

Integer Factorization (29 digits)

This is a problem to test the robustness of your Integer Factorization algorithm.

Given some integers, you need to factor them into product of prime numbers.

The largest integer given in the input file has 29 digits.

You may need to use a general factorization algorithm since no special numbers (e.g. Fermat numbers) are considered when designing the input data.

Input

There are several numbers given, each one in a line.

The input ends with a number 0.

The number of test cases is about 10.

Output

For each number, print in a line the factorization of it. See examples below for the output format.

Example

Input:

```
3111989
13091989
2432902008176640000
77145199750673
0
```

Output:

```
317^1 9817^1
17^2 89^1 509^1
2^18 3^8 5^4 7^2 11^1 13^1 17^1 19^1
328439^1 234884407^1
```