<u>GROUP4 MEMBERS:</u>

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COMPUTER GRAPHICS ASSIGNIMENT

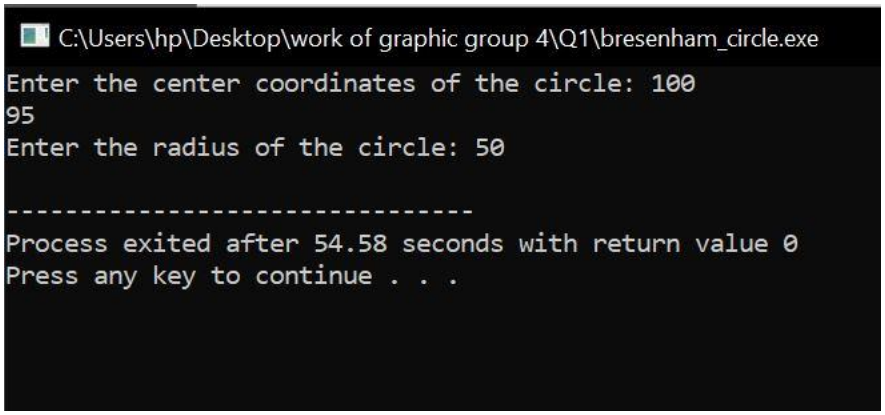
Question 1.

A.

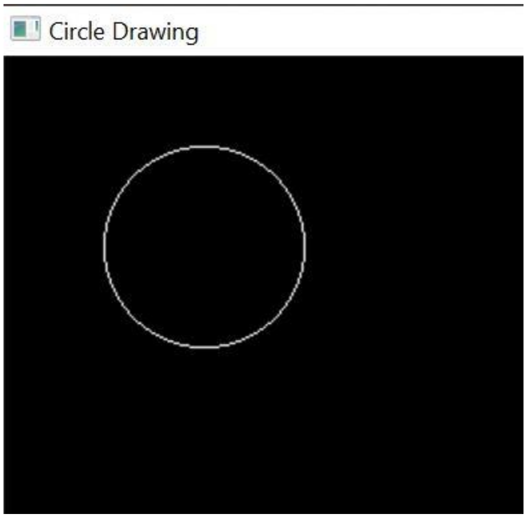
```
#include <iostream>
#include <graphics.h>
using namespace std;

class Circle {
public:
   int centerX, centerY, radius;

   void input() {
      cout << "Enter the center coordinates of the circle: ";
      cin >> centerX >> centerY;
      cout << "Enter the radius of the circle: ";
      cin >> radius;
   }

   void draw() {
        int x = 0, y = radius;
        int d = 3 - 2 * radius;

        initwindow(800, 600, "Circle Drawing");

        while (x <= y) {
            putpixel(centerX + x, centerY + y, WHITE);
            putpixel(centerX + y, centerY + x, WHITE);
            putpixel(centerX - y, centerY + x, WHITE);
            putpixel(centerX - x, centerY + y, WHITE);
            putpixel(centerX - x, centerY - y, WHITE);
            putpixel(centerX - y, centerY - x, WHITE);
            putpixel(centerX + y, centerY - x, WHITE);
            putpixel(centerX + x, centerY - y, WHITE);

            if (d <= 0) {
                d = d + 4 * x + 6;
            } else {
                d = d + 4 * (x - y) + 10;
                y--;
            }
            x++;
        }

        delay(10000);
        closegraph();
    }
};
```

```
int main() {
    Circle circle;
    int gd = DETECT, gm;
    initgraph(&gd, &gm, NULL);


    circle.input();
    circle.draw();


    delay(5000);
    return 0;
}
```

Output



```
C:\Users\hp\Desktop\work of graphic group 4\Q1\bresenham_circle.exe
Enter the center coordinates of the circle: 100
95
Enter the radius of the circle: 50

--------------------------------
Process exited after 54.58 seconds with return value 0
Press any key to continue . . .
```

