Q6. King and Traveler (40 marks):

A king has instructed a traveler to travel from city to city to gain enlightenment. However, the traveler must follow certain rules when he travels. When the traveler has completed his journey, he must also report to the king the total distance that he has travelled.

The rules that the traveler must follow are:

(1) To begin with, the traveler must start his journey from the city that is farthest to the West. If there are more than one city that fulfils this criterion, then he chooses the one farthest to the South among these Western cities to depart.

(2) The traveler cannot travel to the same city more than once.

(3) Before reaching the destination city, the traveler must always travel to the next city that he has not visited, which has the nearest distance from the city where he is currently located.

(4) If there are multiple cities having the same distance from the city where the traveler is currently located, then he must always choose the city that is located nearest to the South to travel to.

(5) To the end, the traveler must end his journey at the city that is farthest to the East. If there are more than one city that fulfils this criterion, then he chooses the one farthest to the North among these Eastern cities.

For example, if there are 6 cities that are represented by the **SIX (6)** coordinates (2, 3), (2.866025, 3.5), (3, 3), (2.866025, 2.5), (3, 2.5), (2, 4) respectively as illustrated in **Figure Q6**, then the traveler will start the journey from the city at coordinate (2, 3). From (2, 3), the traveler will then travel to the city at (2.866025, 2.5), and then to the city at (3, 2.5), and finally to the city at (3, 3). The journey ends at coordinate (3, 3), and the total distance for the journey from the starting city until the ending city along the route that the traveler has travelled is 1.6339747. [Note: The route the that the traveler has travelled is indicated with the red dotted arrow line.]

Figure Q6. City travelling map

Write a programme to

Input, in sequence

1. A positive integer, n, where $1 \leq n \leq 10$, to indicate the number of coordinates of cities to be read subsequently.
2. n lines of data; for each line i, two real numbers, x_i and y_i are read, respectively, to represent the coordinate of city i, where $1 \leq i \leq n$.

Output, the distance that the traveler will travel in total. Your answer should be rounded to 7 decimal places.

试题 6. 国王和旅者（40 分）:

一位国王指示一位旅者在城市间旅行，以期旅者得到开悟。在旅行时，旅者必须遵守一定的规则。当完成他的旅程时，旅者也必须向国王报告他所走过路程的总距离。

旅者必须遵守的规则如下所示：

(1) 起始时，旅者必须从最西边的城市出发。如果有多个城市满足此条件，则他在这些西部城市中选择最南端的一个出发。

(2) 同一个城市最多只能到访一次。

(3) 在抵达终点城市前，旅者必须持续前往他还未到过、距离他当前所在城市最近的下一个城市。

(4) 如果有多个城市与旅者当前所在城市的距离相同，则他必须在这些城市里，选择前往最南方的城市。

(5) 结束时，旅者必须抵达最东边的城市以结束旅程。如果有多个城市满足此条件，则他在这些东部城市中选择最北端的一个结束旅程。

例如，如图 Q6 所示，倘若有六个城市分别坐落在以下坐标: (2, 3), (2.866025, 3.5), (3, 3), (2.866025, 2.5), (3, 2.5), (2 , 4)，则旅行者将从坐标为 (2, 3) 的城市开始旅程。出发后，旅行者将从坐标 (2, 3) 前往坐标为 (2.866025, 2.5) 的城市，然后到达坐标为 (3, 2.5) 的城市，最后抵达终点，即坐标为 (3, 3) 的城市。旅程在城市 (3, 3) 结束时，旅者所走过的路线、从起点到终点的总距离为 1.6339747。[注: 在图中，红色虚线箭头标示的是旅者所走过的路线。]
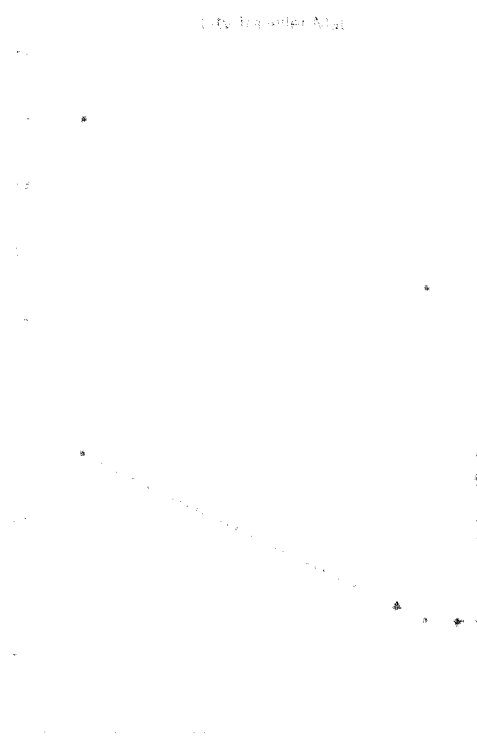

图 Q6. 城市分布图

<u>**试写一程式以**</u>

依序输入

(1) 一个正整数 n，其中 $1 \le n \le 10$，表示城市坐标的个数。

(2) n 行数据；其中第 i 行的数据包含了两个实数 x_i 和 y_i，代表了城市 i 的坐标，其中 $1 \le i \le n$。

输出 旅者在整个旅程所走过的总距离。你的答案必须进位至小数点后 7 位数。

试写一程式以

依序输入

Example (例子)

Input (输入)	Output (输出)
6 5 1 2 3 3 5 6 4 7 3 4 3	7.0644951
4 2 3 2.866025 3.5 2.9 3 2.866025 2.5	0.9000000
4 2 3 2.866025 3.5 3 3 2.866025 2.5	1.5176378
10 -25 25 20 -20 -20 20 15 -15 10 -10 -15 15 0 0 -10 10 5 -5 -5 5	63.6396103
6 2 3 2 4 2 5 2 -6 2 -7 2 -8	13.0000000