

12438 Farey Polygon

In mathematics, the Farey sequence of order n is the sequence of completely reduced fractions between 0 and 1 which, when in lowest terms, have denominators less than or equal to n , arranged in order of increasing size. Each Farey sequence starts with the value 0, denoted by the fraction 0/1, and ends with the value 1, denoted by the fraction 1/1 (taken from Wikipedia). For this problem we append a fraction 0/0 at the beginning of each series. So, the modified Farey sequences of order 1 to 8 are given below:

$$\begin{aligned}
 F_1 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{1} \right\} \\
 F_2 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_3 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{3}, \frac{2}{3}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_4 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{4}, \frac{1}{3}, \frac{2}{3}, \frac{3}{4}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_5 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{5}, \frac{1}{4}, \frac{2}{5}, \frac{1}{3}, \frac{2}{5}, \frac{3}{5}, \frac{2}{3}, \frac{4}{5}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_6 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{6}, \frac{1}{5}, \frac{2}{5}, \frac{1}{4}, \frac{2}{5}, \frac{3}{5}, \frac{2}{3}, \frac{4}{5}, \frac{5}{6}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_7 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{7}, \frac{1}{6}, \frac{2}{6}, \frac{1}{5}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{2}{3}, \frac{5}{7}, \frac{3}{4}, \frac{5}{6}, \frac{6}{7}, \frac{1}{2}, \frac{1}{1} \right\} \\
 F_8 &= \left\{ \frac{0}{0}, \frac{0}{1}, \frac{1}{8}, \frac{1}{7}, \frac{2}{7}, \frac{3}{7}, \frac{4}{7}, \frac{5}{7}, \frac{6}{7}, \frac{1}{6}, \frac{2}{6}, \frac{3}{6}, \frac{4}{6}, \frac{5}{6}, \frac{2}{5}, \frac{3}{5}, \frac{4}{5}, \frac{5}{5}, \frac{6}{8}, \frac{7}{8}, \frac{1}{2}, \frac{1}{1} \right\}
 \end{aligned}$$

Now we can represent each fraction p/q as a point (q, p) in the Cartesian plane. If we connect these points in the same order of Farey sequence (additionally the last one is connected to the first) we get a polygon. In this problem such a polygon will be called Farey Polygon of magnification 1. For example if we plot the fractions of F_4 in Cartesian plane and connect them in the same order as they are in the Farey sequence we get a Farey polygon of order four and magnification 1. This polygon is shown in Figure 1 (see the next page).

By multiplying the coordinates of vertices of Farey Polygon of order n , and magnification 1 with an integer m (and of course then connecting them) we get a Farey Polygon of order n and magnification m . For example in Figure 2 we see a Farey Polygon of order 4 and magnification 2. The number of lattice points inside this polygon is 5. Given the number of lattice points inside a lattice polygon, you will have to find its order and magnification.

Input

The input file contains 12000 lines of inputs. Each line contains a non-negative integer I , which denotes the number of lattice points inside the Farey Polygon. The value of I does not exceed 10^{16} . Input is terminated by a line containing '-1'. This line should not be processed.

Output

For each line of input produce one line of output. This line may contain two positive integers n and m that indicates the order and magnification respectively of the Farey Polygon, that has exactly I lattice

points inside it. If there is more than one answer produce the one that has the minimum positive n . If there is still a tie choose the minimum positive m . If no such Farey Polygon is found whose order and magnitude is less than 15001, then print the line 'NOT FOUND' (without the quotes) instead.

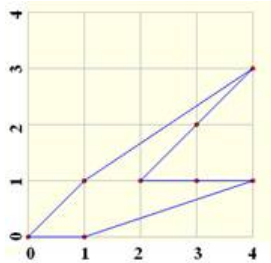


Figure 1: Farey Polygon of order 4 and magnification 1

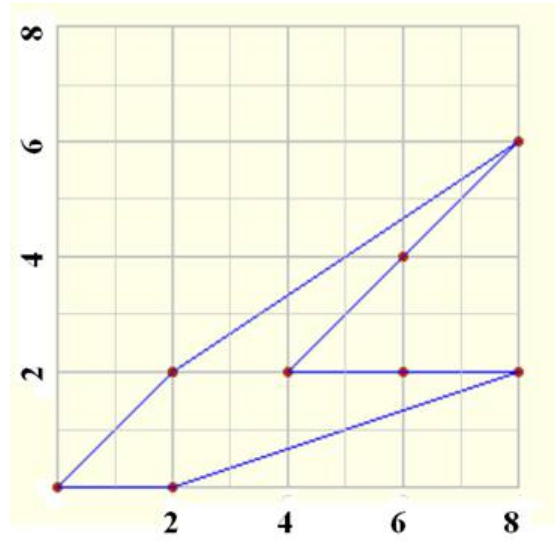


Figure 2: Farey Polygon of order 4 and magnification 2

Sample Input

```
5
1
100
102
-1
```

Sample Output

```
4 2
1 3
2 11
NOT FOUND
```