

Project Euler #89: Roman numerals



The values of Roman Numeral symbols in decimal are the following:

```
I - 1
V - 5
X - 10
L - 50
C - 100
D - 500
M - 1000
```

In general, a roman number is written in descending order of symbols which are to be added. For example, **14** is written as **XIV** as **X** and **V** are to be added and **I** is subtracted from **V**. One does not write 14 as IVX or 15 as VX. This is because, appearance of a symbol with lesser value before another symbol implies subtraction.

Rules for subtraction:

1. I can only be subtracted from V and X.
2. X can only be subtracted from L and C.
3. C can only be subtracted from D and M.
4. V, L, D and M can't be subtracted from any symbol.
5. At most one symbol can be subtracted from another symbol.

For example, **999** would be written as CMXCIX and not IM.

One last rule to be kept in mind while writing Roman Numerals is that except M, no numeral appears more than 3 times in a row and none of V, L, D appear even twice in a row. Hence 9 is IX and not VIIII.

In this task, you'll be given symbols in descending order which represent a number. You have to output a valid roman numeral representation of that number by following the above rules.

For example, the following represent all of the legitimate ways of writing the number sixteen:

```
IIIIIIIIII
VIIIIIIII
VVIIIIII
XIIIIII
VVVI
XVI
```

The last example being considered the most efficient, as it uses the least number of numerals.

Input Format

First line contains a single integer T denoting the number of test-cases.

T lines follow, each contains a string representing a number.

Output Format

Output T lines, i^{th} line should contain the correct roman number representation of the i^{th} string in the input.

Constraints:

$$1 \leq T \leq 1000$$

$1 \leq \text{Length of each string in the input} \leq 1000$

Sample Input

```
5
IIIII
VVVVVVVV
MMMMMMMMMMMMMMIII
LLLXXXXX
CCXX
```

Sample Output

```
V
XLV
MMMMMMMMMMMMMIV
CC
CCXX
```

Explanation

1. More than 3 symbols can't appear in a row.
2. V can't be subtracted from anything.
3. More than 3 M can appear in a row.
4. Converting all X to L makes LLLL which is not valid since V, L, D can not appear more than once in a row.
5. This is an example of a correct representation.