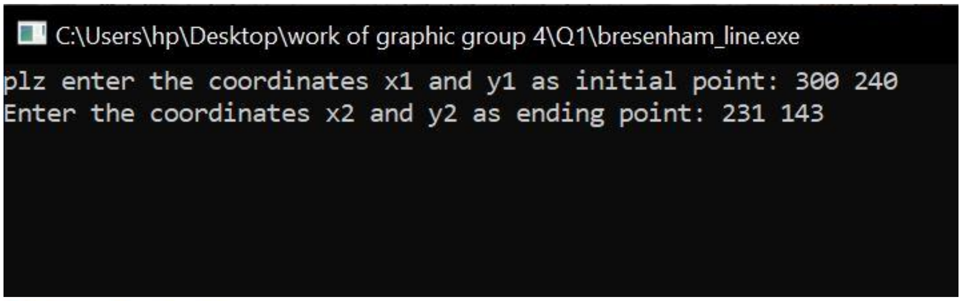


B. Bresenhm line

```
#include <iostream>
#include <graphics.h>
#include <math.h>
using namespace std;

void drawBresenhamLine(int x1, int y1, int x2, int y2, int color) {
    int x, y, dx, dy, dx1, dy1, px, py, xe, ye, i;

    dx = x2 - x1;
    dy = y2 - y1;
    dx1 = fabs(dx);
    dy1 = fabs(dy);
    px = 2 * dy1 - dx1;
    py = 2 * dx1 - dy1;

    initwindow(800, 600, "Bresenham Line Drawing");

    if (dy1 <= dx1) {
        if (dx >= 0) {
            x = x1;
            y = y1;
            xe = x2;
        } else {
            x = x2;
            y = y2;
            xe = x1;
        }
        putpixel(x, y, color);
        for (i = 0; x < xe; i++) {
            x = x + 1;
            if (px < 0) {
                px = px + 2 * dy1;
            } else {
                if ((dx < 0 && dy < 0) || (dx > 0 && dy > 0)) {
                    y = y + 1;
                } else {
                    y = y - 1;
                }
                px = px + 2 * (dy1 - dx1);
            }
            delay(0);
            putpixel(x, y, color);
        }
    } else {
        if (dy >= 0) {
            x = x1;
            y = y1;
            ye = y2;
        } else {
            x = x2;
            y = y2;
            ye = y1;
        }

        putpixel(x, y, color);
```

