Project Description

It is required to develop a program to do operations on polygons data. The program uses a defined string format to represent polygons. All polygons will be in one line input. For example: **Polygons = [(1,1),(4.1),(4,5),(1,5);(3,4),(6,4),(6,12),(3,12)]**

Polygons Data

The Polygons line contains a list of polygons data separated by ';'. Fields of a Polygon is represented by a set of points separated by ','

Definition of Redundant Point

A redundant point is a point of the polygon points that can be deleted without change in the polygon shape. Like

(1,1),(2,1),(4,1),(4,3),(1,3)

(1,2),(4,2),(4,2),(4,8),(1,8)

(1,2),(4,2),(4,2),(4,2),(4,8),(1,8)

In the second case two neighbor identical points any one of them can be redundant (you should select only the second one). If more than two points are identical and follow each other, all of them are redundant except the first point of them.

Intersecting Polygons

Intersecting Polygons are polygons sharing common area, side, or point(s).

Connected Polygons

Two Connected Polygons are polygons that are intersecting or polygons which have path from one to the other through intersecting polygons.

Operations

When the program starts, the user enters one Polygons Line in the defined above format then followed by **one or more** operations from the below table (each operation in a line). The program ends when it reads **Quit** operation.

INPUT: Polygons=

[(1,1),(2,2),(1,3),(0,2);(0,1),(3,3),(1,6),(2,4);(2,3),(5,3),(4,8);(7,7),(6,8),(4,11),(3,10),(2,5),(3,3),(3,3),(5,5),(5,5),(7,7);(4,5),(7,8),(6,11),(3,8);(2,6),(5,8),(5,13),(1,11);(0,6),(2,10),(2,12),(-1,13),(-2,11),(-2,7);(-5,5),(-1,5),(-1,10),(-1,10),(-5,12);(-4,4),(-1,8),(-2,10),(-4,4);(-5,3),(-3,3),(-1,3),(3,7),(5,6);(-2,-1),(-4,-4),(-4,-7),(-2,-9),(-2,-4),(-2,-1);(-2,-7),(-4,-10),(-1,-12);(-1,-6),(-3,-6),(-2,-9),(1,-11),(3,-6),(0,-6),(-1,-6);(1,-9),(4,-2),(7,-5),(4,-11);(5,-5),(1,-3),(4,1),(7,2),(7,-6);(-1,1),(-2,2),(3,5),(4,4)]

Operation	OUTPUT
Number_Polygons Print the number of polygons.	16
Total_Number_Points Print the total number of points in all polygons.	78
Minimum_X Print the minimum X value of all points.	-5
Maximum_X Print the maximum X value of all points	7
Minimum_Y	-12
Maximum_Y	13
Enclosing_Rectangle Print the minimum Enclosing Rectangle that includes all polygons inside it.	(7,-12),(7,13),(-5,13),(-5,-12)
Total_Redundant_Points The number of Redundant points in all polygons	13
Polygon_Points 16 List all points of the n th polygon (neglecting redundant points) n start from 1 (1 means the first polygon)	(-1,1),(-2,2),(3,5),(4,4)
Point_Polygons (-2,-9) List all polygons IDs (ID is 1 for the first polygon, 2 for the second polygon,...) of polygons that have the point (2,1) in their points list	11,13
List_Polygons_Points More 3 List Polygons having more than n points excluding redundant points where n is an integer.	1,2,4,5,6,7,8,10,11,13,14,15,16
List_Polygons_Points Less 6	1,2,3,5,6,8,9,10,11,12,13,14,15,16
List_Polygons_Points Equal 6	4,7
List_Points_Polygons More 2 List all Points that are in the list of more than n polygons where n is an integer.	(3,3)
List_Points_Polygons Less 1	none
List_Points_Polygons Equal 2	(7,7),(5,5),(-1,10),(-4,4),(-2,-1),(-2,-9),(-1,-6)
Polygon_Perimeter 5 Print the perimeter of the n th polygon.	14.8098
List_Triangles List all Polygon IDs of polygons that are triangles.	3,9,12
List_Rectangles	1,2
List_Trapezoid	8,11
Inside_Rectangle (-5,8),(6,8),(6,2),(-5,2) List all Polygon IDs of polygons that are inside the given rectangle.	3,10
Inside_Circle (1,2),5	1,2,16
Polygon_Area 4	20.5
Polygons_Area_Range 3,20 List all Polygon IDs of polygons that have area <= minArea and >=maxArea.	2,3,5,6,9,11,12,13,16
Polygons_Enclosing_Point (7,-5) List all Polygon IDs of polygons that have the point (1,2) inside it (or on its boundaries).	14,15
Quit	Close program
Polygons_Enclosing_Point (-1,-11)	none

'Any operation doesn't have value print "none".'