

**Version**

**1**

SIMPLE POLYGON MATH TOOL PROGRAM

---

MA 1008 Mini Project by Brilliant Stanley

# User Manual

MA1008 MINI PROJECT BY BRILLIANT STANLEY

# Simple Polygon Tool User Manual

---

# Table of Contents

System Requirements.....	1
Program Capabilites .....	2
Creating or Importing Polygons .....	3
Creating Polygon Using Keyboard Inputs .....	3
Importing Polygon(s) from Text File .....	4
Modifying Polygons .....	5
Edit Vertex.....	6
Move Polygon .....	6
Rotate Polygon.....	7
Scale Polygon.....	8
Creating Copies of Polygon.....	8
Analyze Polygon .....	9
Calculate Area.....	9
Calculate Perimeter.....	10
Check a Point Position Relative to The Polygon.....	10
Export Polygons to File .....	11
Future Program Updates.....	12

---

## System Requirements

In order to run this program, you will need :

- A computer with any Operating System
- Python Shell or IDLE with included turtle and math libraries
- The program code itself
- Monitor with any resolution and size
- A keyboard

## Program Capabilities

What this program can do :

- Display simple polygons created by users with color
- Import simple polygons from .txt file
- Export simple polygons to .txt file
- Modify the simple polygons created/imported including : edit vertexes, move polygon, rotate polygon, scale polygon
- Create copies of the polygon with different parameters set by user
- Works on any monitors regardless of their sizes
- Window adapts to fit the objects within the monitor and object scaling is consistent
- Analyze a polygon including : area, perimeter, and point position checks
- Handle 99% of the error inputs by user
- Run without mouse

What it can not do :

- Live drawing while the user inputs or modifies the polygon
- Create complex polygons (self-intersecting polygons)
- Create polygons with curved edge
- Polygon input using mouse clicks
- Custom format of text input/output form/to file (requires changing program codes to do so)
- Select polygon using mouse clicks

## Creating or Importing Polygons

After opening the program, it will prompts user to choose a method of creating polygons. Choose a method that suits you.

### Creating Polygon Using Keyboard Inputs

1. Type 1 then press enter, it will show you the current polygon number you are working on.
2. Type the color that you choose for your polygon when prompted , then press enter.
3. Type in the number of your polygon vertexes.
4. Input your vertex coordinates one by one as instructed by the program.
5. After done, it will open a new window displaying the polygon(s).
6. Close the window to continue the program

```
C:\WINDOWS\py.exe
POLYGON MATH TOOL
Choose of those methods, '1' = enter manually or '2' = input from file : 1
Polygon 1
Enter fill color ('0' for default) : blue
Enter outline color ('0' for default) : yellow
Input number of polygon vertices : 3
Enter x coordinate of vertex 1 : 1
Enter y coordinate of vertex 1 : 4
Enter x coordinate of vertex 2 : 2
Enter y coordinate of vertex 2 : 5
Enter x coordinate of vertex 3 : 3
Enter y coordinate of vertex 3 : 3
Polygon is drawn on the other window. Close that window when you want to continue the program.
```

Figure 1 Main Window When Creating Polygon

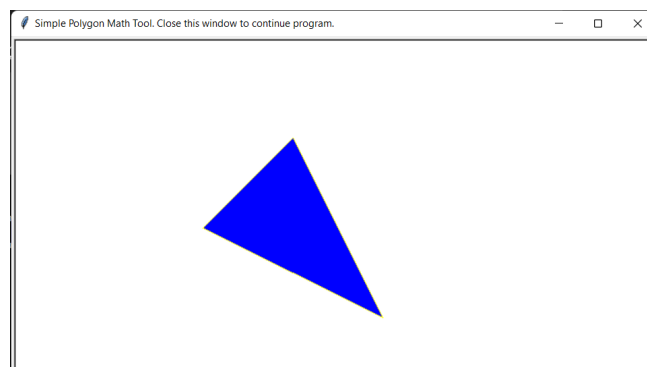


Figure 2 Display Window

## Importing Polygon(s) from Text File

To successfully import, you must place the file in the same folder as the program. It can only read .txt file. Text format for each line (1 line 1 polygon) must be :

$(x_1, y_1), (x_2, y_2), (x_3, y_3), \dots, (x_n, y_n)$ :fill color, outline color.

