New Island and Radios

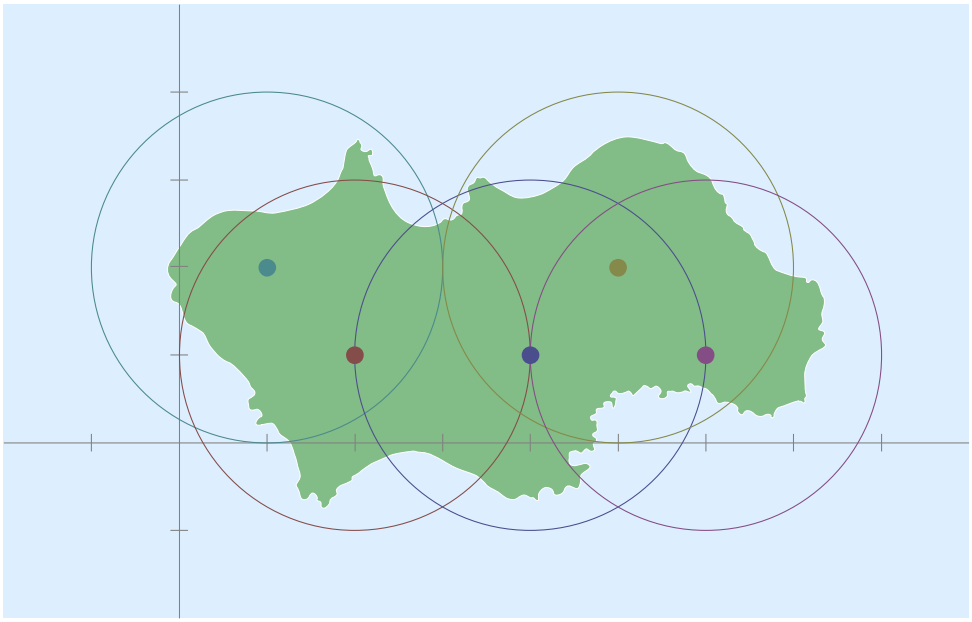
Filename: `radios`

A set of new islands were discovered in the Berland Sea today! In order to populate the islands and expand areas of living, the President of Berland wants all areas of an island to communicate by radios.

Within each island, there is a set of radio towers. Each radio tower can emit a signal that can travel up to *r* miles in radius from the tower, where *r* is an integer. Each tower will use the same *r*. Two radios towers *A* and *B* can communicate with each other if either of the following two conditions is met:

1. Tower *A*'s signals reach Tower *B* (Tower *A*'s signal is said to reach Tower *B* if Tower *B* is within or on the radius *r* from Tower *A*), or
2. Tower *A*'s signals reach the a set of towers whose signals also reach Tower *B*'s signals (for example, if there are three radio towers *A*, *B*, and *C*, and *A* can communicate with *B*, and *B* can communicate with *C*, then *A* can also communicate with *C)*.

The towers have been set up by the President, but the value for the radius, *r*, is still not set. For each island, help the president of Berland to choose the minimum integer value *r* which allows for each sector to communicate with every other sector. For example, for five towers at (1, 2), (2, 1), (4, 1), (5, 2) and (6, 1), the minimum integer value for *r* should be 2.



Note that islands do not communicate with other islands via radio (other methods are used instead).

The Problem:

For a set of radio towers on a single island, determine the minimum integer radius, *r*, required for each tower to be able to communicate with every other tower on that island.

The Input:

The first line of the input will contain a single, positive integer, *t*, representing the number of islands. Each island's input will be on multiple lines.

For each island, the first line contains a single, positive integer, *n* ($2 \leq n \leq 200$), representing the number of radio towers on that island. The next *n* lines each contain two integers separated by a single space, *x* and *y* ($-10^4 \leq x \leq 10^4$; $-10^4 \leq y \leq 10^4$), representing the x- and y-coordinates for the radio tower, respectively. You are guaranteed that multiple towers within an island will not be located at the same position.

The Output:

For each island, output "`Island #`*`i`*`: `*`r`*" on a new line where *i* is the island number (starting with 1) and *r* is the integer value representing the minimal radius value for the i^{th} island to have all of its radio towers communicate with each other.

Sample Input:

```
2
3
0 0
1 1
2 2
5
-3 -9
3 4
8 28
32 -2
-55 91
```

Sample Output:

```
Island #1: 2
Island #2: 90
```