Segment Tree

It was Arbor Day. Alice implemented an RB-tree, Bob composed a segment tree, I made a binary tree - we all have a bright outlook.

Lambda is always making mistakes while implementing segment trees (See his history of submissions). He then decides to draw a "segment tree". He puts n points on a plane, link certain pairs of them to form segments and all the segments form a tree. As a normal tree, it satisfies the following conditions:

1. Consider points as vertices, segments as edges, it forms a rooted tree.
2. Each node u is **strictly higher** than its parent, namely $y_u > y_{parent\_of\_u}$.
3. Segments may only intersect on their endpoints.

Lambda wants to minimize the total length of segments. **The tree can be rotated to satisfy above conditions.**

Input

First line of input contains single integer n ($1 \le n \le 500$).
Next n lines each contain two integers x_i, y_i denoting the coordinate of i-th point ($0 \le x_i, y_i \le 1000$).
Points are distinct.

Output

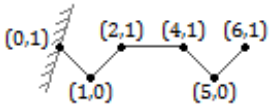
The one and only line contains a real number representing the minimum length.
Your answer must be rounded up to 4 digits after the decimal point.

Example 1

Input:
6
0 1
1 0
2 1
4 1
5 0
6 1

Output:
7.6569

Illustration:



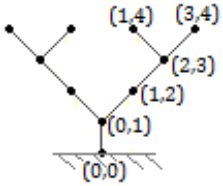
Example 2

Input:
10

0 0
0 1
1 2
2 3
1 4
3 4
-1 2
-2 3
-1 4
-3 4

Output:
12.3137

Illustration:



This is just a sample test case. There's no negative in the real test data.