K   King's Keep

King Carl's kingdom contains k keeps (commonly called castles).

Coordinates of keeps are known, and King Carl considers himself convinced that it could be convenient to choose a central keep as King Carl's residence.

Critically, King Carl considers that the average cost to carry commands from King Carl's residence to King Carl's other keeps should be small.

King Carl's keep of choice: created with contours of a capital 'K'. CC BY-SA 2.0 by David Dixon on geograph.co.uk, modified

Compute the minimal average Euclidean distance[1] from his residence keep to the other keeps if King Carl chooses his residence optimally.

Input

The input consists of:

- One line with an integer k ($2 \leq k \leq 1000$), the number of keeps.

- k lines, each with two integers x and y ($|x|, |y| \leq 1000$), the coordinates of the keeps.

It is guaranteed that all keeps are at distinct locations.

Output

Output the minimal possible average distance from the keep that is chosen as the king's residence to all other keeps.

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

Sample Input 1	Sample Output 1
3 0 0 9 9 0 9	9

Sample Input 2	Sample Output 2
5 −3 5 6 8 1 2 5 −4 −7 −9	8.405705684

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[1]The Euclidean distance between two points is the length of a straight line segment between these points.