Surveillance

Burglars are around! Lea's aunt fears that they will get to her house next and asks Lea to stay with her all night to defend her belongings. Lea has naturally better plans for tonight, so she has a another proposal. Lea will buy and install some surveillance cameras together with her aunt.

The cameras they buy are cutting-edge technology: They scan their environment using quantum technology and can detect any intruder with ease. To do so, they send out some quantum waves that are not blocked by anything: buildings, plants, not even by the great aquarium Lea's aunt installed in her bathroom. Unfortunately, the waves disturb each other, so no two cameras may watch the same area of the property.

The area a camera watches is a perfect circle around the point where the camera is installed. The software to control the cameras allows for only one size of the surveillance radius for all cameras. This is a huge restriction, so Lea spent some time hacking the software. She got bored with the awful code of the software, so she just implemented a way to set the radius of the first camera individually while the other cameras still need to have the same surveillance radius. A radius can never be set to 0 to switch the camera off but can be as small or large as required.

Lea wants to set the radii in a way that all but the first one are the same, no surveillance area overlaps with another and the total area seen by the cameras is maximal. Can you help her compute this area?

Input

The first line of the input contains an integer t. t test cases follow.

Each test case starts with a line containing an integer n, the number of cameras. n lines follow describing the cameras. The i-th of them contains two space-separated real numbers x_i and y_i, the coordinates of the i-th camera. The radius of the first camera can be chosen arbitrarily, the radii of all other cameras have to be the same.

Output

For each test case, output one line containing "Case #i: a" where i is its number, starting at 1, and a is the maximum area that can be watched by the cameras. Each line of the output should end with a line break.

Your output must have an absolute or relative error of at most 10^{-6}.

Constraints

- $1 \leq t \leq 20$
- $2 \leq n \leq 10^4$
- $-100.0 \leq x_i, y_i \leq 100.0$ for all $1 \leq i \leq n$

Lea's aunt's property is very big, so we can assume it to be an infinite two-dimensional plane.

Sample Input 1

```
3
7
0.0 0.0
-2.0 0.0
2.0 0.0
-1.0 1.732
1.0 1.732
-1.0 -1.732
1.0 -1.732

3
-1.0 0.0
0.0 0.0
1.0 0.0

2
0.0 0.0
1.0 0.0
```

Sample Output 1

```
Case #1: 21.99018096
Case #2: 3.14159265
Case #3: 3.14159265
```

Sample Input 2

```
6
3
85.89749 8.041092
13.502266 80.74486
1.2792587 28.864044

2
10.871872 98.02222
-10.477295 -23.74871

5
6.6840286 99.15872
63.19284 37.411926
-99.12375 6.2733994
13.110519 -79.276566
51.04373 -90.824745

5
41.790314 22.764038
69.2648 -50.786854
0.49011993 -74.49112
5.434021 75.42493
18.820465 -99.197754

4
96.94888 -62.5437
-52.94235 -28.406075
-36.57235 4.2853622
27.117096 -20.070099

5
-76.06155 -0.68807983
12.408653 -34.555946
-44.162727 -99.990585
79.7007 -27.338135
-56.049953 22.013031
```

Sample Output 2

```
Case #1: 23856.75320794
Case #2: 48015.93349141
Case #3: 22009.72272370
Case #4: 12864.66353914
Case #5: 20987.36209114
Case #6: 11508.33809639
```