CPC '21 Contest 1 P3 - AQT and Circles

Time limit: 2.0s **Memory limit:** 256M
Python: 4.0s

AQT is studying circles and he has encountered the following problem. Two circles C_1 and C_2 have their centres located at $(0, 0)$ on a coordinate plane. Circle C_1 and C_2 have radii R_1 and R_2 $(R_1 \leq R_2)$, respectively. AQT decides to add another circle C_3 with radius R_3 $(R_3 < R_2)$ and a centre that is located at (x, y), where x and y are real numbers. The location of circle C_3 is random but it follows the condition that it is completely inside circle C_2. Formally, $x^2 + y^2 < (R_2 - R_3)^2$. A position of circle C_3 is called valid if the circumference of circle C_3 has 0 intersection points with the circumference of circle C_1. AQT wants to know the probability that the position of circle C_3 is valid. AQT is given T of these problems. Can you help AQT solve all of them?

Constraints

In all subtasks,

$1 \leq T \leq 2 \cdot 10^5$

$1 \leq R_1 \leq R_2 \leq 10^3$

$1 \leq R_3 < R_2$

It is guaranteed that R_1, R_2, and R_3 are integers.

Subtask 1 [10%]

$R_1 = R_2$

Subtask 2 [15%]

$0 \leq R_2 - R_1 \leq 2$

$R_3 < R_1$

Subtask 3 [75%]

No additional constraints.

Input Specification

The first line contains T, the number of problems you need to help AQT solve.

The next T lines each contain the radii of the three circles: R_1, R_2, and R_3.

Output Specification

Output T lines. In the i-th line, output the answer to the i-th problem. Your answer will be considered correct if it differs from the correct answer by at most 10^{-3}.

Sample Input

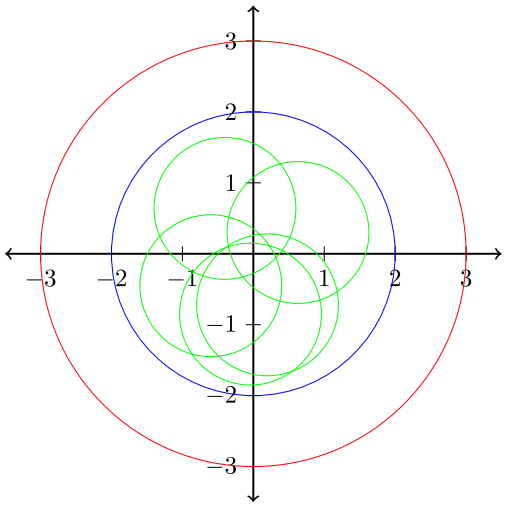
```
2
2 3 1
5 10 2
```

Sample Output

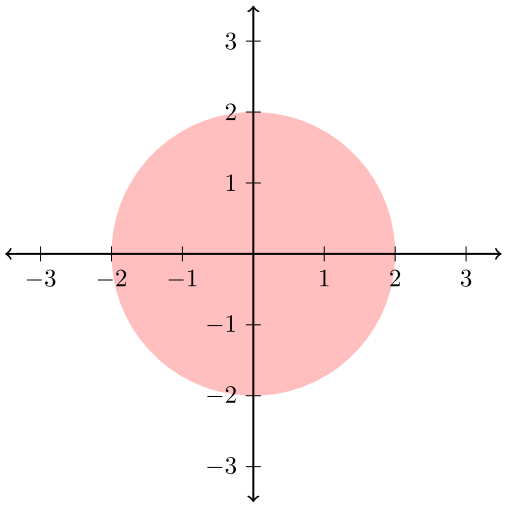
```
0.25
0.375
```

Explanation

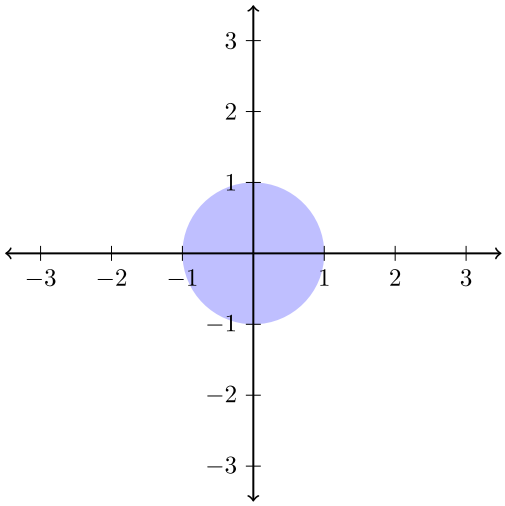
For the first test case, circle C_1 and C_2 are represented by the blue circle and the red circle, respectively. The green circles represent possible valid positions for circle C_3.



This region represents the set of all possible centres for circle C_3 and has an area of 4π



This region represents the set of all **valid** centres for circle C_3 and has an area of π



The probability is $\frac{\pi}{4\pi} = 0.25$