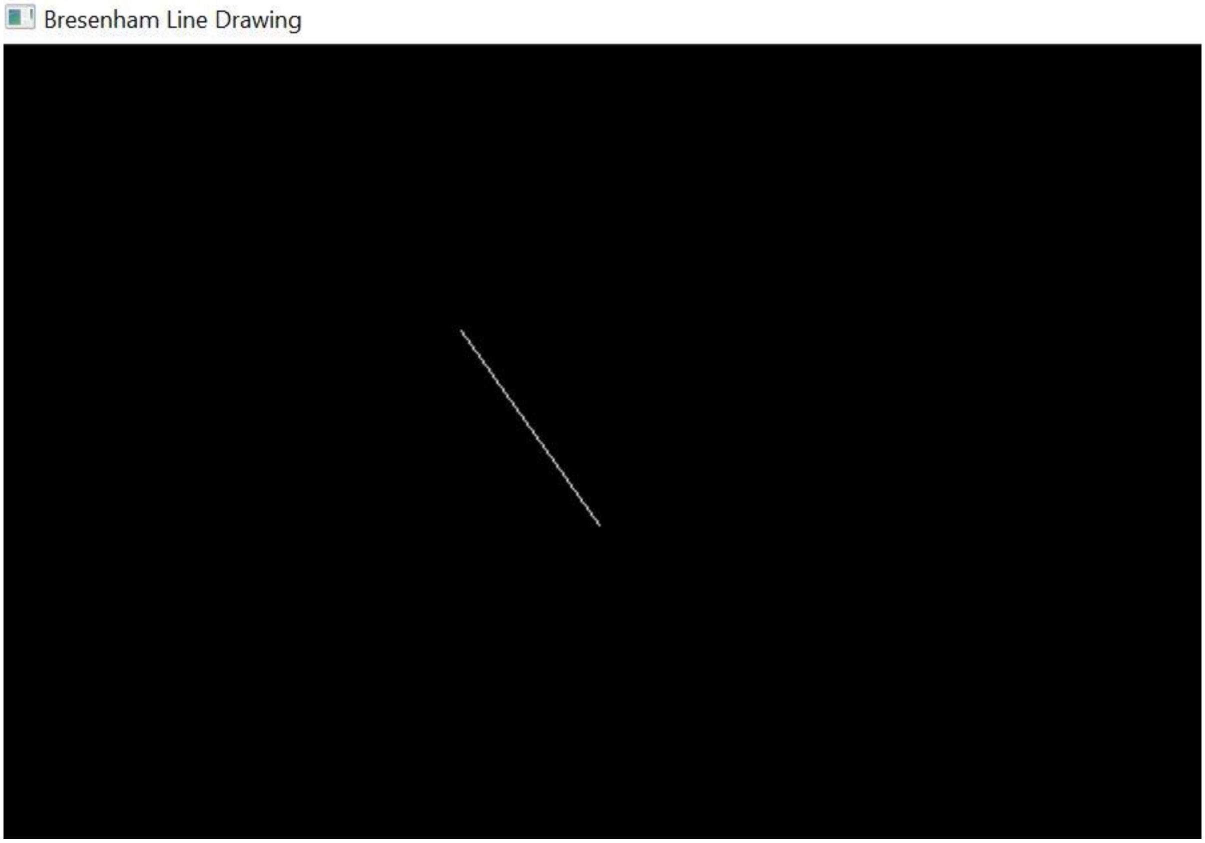
```
        for (i = 0; y < ye; i++) {
            y = y + 1;
            if (py <= 0) {
                py = py + 2 * dx1;
            } else {
                if ((dx < 0 && dy < 0) || (dx > 0 && dy > 0)) {
                    x = x + 1;
                } else {
                    x = x - 1;
                }
                py = py + 2 * (dx1 - dy1);
            }
            delay(0);
            putpixel(x, y, color);
        }
    }

    delay(10000);
    closegraph();
}

int main() {
    int x1, x2, y1, y2;
    initwindow(800, 600, "Bresenham Line Drawing");

    cout << "plz enter the coordinates x1 and y1 as initial point: ";
    cin >> x1 >> y1;
    cout << "Enter the coordinates x2 and y2 as ending point: ";
    cin >> x2 >> y2;
    drawBresenhamLine(x1, y1, x2, y2, WHITE);


    getch();
    closegraph();
    return 0;
}
```

