6878 Generalized Roman Numerals

The ancient Romans developed a terrible numbering system in which `I`, `V`, `X`, `L` and `C` stood for 1, 5, 10, 50 and 100, respectively. So `XXXVII` represents 37 (10+10+10+5+1+1). They typically wrote the numerals in non-increasing order. However, when a single Roman numeral is written before one that is larger, we subtract the smaller from the larger. So we can write `IV` and `IX` to represent 4 and 9 (subtracting 1), or `XL` and `XC` to represent 40 and 90 (subtracting 10). To represent 94, we would write `XCIV`.

`VIC` is generally not considered a traditional Roman numeral, but we can interpret this as another representation of 94: `VI` is 6, so `VIC` is 100-6. In general, if we have two expressions a and b representing values $v(a)$ and $v(b)$, then we say that $v(ab)$ is $v(a) + v(b)$ if $v(a) \geq v(b)$, and $v(b) - v(a)$ otherwise.

Unfortunately, this generalization introduces some ambiguity, since different orders of evaluation may result in different values. For example, consider `IVX`: `IV` is 4 and `X` is 10, so by that reasoning `IVX` is 6. However, `I` is 1 and `VX` is 5, so this suggests that `IVX` is actually 4. To remedy this ambiguity, we allow the addition of parentheses. The question arises: for a given string of Roman numeral characters, how many different values can be obtained using different placements of parentheses?

Input

Each test case consists of a single string containing only the characters '`I`', '`V`', '`X`', '`L`' and '`C`'. The length of this string will be ≤ 50. A line containing of a single '`0`' will terminate input.

Output

For each test case, output all possible distinct values that can be represented by the string via the addition of parentheses. Display these values in increasing order.

Sample Input

```
IVX
XIXIX
0
```

Sample Output

```
Case 1: 4 6
Case 2: 8 10 28 30 32
```