Example :

```
(1.00,4.00),(2.00,5.00),(3.00,3.00):blue,black.  
(-3.95,0.62),(-5.62,2.90),(-1.36,4.26):red,black.  
(1.21,-10.21),(-3.82,-12.80),(-5.19,-3.96):white,black.  
(24.20,-3.36),(27.76,-14.10),(9.87,-14.08):green,black.  
(17.75,44.18),(40.07,47.92),(34.52,12.58):light blue,black.  
(-78.19,46.12),(-78.69,91.37),(-10.56,69.49):pink,black.
```

When prompted to choose method, input 2. Then, type in your polygon filename. If successful, it will display the polygon(s). Invalid line will be omitted. Invalid color will be set to default(white fill, black outline).

```
C:\WINDOWS\py.exe  
POLYGON MATH TOOL  
Choose of those methods, '1' = enter manually or '2' = input from file : 2  
Supported format : '(x1,y1),(x2,y2),...:FillColor,OutlineColor'  
Enter filename : trial  
Polygons are drawn on the other window. Close that window when you want to continue the program.
```

Figure 3 Import Polygon from File

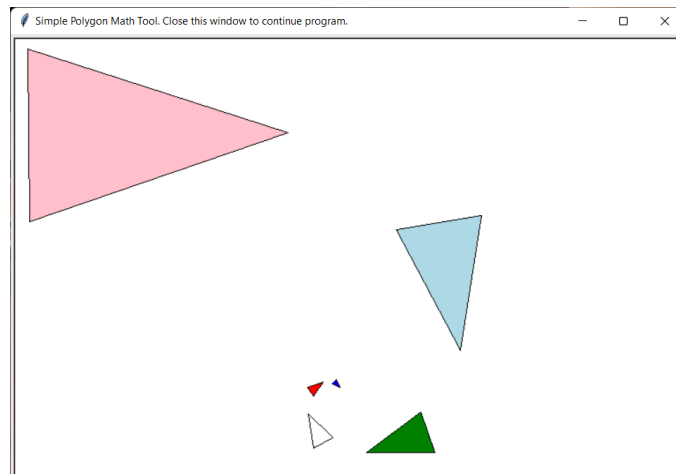


Figure 4 Drawing Window

## Modifying Polygons

After polygon(s) are inputted and drawing window is closed, the program will prompt the user to choose a menu from a list of menus as shown below. Input 1 to modify polygon.

```
Polygons are drawn on the other window. Close that window when you want to continue the program.
=====
What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above :
```

Figure 5 List of Menus

### Steps to modify polygon :

1. After inputting 1, if more than one polygon are available, list of polygons will be shown. Choose one of them by entering the polygon number. Else, it will automatically select the first polygon.
2. Enter a number which function you wish to do with the chosen polygon.
3. After successfully modified, drawing window will pop and display all of the polygons including the updated one.
4. Close the window to continue using the other sub-menu.

```
What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 1
Polygon 1 : [(1.0, 4.0), (2.0, 5.0), (3.0, 3.0)]
Polygon 2 : [(-3.95, 0.62), (-5.62, 2.9), (-1.36, 4.26)]
Polygon 3 : [(1.21, -10.21), (-3.82, -12.8), (-5.19, -3.96)]
Polygon 4 : [(24.2, -3.36), (27.76, -14.1), (9.87, -14.08)]
Polygon 5 : [(17.75, 44.18), (40.07, 47.92), (34.52, 12.58)]
Polygon 6 : [(-78.19, 46.12), (-78.69, 91.37), (-10.56, 69.49)]
Enter polygon number : 6
=====
What to modify ?
1 | Edit Vertex
2 | Move
3 | Rotate
4 | Scale
5 | Back to main menu
Enter one of the value above : _
```

