



Inter University Programming Contest

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Reading Steiner

Max. Score: 100

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Problem Statement

It is 9th January, and Joker is on his move again. This time he had planted time-bombs in the security headquarters which are set to explode the next day. Unfortunately the bombs are in a shielded suitcase, and any tinkering with the suitcase will cause the bomb to explode at that very instant. The only way to open the suitcase is through a secret message, which no one knows other than Joker. As usual, Joker announces his plan on the news, and challenges batman to stop him if he can. He also gives Batman an arbitrary message, which he says is related to that secret message, in a way that the arbitrary message is built around the 'Reading Steiner' of the actual secret message.

Since Batman didn't know what is 'Reading Steiner', he immediately investigates, and finds that the suitcase has IBN-5100 security which uses a special string as a means to lock-unlock. The special string is special in two ways. First, it is a sentence with arbitrary number of different words, but its first word is always a six alphabet word, and this word always start and end with the same alphabet and no other alphabets are repeated in it. This word is called the 'Reading Steiner' of the string. Second, this string can only use 25 types of different alphabets instead of 26. Batman deduces that since Joker always reserve his 'J' as the trump card, this string also does not contain any 'J'.

For now, lets call this special string as the first string and the arbitrary message of Joker to Batman as second string. To unlock the suitcase, Batman needs this the first string, but all he have is that second string from Joker which is built around the 'Reading Steiner' of the first string. He then gets another hint from Joker, informing him more about the relation between the two strings. He tells Batman how he built the second string from the first string.

He first took all the alphabets and removed 'J'. Then he changed their alphabetic order in such a way, that all the alphabets that appear in the 'Reading Steiner' are written first (in order as they appear), and the remaining alphabets are left as it is. **For eg.** if 'Reading Steiner' is HELOPH, the new alphabetic order will be : HELOPABCDGFIKMNQRSTUVWXYZ. Next he takes a 5x5 grid, and fill it with alphabets row wise according to this new alphabetic order.

Now he takes the first string, remove all the spaces, and then breaks the string again, by adding space after every two alphabets. In case a pair has both the same alphabets, then he adds 'X' between them and make new pairs. In case the last pair has only one alphabets, then he adds 'X' again in the end. **For eg.** MEDIUM IS FOR FOOL becomes ME DI UM IS FO RF OX OL Now he takes each pair and replaces them with another pair using the grid under the following rules :

1). If the two letters forms a line then

a). if they form a line in a row, then each letter gets replaced by the letter to their right wrapping at the ends.

If Grid =

```
* * * * *
* O Y R Z
* * * * *
* * * * *
* * * * *
```

Then OR -> YZ

b. if they form a line in a column, then each letter gets replaced by the letter below them wrapping at the ends.

If Grid =

```
* * O * *
* * B * *
* * * * *
* * R * *
* * Y * *
```

Then OR -> BY

2). If the two letters forms a rectangle with both being at the opposite ends, then the letters are replaced with the letters coming at the other end of the same row.

If Grid =

```
Z * * O *
* * * * *
* * * * *
R * * X *
```

Then OR -> ZX

Here OR formed a rectangle, with both being at opposite ends. Then O gets replaced by Z which is on the other end at the same row. Same with R.

After replacing each pair using the above two rules, he combines all pairs and obtains the second string. With this much info at hand, the knowledge about the 'Reading Steiner' and a second string, he must obtain the first string before its too late. The Batman comes to you to help him in this task. Given an input string, you have to find an output string, such that when

the above process is carried out on the output string, we get the input string again. IBN-5100 is case sensitive, it needs the complete string in upper case, and it shouldn't contain any space.

Input :

Input begins with an integer T , the number of test cases. T lines follow. For each test case, you are given a string.

Output :

For each input, produce an output string (should be in uppercase and shouldn't contain any spaces).

Constraints :

$0 \leq T \leq 100$

$6 \leq \text{String Length} \leq 600$

Remark : Neither the output nor the input makes any sense meaning wise.

Sample Input ([Plaintext Link](#))

```
2
TDYHGTNFDARI
MNGIQMHQ
```

Sample Output ([Plaintext Link](#))

```
OM
QMNGIQFM
```

Time Limit: 1 sec(s) for each input file.

Memory Limit: 256 MB

Source Limit: 1024 KB

Scoring: Score is assigned when all testcases pass.

Allowed languages: C, C++, Clojure, Go, Haskell, C#, Java, JavaScript, Objective-C, Perl, PHP, Python, Ruby

[Load Code Editor](#) You can submit code after loading editor.

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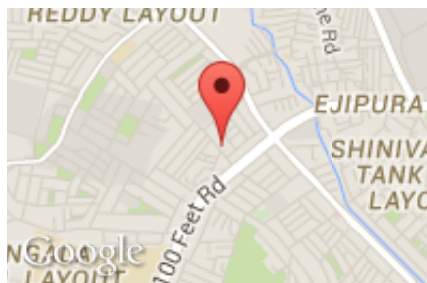
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