is the first character of the $(i + 1)$-th label.

Input

The first line contains a single integer t $(1 \leq t \leq 10)$, the number of test cases. Each test case starts with a line, containing an integer M $(1 \leq M \leq 10000)$, the number of common words in the test case. In each M subsequent line, there is a common word. Each common word contains at most 30 characters from the alphabet {a, b, c, . . . , z, +, *, /, ?}.

Output

The output contains one line per test case containing an optimal cut string. Obviously, there may be more than a single optimal cut string, so print the optimal cut string which is the smallest one in lexicographic order.

Sample Input

```
2
2
hi
ok
5
hello
bye
how
when
who
```

Sample Output

```
bcdefghijko
bcdefhlnowy
```