Figure 6 Modify Sub-menu and List of Polygons



## Edit Vertex

With this menu, you can delete or edit a vertex of a chosen polygon. Enter the vertex number followed by action to do for the chosen vertex. Example : 3d → delete vertex 3, 2e → edit vertex 2. If number of vertexes is less than 4, you can only edit them. After editing/deleting, the program will check the polygon result. If it is invalid, it will prompt you to re-input again. Otherwise, updated polygon with the others will be displayed.

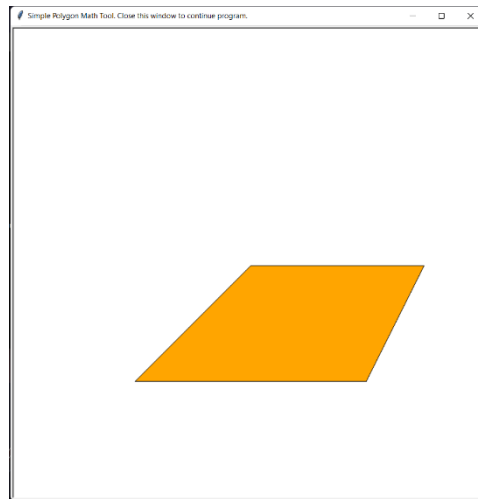


Figure 7 Before Editing

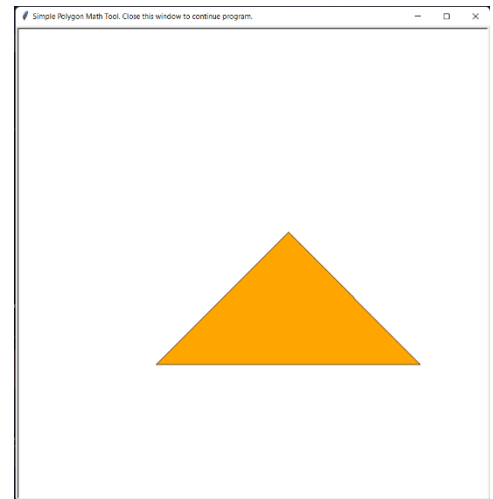


Figure 8 After Deleting Rightmost Vertex

```
What to modify ?
1 | Edit Vertex
2 | Move
3 | Rotate
4 | Scale
5 | Back to main menu
Enter one of the value above : 1
Enter vertex no followed by function (Ex. '4d' means delete vertex 4 or '1e' means edit vertex 1)
or enter 'e' to exit : 3d
Success
Polygon is drawn on the other window. Close that window when you want to continue the program.
```

Figure 9 Edit Vertex

## Move Polygon

With this menu, you can move a chosen polygon along the x-axis and y-axis (panning). Enter the value according to the prompt. Then drawing window will display the updated polygon with others.

