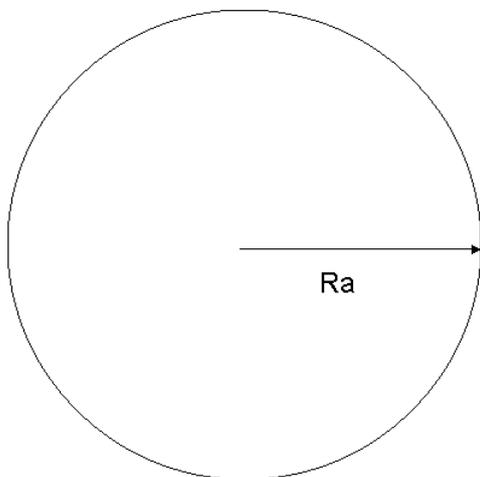


4111 Bombs

There are N cities that are to be considered as points on a plane. Terrorists have decided to plant bombs in every city. However they are required to blow up only city N . An exploding bomb can cause any adjacent bombs within its range to explode. The terrorists can initiate an explosion only at city 1.

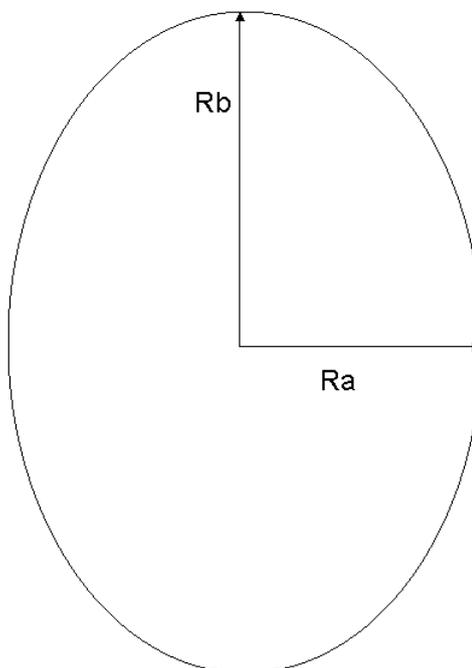
The terrorists have two types of bombs (A and B), each with its own explosion range and purchase cost. Type A bombs have a circular explosion range, while type B bombs are an elliptical variation:

Type A Bomb:



$$(x^2)/(R_a^2) + (y^2)/(R_a^2) = 1$$

Type B Bomb:



$$(x^2)/(R_a^2) + (y^2)/(R_b^2) = 1$$

R_a is the minor axis of the ellipse.

The bombs may be oriented in any manner (i.e. their range curve is allowed to be rotated while they are planted in a city), and the rotation may be different for each city. The explosion range of A is already known (R_a), but about B, we are still not sure. (i.e. we do not know R_b). It is known that the purchase cost of B is strictly greater than that of A. You must find out the minimal R_b that is required so that the destruction of city N is possible. At this minimal range you need to select which type of bomb is to be placed in each city, and their respective orientations, so that city N is destroyed and the overall cost is minimised.

Input

The input consists of multiple testcases.

The first line of each test case contains a single integer N ($2 \leq N \leq 5000$). The second line contains three integers, R_A , C_A , C_B , ($1 \leq C_A < C_B \leq 10^3$) that are the explosion range for type A bombs and costs of type A and B bombs respectively. The subsequent N lines contain two integers each specifying

the co-ordinates of the cities. City 1 is first, and City N , last. The input terminates with a single line containing a zero.

Output

The output of each test case must begin with 'Case #< case - number >:', sans quotes.

Print one real and one integer, stating the minimal R_b ($(R_b \geq R_a)$) and the minimal overall cost respectively. The range must be printed exactly to two decimal places, rounded.

Sample Input

```
6
3 1 3
0 0
0 1
1 1
5 5
5 6
6 6
6
2 2 3
1 0
3 0
4 1
5 0
7 1
10 0
0
```

Sample Output

```
Case #1: 5.66 8
Case #2: 3.16 14
```