

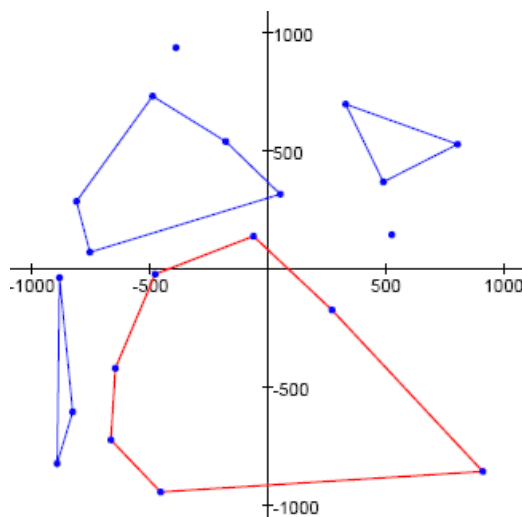
Project Euler #252: Convex Holes

This problem is a programming version of [Problem 252](#) from [projecteuler.net](#)

Given a set of points on a plane, we define a **convex hole** as a strictly convex polygon such that:

1. the vertices are from the set of given points;
2. the polygon is convex;
3. none of the elements of the given set lie in the interior of the polygon. Non-vertex elements may lie on the boundary;
4. no three consecutive vertices are colinear.

As an example, the image below shows a set of twenty points and a few such convex holes. The convex hole shown as a red heptagon has an area equal to **1049694.5** square units, which is the highest possible area for a convex hole on the given set of points.



For our example, we used the first 20 points (T_{2k-1}, T_{2k}) , for $k = 1, 2, \dots, 20$, produced with the pseudo-random number generator (given $S_0 = 290797$ and $M = 50515093$):

$$S_{n+1} = S_n^2 \bmod M$$

$$T_n = (S_n \bmod 2000) - 1000$$

i.e. $(527, 144), (-488, 732), (-454, -947), \dots$

Given integers M , S_0 and N , generate N ordered pairs with the pseudo-random sequence with parameters M and S_0 . Remove duplicate points. What is the maximum area of a convex hole with vertices from this set of points? How many different convex holes are there?

Input Format

Each test file contains 3 lines containing the integer values of N , S_0 and M .

Constraints

- $0 < N \leq 450$

- $0 < M \leq 1000000000$

- $0 < S_0 < M$

Output Format

Print your solution in two lines. On the first line print the maximum convex hole area with exactly one digit after the decimal point. On the second line print the integer value of the number of convex holes.

Sample Input 0

```
50
290797
50515093
```

Sample Output 0

```
584388.5
16186
```

Explanation 0

All **50** of the generated points are unique. The largest area convex hole has area **584388.5** and there are **16186** different convex holes.