ECE30017, Fall 2020
Problem Solving through Computational Thinking

Week 13

- **C10. Chinese or Pizza**
 Deadline: 11:59 PM, 27 November (Fri)

- **P11. Shiritori**
  Deadline: 4:00 PM, 30 November (Mon)

C10. Chinese or Pizza

You are franchisor of two restaurant brands, one for Pizza house and the other for Chinese restaurant. You also owns N bulidings in a city of course.

You want to open a restaurant with one of your brands on every building of your own. To maximize benefit, you do not open a restaurant of a brand if another restaurant of the same brand exists within 5 miles in Euclidean distance. Given N positions of buildings on a 2-D plane, there may exist various possible combinations of restaurants and buildings.

Write a program that receives the positions of N buildings and find out the minimum number of restaurants that a brand can open in all possible combinations.
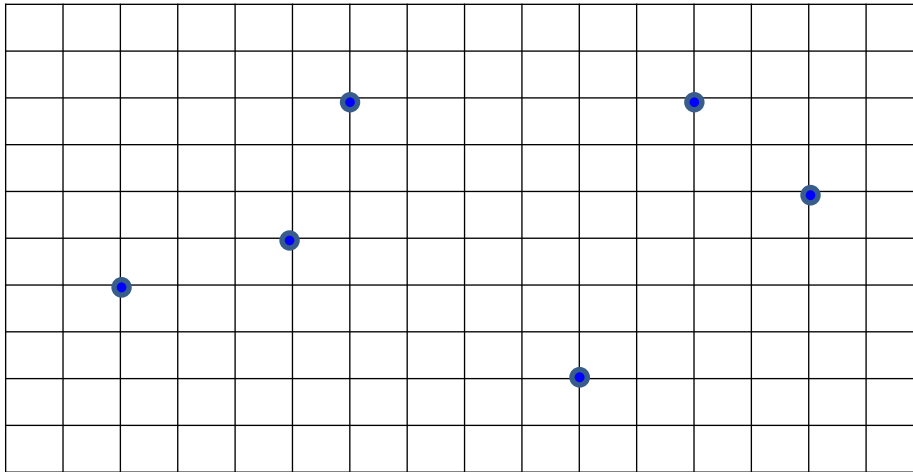
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A:  (2, 4)
B:  (5, 5)
C:  (6, 8)
D:  (10, 2)
E:  (12, 8)
F:  (14, 6)
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Suppose that there are six buildings placed as above.

There are eight possible combinations of brands and buildings:

(Chinese: {A, C, E}, Pizza: {B, D, F}), (Chinese: {B, D, F}, Pizza: {A, C, E}),

(Chinese: {A, C, F}, Pizza: {B, D, E}), (Chinese: {B, D, E}, Pizza: {A, C, F}),

(Chinese: {A, C, D, F}, Pizza: {B, E}), (Chinese: {B, E}, Pizza: {A, C, D, F}),

(Chinese: {A, C, D, E}, Pizza: {B, F}), (Chinese: {B, F}, Pizza: {A, C, D, E})

Among these combinations, at least two buildings are chosen for a brand.

Input

- Input is given as text via the standard input

- The first line has one integers N for $1 \le N \le 50000$.

- From the second to the $(N+1)$-th lines, each line has two integers x_i and y_i for $1 \le x_i \le 500000$ and $1 \le y_i \le 500000$ that represents the position of the i-th building in mile.

Output

- Print the minimum number of restaurants that a brand can open. Your program should return the answer within 1.0 second.

Test case example

Input 1	Output 1	Input 2	Output 2
6 2 4 5 5 6 8 10 2 12 8 14 6	2	2 20 20 60 40	0

C10 Teams

Team 1001	황소정	최우석	
Team 1002	윤지영	강하영	
Team 1003	한정섭	정현섭	
Team 1004	윤다은	이예준	
Team 1005	한찬솔	신희주	
Team 1006	김지원	김준서	
Team 1007	김석진	김유진	
Team 1008	지성민	정진혁	
Team 1009	정희석	임예찬	
Team 1010	정예은	전해주	
Team 1011	송수근	최재혁	
Team 1012	홍원표	정원식	
Team 1013	홍석현	박민준	
Team 1014	송진범	김윤정	
Team 1015	박수현	김승우	김기훈

P11. Shiritori

Shiritori is a game to enumerate words such that the last letter of a proceeding word appears at the beginning of the succeeding word.

For a given set of words, you want to find a scenario of Shiritori where every word appears exactly once, and the resulting word sequence is least among all feasible Shiritori scenarios in lexicographical order.

Write a program that finds such a solution for a given set of words.

Input

- The input is given via standard input.
- The first line has an integer N for $3 \le N \le 1000$ representing the number of words.
- From the second to the $(N+1)$-th line, a word is given. Each word consists of only lowercase alphabet letters. The length of a word does not exceed 20.

Output

- The output must be printed via standard output.
- Print a word in a line in the solution sequence. If there is no possible solution, print one line containing a zero.

Test cases

Input 1	Output 1	Input 2	Output 2
6 alabama around trigger drawing gambler rocket	alabama around drawing gambler rocket trigger	3 playlist fever radio	0