Output of Bresenhma line



C:\Users\hp\Desktop\work of graphic group 4\Q1\bresenham_line.exe

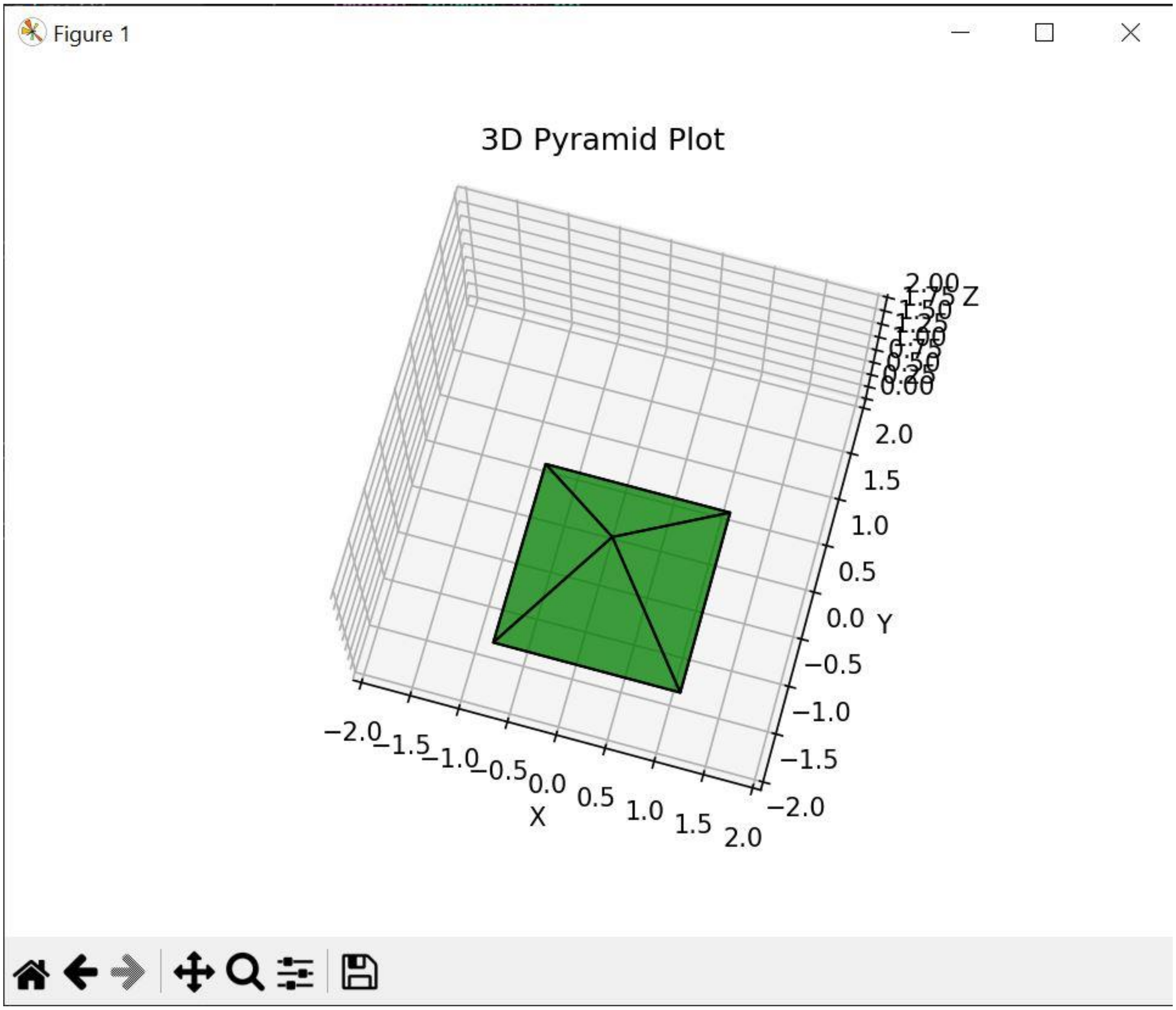
```
plz enter the coordinates x1 and y1 as initial point: 300 240
Enter the coordinates x2 and y2 as ending point: 231 143
```



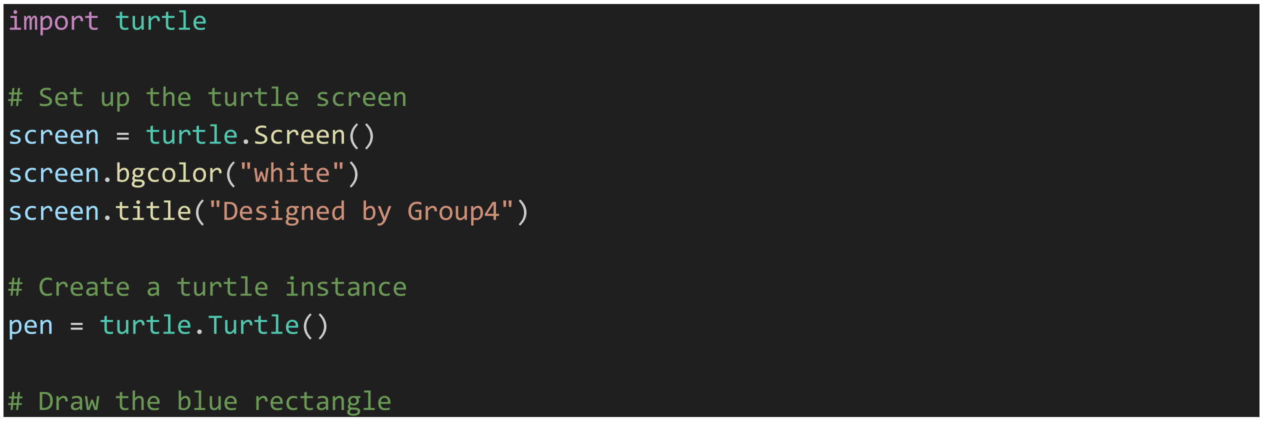
Question 2. modeling

```
import numpy as np
import matplotlib.pyplot as plt
from mpl_toolkits.mplot3d.art3d import Poly3DCollection

# Create a figure and a 3D axis
fig = plt.figure()
axis = fig.add_subplot(111, projection='3d')

# Define pyramid vertices
vertices = np.array([
    [0, 0, 0],
    [1, -1, -1],
    [-1, -1, -1],
    [-1, 1, -1],
    [1, 1, -1],
])

# Define faces using vertex indices
faces = [
    [vertices[0], vertices[1], vertices[2]],
    [vertices[0], vertices[2], vertices[3]],
    [vertices[0], vertices[3], vertices[4]],
    [vertices[0], vertices[4], vertices[1]],
    [vertices[1], vertices[2], vertices[3], vertices[4]]
]

# Create a Poly3DCollection from the faces
pyramid = Poly3DCollection(faces, facecolors='green', edgecolors='black',
alpha=0.5)
axis.add_collection3d(pyramid)

# Set plot limits and labels
axis.set_xlim([-2, 2])
axis.set_ylim([-2, 2])
axis.set_zlim([0, 2])
axis.set_xlabel('X')
axis.set_ylabel('Y')
axis.set_zlabel('Z')
axis.set_title('3D Pyramid Plot')

# Show the plot
plt.show()
```

