The factorial of a number N (written $N!$) is defined as the product of all the integers from 1 to N. It is often defined recursively as follows:

$$1! = 1$$
$$N! = N * (N - 1)!$$

Factorials grow very rapidly — $5! = 120$, $10! = 3,628,800$. One way of specifying such large numbers is by specifying the number of times each prime number occurs in it, thus 825 could be specified as (0 1 2 0 1) meaning no twos, 1 three, 2 fives, no sevens and 1 eleven.

Write a program that will read in a number N ($2 \leq N \leq 100$) and write out its factorial in terms of the numbers of the primes it contains.

Input

Input will consist of a series of lines, each line containing a single integer N. The file will be terminated by a line consisting of a single '0'.

Output

Output will consist of a series of blocks of lines, one block for each line of the input. Each block will start with the number N, right justified in a field of width 3, and the characters '!', space, and '='. This will be followed by a list of the number of times each prime number occurs in $N!$.

These should be right justified in fields of width 3 and each line (except the last of a block, which may be shorter) should contain fifteen numbers. Any lines after the first should be indented.

Follow the layout of the example shown below exactly.

Sample Input

```
5
53
0
```

Sample Output

```
  5! =  3  1  1
 53! = 49 23 12  8  4  4  3  2  2  1  1  1  1  1  1
        1
```