

Expected Size of Random Convex Hull

Description

Currently, Eddy is reading this paper “On the Expected Complexity of Random Convex Hulls”(1997). It states that the expected number of vertices of the convex hull of N points, chosen uniformly and independently from a disk is $O(N^{\frac{1}{3}})$, and $O(K \log N)$ for the case a convex polygon with K sides, and so on. Eddy thinks it's very interesting and now wants to research something about it. But, it seems too hard to start with something like disk or polygon.

Thus, as his first step in the research, Eddy first chooses a triangle. Now, Eddy wants to find out the expected number of points on the convex hull when uniformly randomly picking N points within the triangle. However, Eddy can't find any way to solve this problem. As his best friend, you come to help Eddy finish his research debut.

Input

For first three lines, each contains two space-separated integer x_i, y_i indicating the points (x_i, y_i) of the triangle Eddy chooses. Forth line contains one integer N indicating that N points will be randomly uniformly chosen within the given triangle.

- $-10^9 \leq x_i, y_i \leq 10^9$
- $3 \leq N \leq 1000$
- It's guaranteed that given input forms a non-degenerate triangle

Output

Output a floating number indicating the expected number of points on the convex hull.

Absolutely or relatively error within 10^{-4} will be considered correct.

Sample Input

```
0 0
1 0
2 1
3
```

Sample Output

```
3.000000000000
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