Polygon Chain

A polygon T is said to be inside a polygon S if all points that lie strictly inside T (not on the perimeter of T) also lie strictly inside S.

A multiset of polygons $\{Q_1, Q_2, \ldots, Q_r\}$ is said to *form a chain* if there is a permutation $p_1, p_2, \ldots, p_r$ of the integers 1 through r such that for each i ($1 \leq i < r$), Q_{p_i} is inside $Q_{p_{i+1}}$.

You are given N convex polygons $P_1, P_2, \ldots, P_N$ in a 2D Cartesian coordinate system. Every 10^{-100} seconds, you may choose one of the polygons and translate it by upto 10^{-100} either along the x-axis or along the y-axis.

Find the minimum amount of time necessary to make all N polygons form a chain or decide that it is impossible.

Input

- The first line of the input contains a single integer N. The descriptions of N polygons follow.
- For each polygon:
  - The first line contains a single integer M denoting the number of its vertices.
  - The following M lines describe the vertices in counterclockwise order. Each of these lines contains two space-separated integers x and y denoting the coordinates of one vertex.

Output

If it is impossible to make the polygons form a chain, print a single line containing the integer -1.

Otherwise, print a single line containing one real number — the minimum amount of time. Your answer will be considered correct if its absolute or relative error does not exceed 10^{-6}.

Constraints

- $2 \leq N \leq 20$
- the sum of M over all polygons does not exceed 100
- $|x|, |y| \leq 100$

Subtasks

Subtask #1 (10 points): $N = 2$ and both polygons are axis-aligned rectangles

Subtask #2 (20 points): $N = 2$

Subtask #3 (20 points): all polygons are axis-aligned rectangles

Subtask #4 (50 points): original constraints

Example Input

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

Example Output

```
3
```

Explanation

Example case 1: Both P_1 and P_2 are squares. If we move P_2 by 1 unit in the x-direction and by 2 units in the y-direction, the vertices of P_1 become the midpoints of edges of P_2.

4	8	AC (0.120000)
4	9	AC (0.140000)
4	10	AC (0.200000)
4	11	AC (0.240000)
4	12	AC (0.270000)
4	13	AC (0.380000)
4	14	AC (0.540000)
4	15	AC (0.490000)
4	16	AC (0.480000)
4	17	AC (0.370000)
4	18	AC (0.330000)
Subtask Score: 50.00%		Result - AC
		Total Score = 100.00%