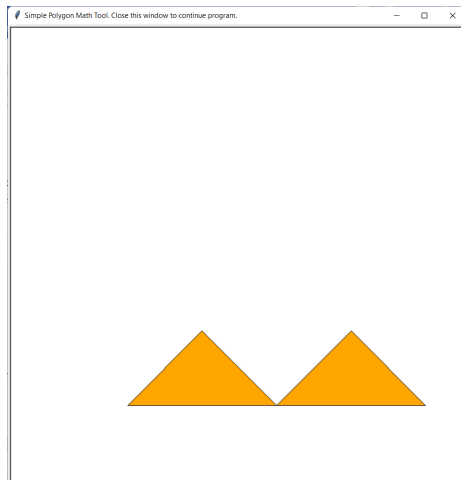


Figure 10 Before Moving the Right Polygon

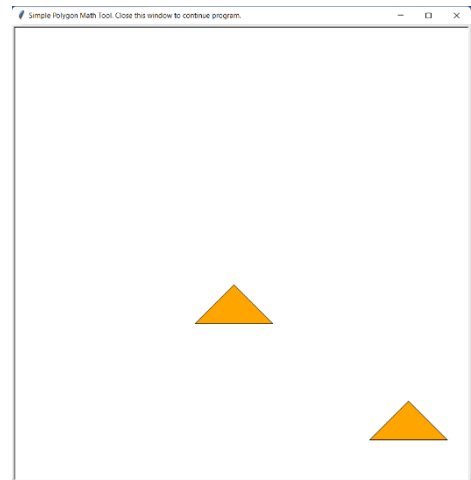


Figure 11 After Moving the Right Polygon

## Rotate Polygon

With this menu, you can rotate a chosen polygon with object center or coordinate as a reference point. Enter the value according to the prompt. Positive angle means rotate counterclockwise. Then drawing window will display the updated polygon with others.

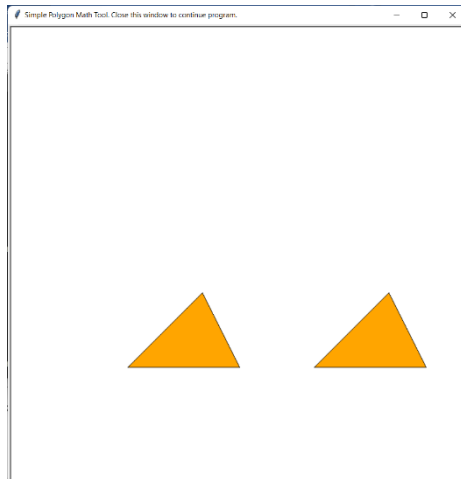


Figure 12 Before Rotating the Right Polygon

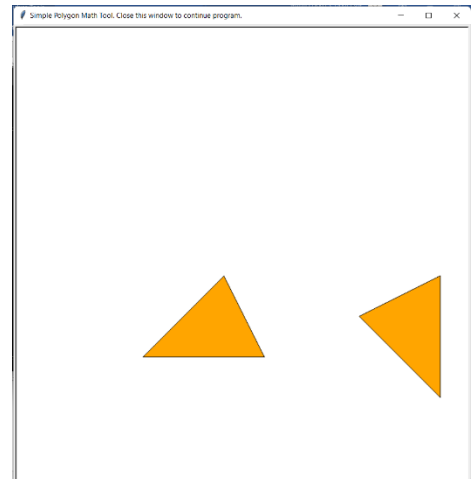


Figure 13 After Rotating the Right Polygon

```

=====
What to modify ?
1 | Edit Vertex
2 | Move
3 | Rotate
4 | Scale
5 | Back to main menu
Enter one of the value above : 3
Enter rotation angle in degrees : 90
Enter point/origin of rotation in 'x,y' or enter 'c' for centroid : c
Success
Polygons are drawn on the other window. Close that window when you want to continue the program.

```

Figure 14 Rotate Polygon

## Scale Polygon

With this menu, you can scale a chosen polygon with object center or coordinate as a reference point. Enter the value according to the prompt. Then drawing window will display the updated polygon with others.

