5865 Finding Bottleneck Shorstet Paths

A sensor network consists of a set of n sensors $s_1, s_2, \ldots, s_n$. All the sensors are placed in a two dimensional plane and will never be moved again. Thus, each sensor s_i has a fixed coordinates (x_i, y_i).

A pair of sensors s_i and s_j can communicate by sending messages. Suppose that s_i wants to send a message directly to s_j, a fixed amount of electrical power $p_{i,j}$ is required at s_i. In real world situation, the value of $p_{i,j}$ depends on many factors. For simplicity we assume that the value of $p_{i,j}$ depends only on the distance between the communicating sensors. In this problem, we assume that

$$p_{i,j} = (x_i - x_j)^2 + (y_i - y_j)^2.$$

Furthermore, we assume that only the sender needs to consume this amount of power in the communication.

Since the power stored in each sensor is a precious resource, sending message directly to the destination sensor may consume too much electrical power for a sensor. In this problem, we want to find an *optimal* path to send a message from s_i to s_j such that the maximum power required by the sensors on the path is minimized.

More formally, let P be a *valid* path from s_i to s_j. Let $k_1 = i, k_2, \ldots, k_r = j$ be the sequence of the indexes of the sensors along the path P. Define the weight of P by

$$w(P) = \max_{1 \le i < r} \{p_{k_i, k_{i+1}}\}.$$

A path P is an optimal path from s_i to s_j if its weight $w(P)$ is minimized among all paths from s_i to s_j.

Given a sensor network G, the sender s_i and the receiver s_j, write a program to compute an optimal path from s_i to s_j for sending a message.

Input

An instance of the problem consists of

1. the number of sensors n,
2. the coordinates of the sensors (x_i, y_i), $1 \le i \le n$, and
3. the source and the destination sensors s_i and t_i.

These data are stored in $\lceil n/20 \rceil + 2$ lines in the input file.

1. The first line is the integer n.
2. The following $\lceil n/20 \rceil$ lines are the n coordinates (x_i, y_i), $1 \le i \le n$. Each line contains at most 20 coordinates. Each coordinates is written in two numbers x_i and y_i, without the parentheses.
3. The last line of an instance contains two integer i and j, indicating s_i is the sender and s_j is the receiver.

In this problem, we assume that $1 < n < 1000$, x_i and y_i are integers and $0 \le x_i, y_i < 2^{15}$.

Note that the test data file may contain more than one instances. The last instance is followed by a line containing a single '0'.

Output

The output for each test case is an integer w which is the maximum power required along the optimal path from s_i to s_j.

Sample Input

```
4
0 0  1 9  8 2  10 10
1 4
5
0 0  8 2  3 4  8 7  10 10
1 5
0
```

Sample Output

```
68
29
```