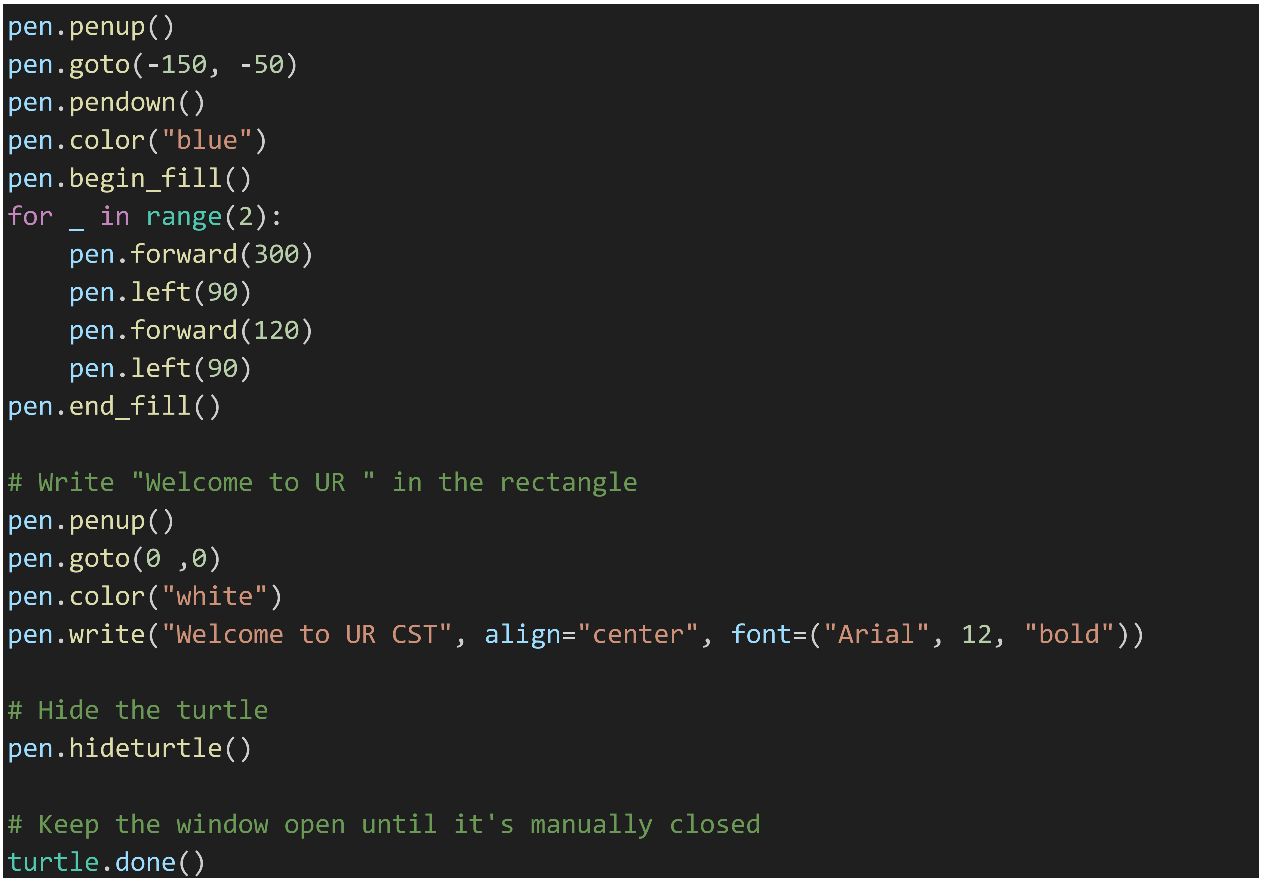
Output



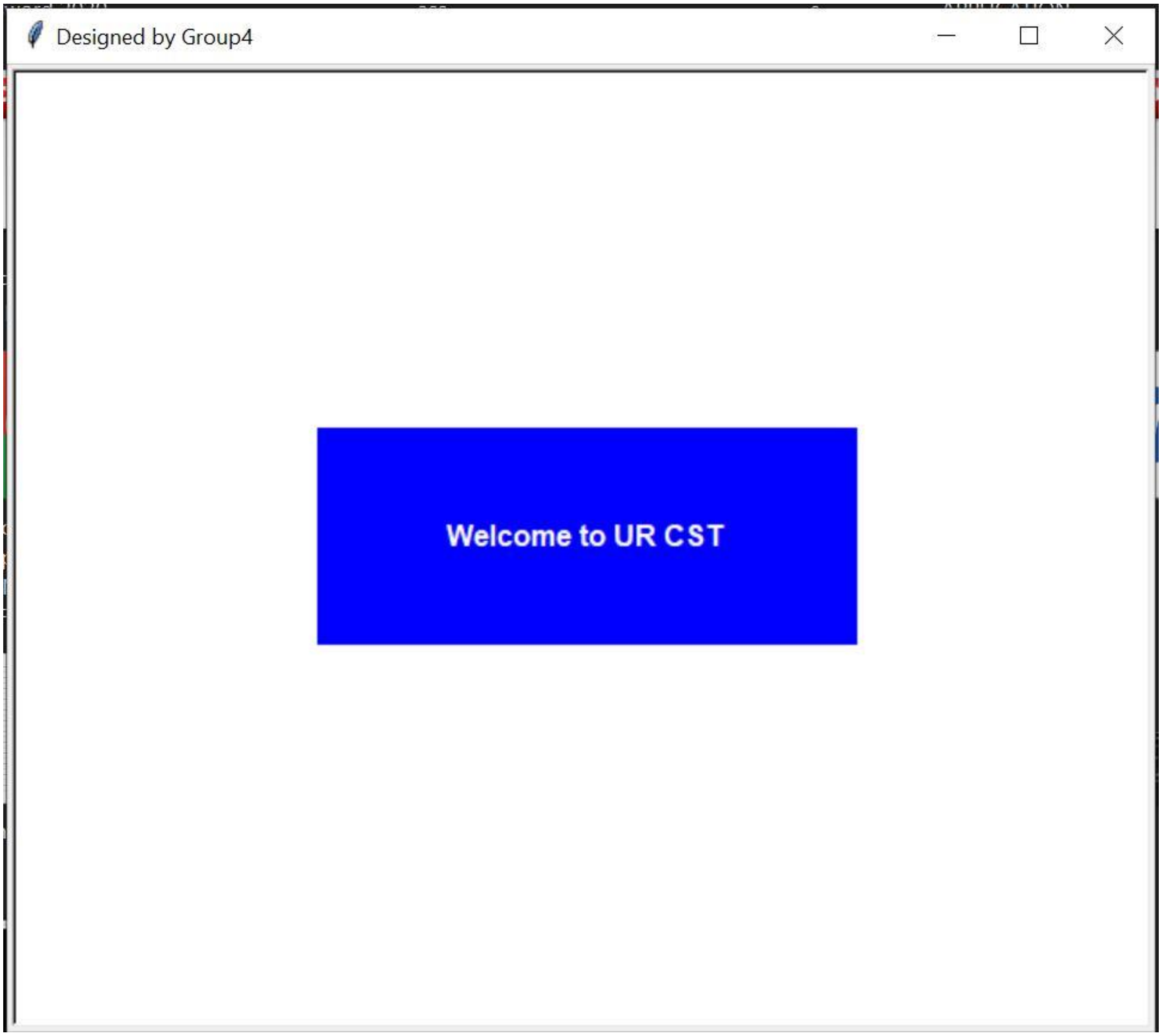
Question 3.a



```
import turtle

# Set up the turtle screen
screen = turtle.Screen()
screen.bgcolor("white")
screen.title("Designed by Group4")

# Create a turtle instance
pen = turtle.Turtle()

# Draw the blue rectangle
```

