

PROBLEM #6:

Farmer Clayton Price

Description:

Tired of watering his vegetable garden by hand, Clayton Price wants to install an irrigation system. Such system will consists of underground pipes. He has mapped his garden as a Cartesian Plane, and listed the locations of the most suitable irrigation points. These points should all need to be connected, but he has some limitations. He only has rigid straight pipes at his disposal, and his digging equipment can only dig at a fixed depth. So no two pipes can cross.

Given a list of points, what is the least amount of pipe necessary to make sure that every pair of points is connected, either directly, or indirectly through other points?

Input:

There will be several test cases in the input. Each test case will begin with an integer N ($2 \leq N \leq 1,000$), which is the number of points in the garden. On each of the next N lines will be two integers, X and Y ($-1,000 \leq X, Y \leq 1,000$), which are the (X,Y) locations of the N points. Within a test case, all points will be distinct. The input will end with a line with a single 0.

Output:

For each test case, output a single real number, representing the least amount of pipe Clayton Price needs to connect all of his irrigation points. Print this number with exactly two decimal places, rounded. Print each number on its own line with no spaces. Do not print any blank lines between answers. The first line of output should be.

Sample:

(Shading is used to highlight the different test cases)

Input	Output
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4	30.00
0 0	14.14
0 10	
10 0	
10 10	
2	
0 0	
10 10	
0	