

Circle vs Triangle

You are given a triangle and a circle in a plane. You can arbitrarily rotate or move them. What's the maximum possible area of their overlapping region?

Input

Input consists of one or more lines. For each line, there are four integers describing one test case: the lengths of three sides of a triangle a, b, c ; and the radius of a circle r , where $1 \leq a \leq b \leq c \leq 100, 1 \leq r \leq 100, a+b > c$.

End of input is indicated by a line consisting four zeros.

Output

For each test case, output a single line showing the largest overlapping area of the circle and the triangle. We accept solutions with absolute error less than 10^{-2} .

Example

Input:

```
3 4 5 1
5 5 8 4
0 0 0 0
```

Output:

```
3.14
12.00
```

Judge is modified on Feb 23,2010. Now you can click on "Wrong Answer" for further information.