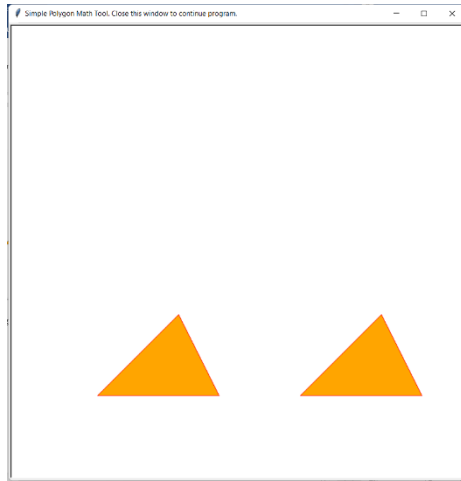


Figure 15 Before Scaling the Right Polygon

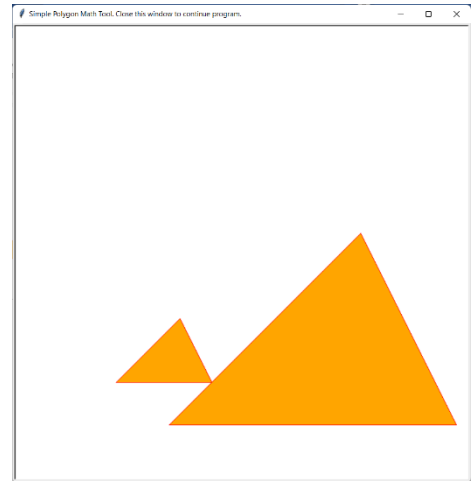


Figure 16 After Scaling the Right Polygon

```
What to modify ?
1 | Edit Vertex
2 | Move
3 | Rotate
4 | Scale
5 | Back to main menu
Enter one of the value above : 4
Enter scaling factor : 3
Enter origin in 'x,y' or 'c' for centroid or 'o' for origin : c
Success
Polygons are drawn on the other window. Close that window when you want to continue the program.
```

Figure 17 Scaling Polygon

## Creating Copies of Polygon

In this menu, you can create multiple copies of chosen polygon, each copy with different parameters. You can scale, move, and rotate the polygon repeatedly. Input 2 to start using it. Then, type in the parameter of modify for n copy of the polygon following the instruction. Note that different order of modify yields different result.

Example : move rotate scale → move then rotate then scale for n copies of polygon

Enter the number of copy as prompted. Then it will cycle through the sub-menu automatically. Enter all values as instructed or mentioned in the part of modify polygon. After finished, drawing window will display the result.

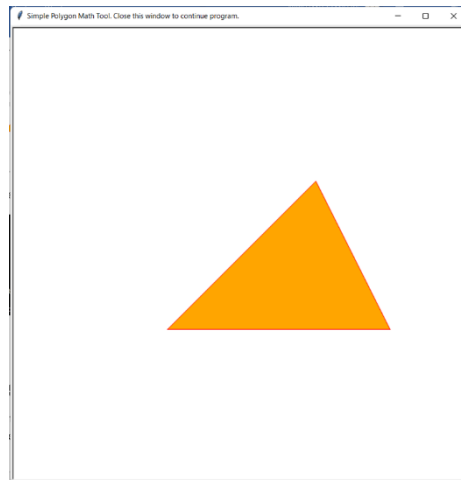


Figure 18 Before Creating Copy of Polygon

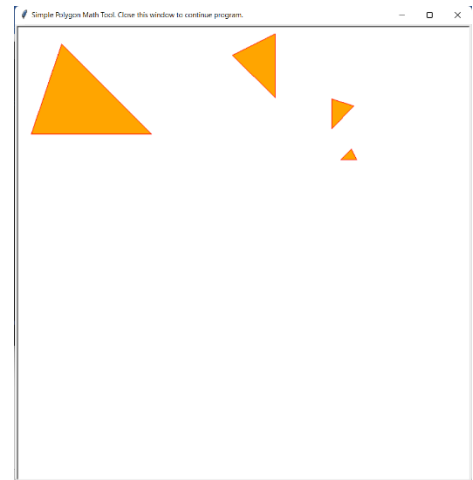


Figure 19 After Creating Copy of Polygon

```

What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 2
Enter the tranformation step for the copies separated with spaces.
Example : 'scale rotate'
Available transformation : scale, rotate, move.
Note : input order affects result.
move scale rotate
Enter number of copies : 3
Enter value to move on x axis : 5
Enter value to move on y axis : 5
Enter scaling factor : 2
Enter origin in 'x,y' or 'c' for centroid or 'o' for origin : c
Enter rotation angle in degrees : 45
Enter point/origin of rotation in 'x,y' or enter 'c' for centroid : 0,0
Done
Polygons are drawn on the other window. Close that window when you want to continue the program.

