Problem 4: Abba

Overview

The security of Internet transactions relies upon strong cryptography. Strong cryptography depends upon \textit{one-way functions}. An example of a one-way function is multiplication. Given two large (usually prime in the case of cryptography) numbers, it is easy to multiply them. On the other hand, given a product, it is very difficult to compute the factors that produced that product. In this problem, you will explore a different sort of one-way function.

Problem

Any positive integer can be broken into two numbers that exhibit the “ABBA” pattern. This is determined by finding values $a$ and $b$ such that $N = a^b b^a$. Such a pair is, by convention, defined with $a <= b$. For instance, $72 = 2^3 3^2$. (All numbers can be decomposed given that there is a trivial solution with $a=1$.) When more than one decomposition exists, the correct decomposition is the one with the highest value for $a$.

Input

The input for this program consists of a single positive integer, $N$. $N$ will be less than $2^{32}$.

Output

The output consists of an ordered pair showing the ABBA decomposition, formatted as in the examples. (Note: there are no spaces in the output.)

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Example 1

Input
72

Output
(2, 3)

Example 2

Input
71

Output
(1, 71)

Mathematical Hint/Warning

If you pick a random number, there is a very high likelihood (>99%) that $a$ will be equal to 1. Among other things, this makes it an extremely poor choice for a one-way function; don’t even think of using this for real cryptography!