

Contest Duration: 2025-04-12(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250412T2100&p1=248>) - 2025-04-12(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250412T2240&p1=248>) (local time) (100 minutes)

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G - Push Simultaneously

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 575 points

Problem Statement

There are N people and N buttons on a plane. The plane has an origin, and the coordinates (x, y) represents the position that is x meters east and y meters north of the origin. The i -th person ($1 \leq i \leq N$) starts at (sx_i, sy_i) . The i -th button ($1 \leq i \leq N$) is located at (gx_i, gy_i) .

The people want to move and press these N buttons **simultaneously**. A button can be pressed only by a person who is at the same coordinate as that button. The time required to press a button after reaching its coordinate is 0 seconds.

Each person can move in any direction with speed at most 1 meter per second. More formally, if the position of the i -th person t seconds after the start is $(x_i(t), y_i(t))$, all of the following must hold:

- $x_i(0) = sx_i$;
- $y_i(0) = sy_i$;
- For all non-negative real numbers t_0, t_1 , the distance between $(x_i(t_0), y_i(t_0))$ and $(x_i(t_1), y_i(t_1))$ is at most $|t_0 - t_1|$.

Find the time required for the people to achieve the goal. Formally, find the minimum t that satisfies the following condition:

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05:22:27 +11:00

- It is possible to set x_i and y_i under the above conditions so that, for every integer j ($1 \leq j \leq N$) and every real number t' ($t' > t$), there exists an integer i ($1 \leq i \leq N$) with $(x_i(t'), y_i(t')) = (gx_j, gy_j)$.

Constraints

- $1 \leq N \leq 300$
- $0 \leq sx_i \leq 10^{18}$ ($1 \leq i \leq N$)
- $0 \leq sy_i \leq 10^{18}$ ($1 \leq i \leq N$)
- $0 \leq gx_i \leq 10^{18}$ ($1 \leq i \leq N$)
- $0 \leq gy_i \leq 10^{18}$ ($1 \leq i \leq N$)
- $(sx_i, sy_i) \neq (sx_j, sy_j)$ ($1 \leq i < j \leq N$)
- $(gx_i, gy_i) \neq (gx_j, gy_j)$ ($1 \leq i < j \leq N$)
- $(sx_i, sy_i) \neq (gx_j, gy_j)$ ($1 \leq i \leq N, 1 \leq j \leq N$)
- All input values are integers.

Input

The input is given from Standard Input in the following format:

```

N
sx1 sy1
sx2 sy2
⋮
sxN syN
gx1 gy1
gx2 gy2
⋮
gxN gyN

```

Output

Print the time required for the N people to press the N buttons simultaneously. Your output is considered correct if the relative error from the true value is at most 10^{-6} .

