Problem 206: Ellipses...

Difficulty: Easy

Author: David Van Brackle, Marietta, Georgia, United States

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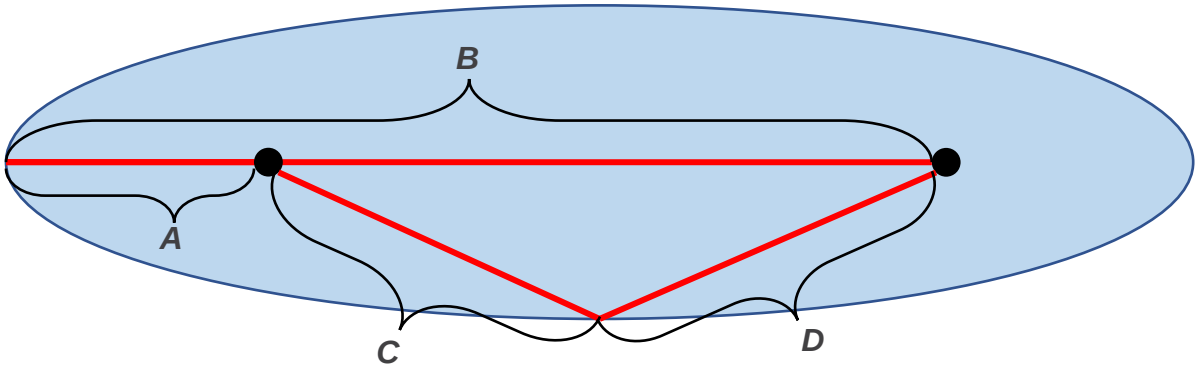
Problem Background

Engineers at Lockheed Martin Missiles & Fire Control are conducting a series of test simulations against a prototype weapon system. The weapon's range is simulated by a long ellipse in the direction the weapon is facing. The weapon should be able to identify if it's able to reach a given target; that is, if the target is actually within the weapon's range or not. Your team has been asked to assist with one of these tests.

Problem Description

An ellipse is similar to a circle that's been squashed so it's much wider in one direction. Ellipses are defined by two points, called foci. For each point on the ellipse, the sum of the distances between that point and each of the two foci is the same. In the example below, $A + B = C + D$.



Given the coordinates of the two foci forming the ellipse that represents the weapon system's range and the maximum width of that ellipse, you'll need to determine which points are inside the ellipse, and thus within the weapon system's functional range. No point involved in the test will be within 0.001 units of the edge of the ellipse.

Sample Input

The first line of your program's input, **received from the standard input channel**, will contain a positive integer representing the number of test cases. Each test case will include:

- A line containing six values, separated by spaces:
  - X1, a number representing the X-coordinate of the ellipse's first focus point

    - Y1, a number representing the Y-coordinate of the ellipse's first focus point
    - X2, a number representing the X-coordinate of the ellipse's second focus point
    - Y2, a number representing the Y-coordinate of the ellipse's second focus point
    - W, a number representing the maximum width of the ellipse
    - N, a positive integer representing the number of test points
- N lines, each containing two numbers separated by spaces, representing the X and Y coordinates (respectively) of a point involved in the test.

```
1
1 0 5 0 6 6
0 2
1 1
2 0
3 -1
4 -2
4 -2.5
```

Sample Output

For each test case, your program must print a single line for each test point involved in the test; print 1 if the point is within the ellipse, or 0 if it is not.

```
0
1
1
1
1
0
```