

Round 2 2010

[A. Elegant Diamond](#)[B. World Cup 2010](#)[C. Bacteria](#)**D. Grazing Google Goats**[Contest Analysis](#)[Questions asked](#) **2**

Submissions

Elegant Diamond

4pt	Not attempted 540/1183 users correct (46%)
8pt	Not attempted 472/531 users correct (89%)

World Cup 2010

10pt	Not attempted 1456/1614 users correct (90%)
15pt	Not attempted 848/972 users correct (87%)

Bacteria

6pt	Not attempted 1655/1870 users correct (89%)
25pt	Not attempted 60/294 users correct (20%)

Grazing Google Goats

7pt	Not attempted 194/333 users correct (58%)
25pt	Not attempted 2/11 users correct (18%)

Top Scores

bmerry	75
ZhukovDmitry	75
winger	75
stgatilov	75
Progbeat	75
pashka	75
halyavin	69
Zhuojie	68
wata	68
rng..58	68

Problem D. Grazing Google Goats

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input
7 points

Solve D-small

Large input
25 points

Solve D-large

Problem

Farmer John has recently acquired a nice herd of N goats for his field. Each goat i will be tied to a pole at some position P_i using a rope of length L_i . This means that the goat will be able to travel anywhere in the field that is within distance L_i of the point P_i , but nowhere else. (The field is large and flat, so you can think of it as an infinite two-dimensional plane.)

Farmer John already has the pole positions picked out from his last herd of goats, but he has to choose the rope lengths. There are two factors that make this decision tricky:

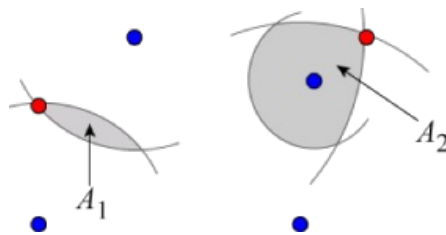
- The goats all need to be able to reach a single water bucket. Farmer John has not yet decided where to place this bucket. He has reduced the choice to a set of positions $\{Q_1, Q_2, \dots, Q_M\}$, but he is not sure which one to use.
- The goats are ill-tempered, and when they get together, they sometimes get in noisy fights. For everyone's peace of mind, Farmer John wants to minimize the area A that can be reached by all the goats.

Unfortunately, Farmer John is not very good at geometry, and he needs your help for this part!

For each bucket position Q_j , you should choose rope lengths so as to minimize the area A_j that can be reached by every goat when the bucket is located at position Q_j . You should then calculate each of these areas A_j .

Example

In the picture below, there are four blue points, corresponding to the pole positions: P_1, P_2, P_3 , and P_4 . There are also two red points, corresponding to the potential bucket positions: Q_1 and Q_2 . You need to calculate A_1 and A_2 , the areas of the two shaded regions.

**Input**

The first line of the input gives the number of test cases, T . T test cases follow. Each test case begins with a line containing the integers N and M .

The next N lines contain the positions P_1, P_2, \dots, P_N , one per line. This is followed by M lines, containing the positions Q_1, Q_2, \dots, Q_M , one per line.

Each of these $N + M$ lines contains the corresponding position's x and y coordinates, separated by a single space.

Output

For each test case, output one line containing "Case #x: $A_1 A_2 \dots A_M$ ", where x is the case number (starting from 1), and $A_1 A_2 \dots A_M$ are the values defined above. Answers with a relative or absolute error of at most 10^{-6} will be considered correct.

Limits

All coordinates are integers between -10,000 and 10,000.

The positions $P_1, P_2, \dots, P_N, Q_1, Q_2, \dots, Q_M$ are all distinct and no three are

collinear.

Small dataset

$1 \leq T \leq 100$.

$N = 2$.

$1 \leq M \leq 10$.

Large dataset

$1 \leq T \leq 10$.

$2 \leq N \leq 5,000$.

$1 \leq M \leq 1,000$.

Sample (Small dataset)

Input	Output
1	Case #1: 1264.9865911 1713.2741229 0.2939440
2 3	
0 20	
20 0	
-20 10	
40 20	
0 19	

Sample (Large dataset)

Input	Output
2	Case #1: 1518.9063729 1193932.9692206
4 2	Case #2: 0.0
0 0	
100 100	
300 0	
380 90	
400 100	
1000 5	
3 1	
0 0	
10 10	
20 0	
10 5	

All problem statements, input data and contest analyses are licensed under the [Creative Commons Attribution License](#).

© 2008-2017 Google [Google Home](#) - [Terms and Conditions](#) - [Privacy Policies and Principles](#)

Powered by



Google Cloud Platform