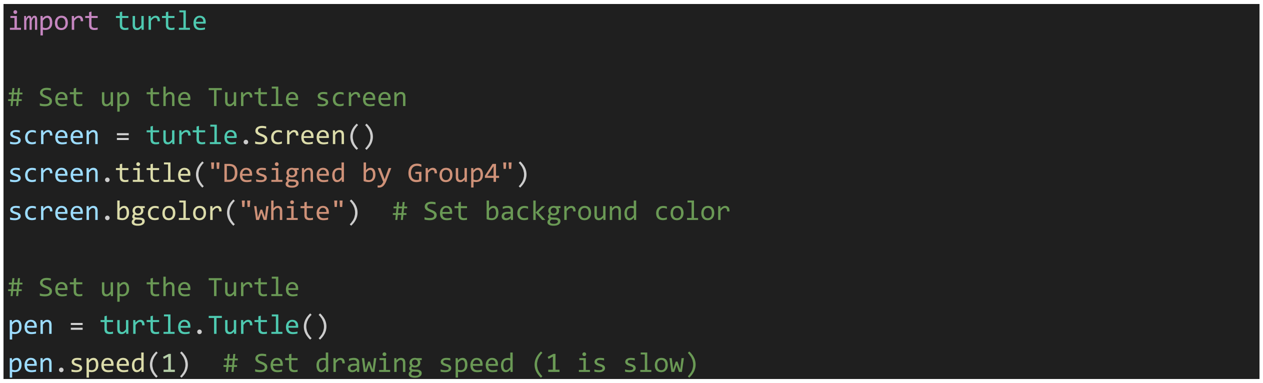


```
pen.penup()
pen.goto(-150, -50)
pen.pendown()
pen.color("blue")
pen.begin_fill()
for _ in range(2):
    pen.forward(300)
    pen.left(90)
    pen.forward(120)
    pen.left(90)
pen.end_fill()

# Write "Welcome to UR " in the rectangle
pen.penup()
pen.goto(0 ,0)
pen.color("white")
pen.write("Welcome to UR CST", align="center", font=("Arial", 12, "bold"))

# Hide the turtle
pen.hideturtle()

# Keep the window open until it's manually closed
turtle.done()
```