```

Figure 20 Creating Copy of Polygon

## Analyze Polygon

To use this menu, input 3. Then, if prompted, choose a polygon to be analyzed. Afterwards, choose a function that are listed.

### Calculate Area

This function calculates the area of the selected polygon. After selecting this function, the program will output the calculated area.

```

What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 3
Polygon 1 : [(1.0, 1.0), (4.0, 1.0), (3.0, 3.0)]
Polygon 2 : [(-0.7071067811865475, 6.835365551469959), (3.5355339059327378, 11.078006238589245), (-0.7071067811865479, 12.492219800962339)]
Polygon 3 : [(-11.373773447853214, 12.673605093390435), (-11.373773447853216, 24.673605093390435), (-19.373773447853214, 20.67360509339043)]
Polygon 4 : [(-34.71523565373305, 5.8451779686442435), (-51.68579840221019, 22.81574071712138), (-57.342652651702565, 5.845177968644233)]
Enter polygon number : 1
=====
1 | Calculate Area
2 | Calculate perimeter
3 | Check a point if it is inside or outside the polygon
Enter a value : 1
The area of polygon 1 is 3.00

```

Figure 21 Calculate Area of a Polygon

## Calculate Perimeter

This function calculates the perimeter of the selected polygon. After selecting this function, the program will output the calculated perimeter.

```

What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 3
Polygon 1 : [(1.0, 1.0), (4.0, 1.0), (3.0, 3.0)]
Polygon 2 : [(-0.7071067811865475, 6.835365551469959), (3.5355339059327378, 11.078006238589245), (-0.7071067811865479, 12.492219800962339)]
Polygon 3 : [(-11.373773447853214, 12.673605093390435), (-11.373773447853216, 24.673605093390435), (-19.373773447853214, 20.67360509339043)]
Polygon 4 : [(-34.71523565373305, 5.8451779686442435), (-51.68579840221019, 22.81574071712138), (-57.342652651702565, 5.845177968644233)]
Enter polygon number : 1
=====
1 | Calculate Area
2 | Calculate perimeter
3 | Check a point if it is inside or outside the polygon
Enter a value : 2
The perimeter of polygon 1 is 8.06

```

Figure 22 Calculate Perimeter of a Polygon

## Check a Point Position Relative to The Polygon

This function check whether a point given by the user is located inside, outside, or within the selected polygon. After selecting this function, the program will ask for user to input a point to be checked.

```

What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 3
Polygon 1 : [(1.0, 1.0), (4.0, 1.0), (3.0, 3.0)]
Polygon 2 : [(6.0, 1.0), (9.0, 1.0), (8.0, 3.0)]
Enter polygon number : 1
=====
1 | Calculate Area
2 | Calculate perimeter
3 | Check a point if it is inside or outside the polygon
Enter a value : 3
Enter a point to check in polygon 1 in format 'x,y' : 3,2
Point located inside of the polygon

```

Figure 23 Check a Point Position Relative to The Polygon

## Export Polygons to File

Export all of the polygon(s) data to a text file including coordinates and color. The file can be used next time when creating polygon(s) in the future. Format is the same as import file.

```

What do you want to do with the polygon?
1 | Modify
2 | Create multiple copies
3 | Analyze
4 | Create new polygon
5 | Save to file
6 | Exit Program
Enter one of the value above : 5
Enter output filename: goodbye

```

Figure 24 Export to File

## Future Program Updates

There are no programs that are future-proof and run without any bugs. This one is no exception let alone done by a newbie. Therefore, any bug fixing and program update will be available at GitHub : [BrilliantStanley/Simple-Polygon-Math-Tool: Made using python language for school mini project \(github.com\)](https://github.com/BrilliantStanley/Simple-Polygon-Math-Tool)