Nonlinear Optimization

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	1024 megabytes

Oh, there is a new logo for OCPC this season? That means we need a problem about it!

Maru is on a point (x_p, y_p) on the plane such that $({x_p}^2 + {y_p}^2) \neq 0$.

Please find the optimal value of the following constrained mathematical optimization problem.

$$\begin{aligned} \min \quad & \sqrt{(x - x_p)^2 + (y - y_p)^2} \\ \text{s.t.} \quad & r, \theta > 0 \\ & x = r\cos\theta \\ & y = r\sin\theta \\ & r = \theta \end{aligned}$$

Input

Each test contains multiple test cases. The first line contains the number of test cases t ($1 \leq t \leq 100$). The description of the test cases follows.

The only line of each test case contains two integers x_p and y_p ($-10^6 \leq x_p, y_p \leq 10^6$, $({x_p}^2 + {y_p}^2) \neq 0$).

Output

Output the optimal value of the mathematical optimization problem on one line.

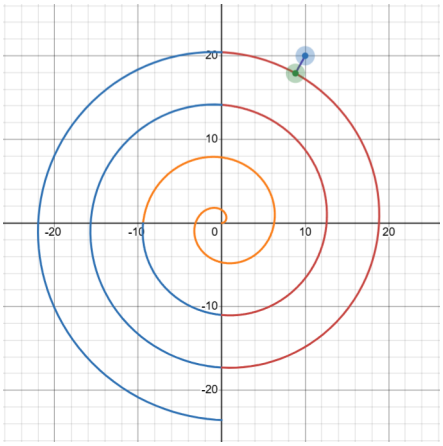
Your output will be accepted if the absolute or relative error does not exceed 10^{-6}.

Example

standard input	standard output
3 10 20 50 40 69 420	2.4012868135739641 0.5245838622565063 3.0344366003046164

Note

The first test case is explained in the following image.



The first test case. The plot for the curve $r = \theta$ is intentionally truncated to $0 < \theta \leq 7.5\pi$.



This area is *not intentionally blank*. Anyways, enjoy the drawing of Maru.