

2.0 second(s), 32 MB

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Introduction

Bruce likes to visit his friends on the weekend. His friends are scattered around near where he lives and each lives at a unique location. Since Bruce does not have much time for visiting, he would like to make the most of his visits.

Bruce wants to find the two friends that live closest to each other so that he can visit both of them in the same visit.

Having a lot on his mind, Bruce was rushed when making the list of friends' locations and thus may have specified some locations more than once. He trusts that you will be able to take this matter into account.

Task

Each of Bruce's  $N$  friends live at some lattice coordinate  $(x_i, y_i)$ . You will be given a description of the position of all Bruce's friends and need to compute the distance between the two closest friends. The distance metric used is the standard Euclidean distance in two dimensions:

$$\text{dist}(a, b) = \sqrt{(a_x - b_x)^2 + (a_y - b_y)^2}$$

Example

Suppose Bruce's friends are at the coordinates  $(3, 0)$ ,  $(3, 5)$ ,  $(2, 4)$ ,  $(4, 2)$  and  $(0, 2)$  as illustrated in Figure 1.

The two friend's at  $(2, 4)$  and  $(3, 5)$  are the closest at a distance of 1.41.

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Figure 1: Example of the location of Bruce’s friends. The two larger points represent the closest friends.

Input (stdin)

The first line contains a single integer, N. The next N lines each contain two space-separated integers  $x_i$  and  $y_i$ , the coordinates of a friend.

Output (stdout)

Output a single number, the distance between the two closest friends rounded off to two decimal places.

Constraints

- $2 \leq N \leq 100\,000$
- $0 \leq x_i, y_i \leq 1\,000\,000\,000$  for all  $i$

50% constraints

- $1 \leq N \leq 10\,000$

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5 3 0 3 5 2 4 4 2 0 2	1.41