In the last IIUPC there was a problem called Da Vinci Code prepared on the story of the bestselling book of Dan Brown, *The Da Vinci Code*. Here is another problem based on his another techno-thriller novel *Digital Fortress*. In this problem, you will be given a cipher text. Your task is to decipher the text using the decrypting technique described below. Let's take an example. A cipher text is given as follows:

`WECGEWHYAAIORTNU`

The output will be:

`WEAREWATCHINGYOU`

For this problem, there are 16 characters in the given cipher text "`WECGEWHYAAIORTNU`" which is square of 4. These letters have to be arranged in $n \times n$ (in this example 4×4) grid and each letter from the given input will be placed in a grid in row major order (1st row, 2nd row, 3rd row, ...). When the given cipher text is placed in the grid it looks like as follow:

```
W E C G
E W H Y
A A I O
R T N U
```

From the above grid if we take the letters in column major order (1st column, 2nd column, 3rd column, ...) then we get the following decrypted text:

`WEAREWATCHINGYOU`

Input

Input starts with a line consisting of a single number T. T test cases follow. Each test case consists of one line. This line contains the cipher text. The cipher text contains either `UPPERCASE` letters or blank spaces. Total number of character in the text will not be more 10,000.

Output

For each test case, the output contains a single line containing the decrypted text. If the number of characters in the input text is not square of any number, then give the output '`INVALID`'.

Sample Input

```
3
WECGEWHYAAIORTNU
DAVINCICODE
DTFRIAOEGLRSI TS
```

Sample Output

```
WEAREWATCHINGYOU
INVALID
DIGITAL FORTRESS
```