Sample Input 1

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```
4
0 0
0 1
2 0
3 1
0 2
1 0
1 2
2 2
```

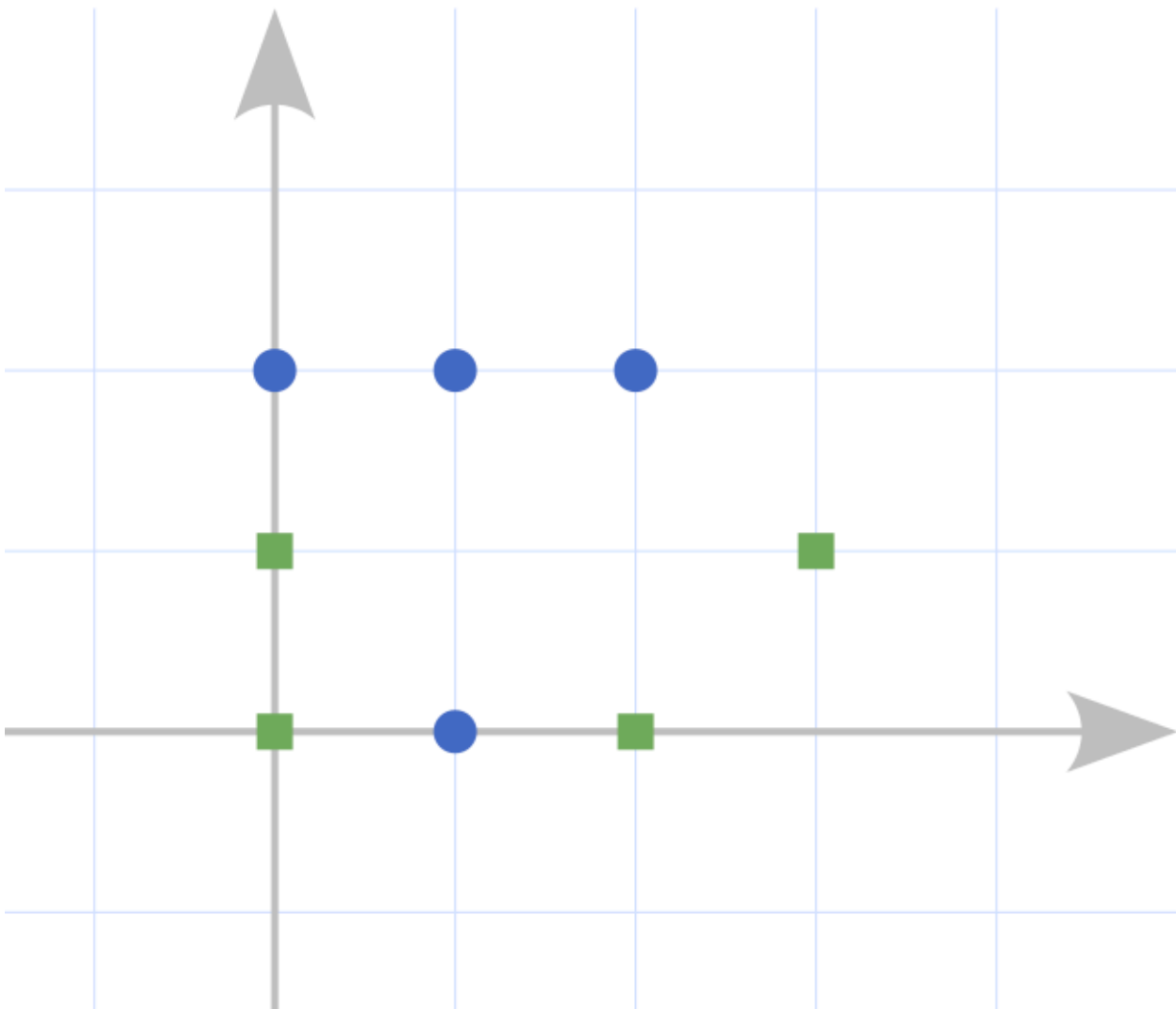
Sample Output 1

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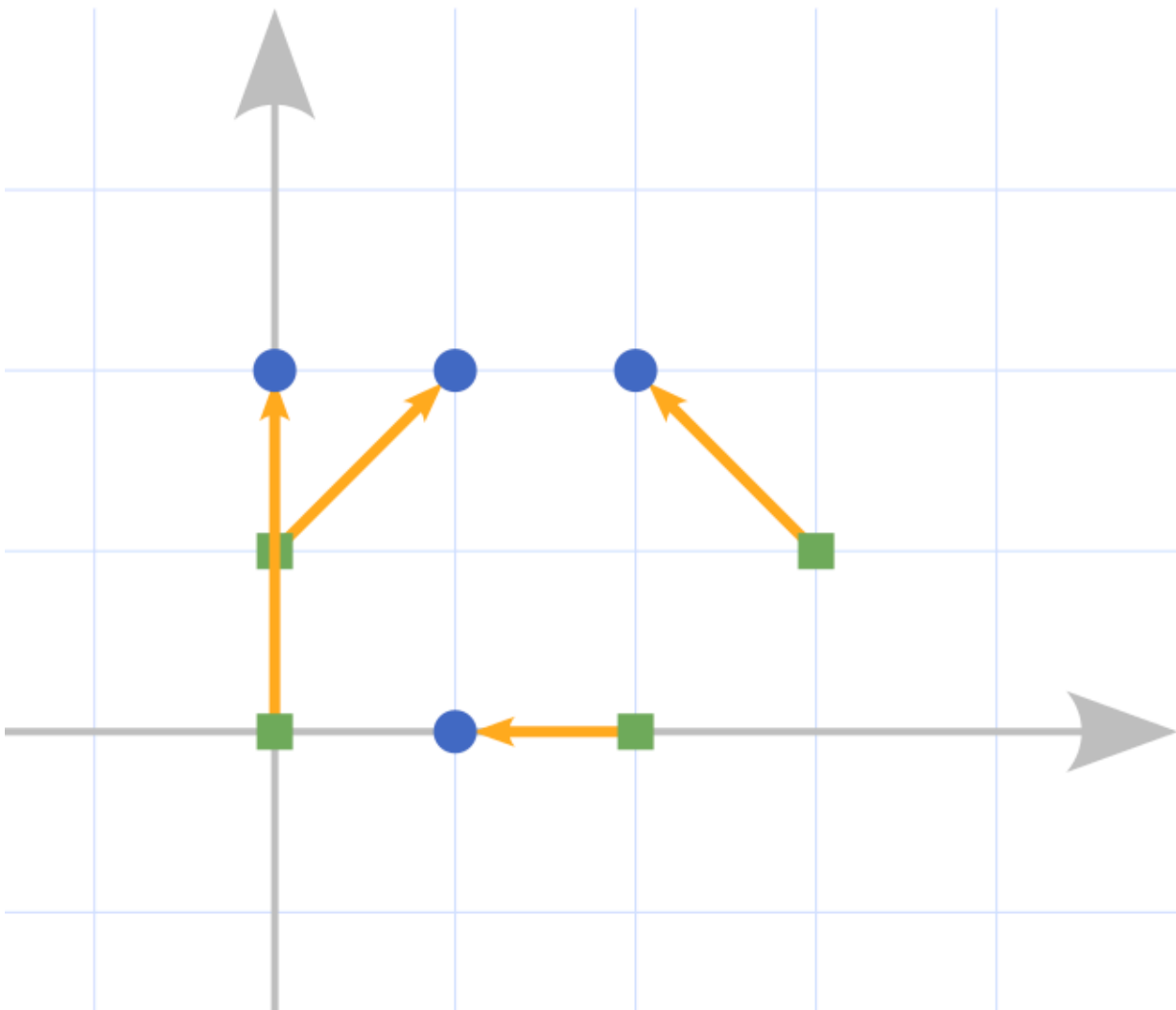
```
2
```

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Initially, the positions of the people and buttons are as shown below.



Suppose persons 1, 2, 3, 4 move straight toward buttons 1, 3, 2, 4, respectively.



They reach their respective buttons after 2 , $\sqrt{2}$, 1 , and $\sqrt{2}$ seconds.

Thus, all buttons can be pressed simultaneously 2 seconds after the start.

Conversely, they cannot press all buttons simultaneously earlier than 2 seconds, so print 2 .

Because an output is accepted if its relative error from the true value is at most 10^{-6} , outputs such as 1.999998 or 2.00000014 are also considered correct for this test case.

Sample Input 2

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```
3
1 4
1 5
9 2
653589793238462643 383279502884197169
399375105820974944 592307816406286208
99862803482534211 706798214808651328
```

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Sample Output 2

Copy

757682516069002110.04581169374262658710741005525

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Note that the input coordinates may not fit in 32-bit integers.

Sample Input 3

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```
12
4459915897 5789359311
4393259463 4247016333
4827828467 4179021045
2654035685 3406423989
1790405301 4886103164
2978675817 4818583236
5912369644 5824121992
6016882384 4165667191
4305949638 3454894060
6545166942 5390976281
4043403253 4019611554
3462096432 4117859301
3528911877 4631601790
4627979431 4814676729
3810130146 5728760563
5586470124 3310360339
3664130072 4525834271
1710246881 3750440871
3143440609 5038869551
2294021341 3965849888
6189106395 4499485672
4799619607 5151972020
6905793542 3976136296
1764267574 4525373194
```

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Sample Output 3

Copy

1299999319.116399442508650717909981965254

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#telegram)

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