Welcome to UR CST

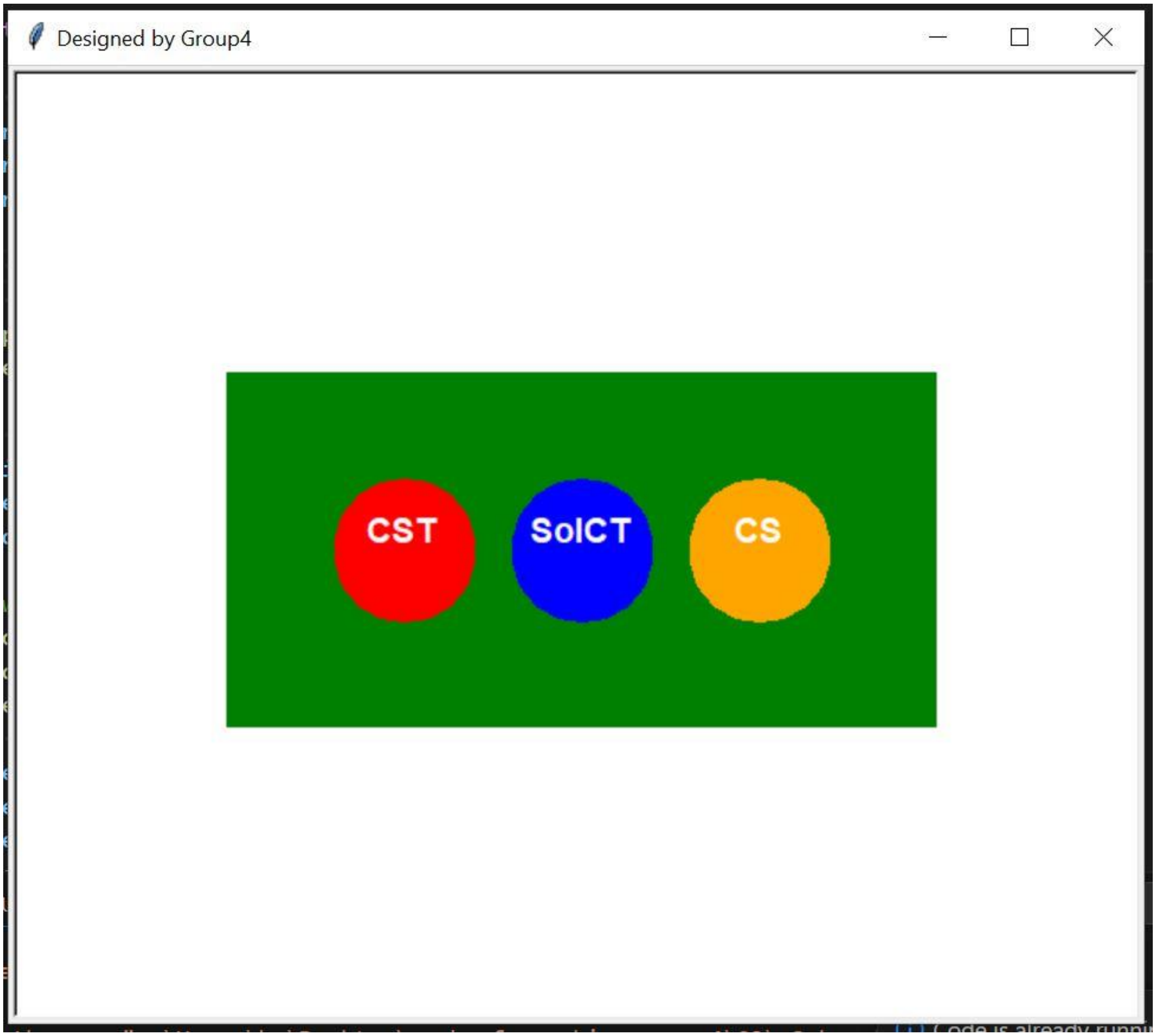
Question 3.b.



```
import turtle

# Set up the Turtle screen
screen = turtle.Screen()
screen.title("Designed by Group4")
screen.bgcolor("white")  # Set background color

# Set up the Turtle
pen = turtle.Turtle()
pen.speed(1)  # Set drawing speed (1 is slow)
pen.penup()

# Set up the rectangular box
box_width = 400
box_height = 200
box_color = "green"

# Draw the rectangular box
pen.goto(-box_width / 2, -box_height / 2)
pen.color(box_color)
pen.begin_fill()
for _ in range(2):
    pen.forward(box_width)
    pen.left(90)
    pen.forward(box_height)
    pen.left(90)
pen.end_fill()

pen.penup()
pen.goto(0, box_height / 2 + 20)  # Position above the box
pen.color("black")  # Set text color
pen.write(" ", align="center", font=("Arial", 14, "bold"))

# List of circle data: (x, y, radius, color, text)
circle_data = [(-100, 0, 40, "red", "CST"),
               (0, 0, 40, "blue", "SoICT"),
               (100, 0, 40, "orange", "CS")]

# Draw the circles using a loop
for x, y, radius, color, text in circle_data:
    pen.penup()
    pen.goto(x, y - radius)
    pen.pendown()
    pen.color(color)
    pen.begin_fill()
    pen.circle(radius)
    pen.end_fill()

    pen.penup()
    pen.goto(x, y)
    pen.color("white")
    pen.write(text, align="center", font=("Arial", 14, "bold"))

# Hide the Turtle
pen.hideturtle()
```

```
# Display the result
screen.mainloop()
```

Output:

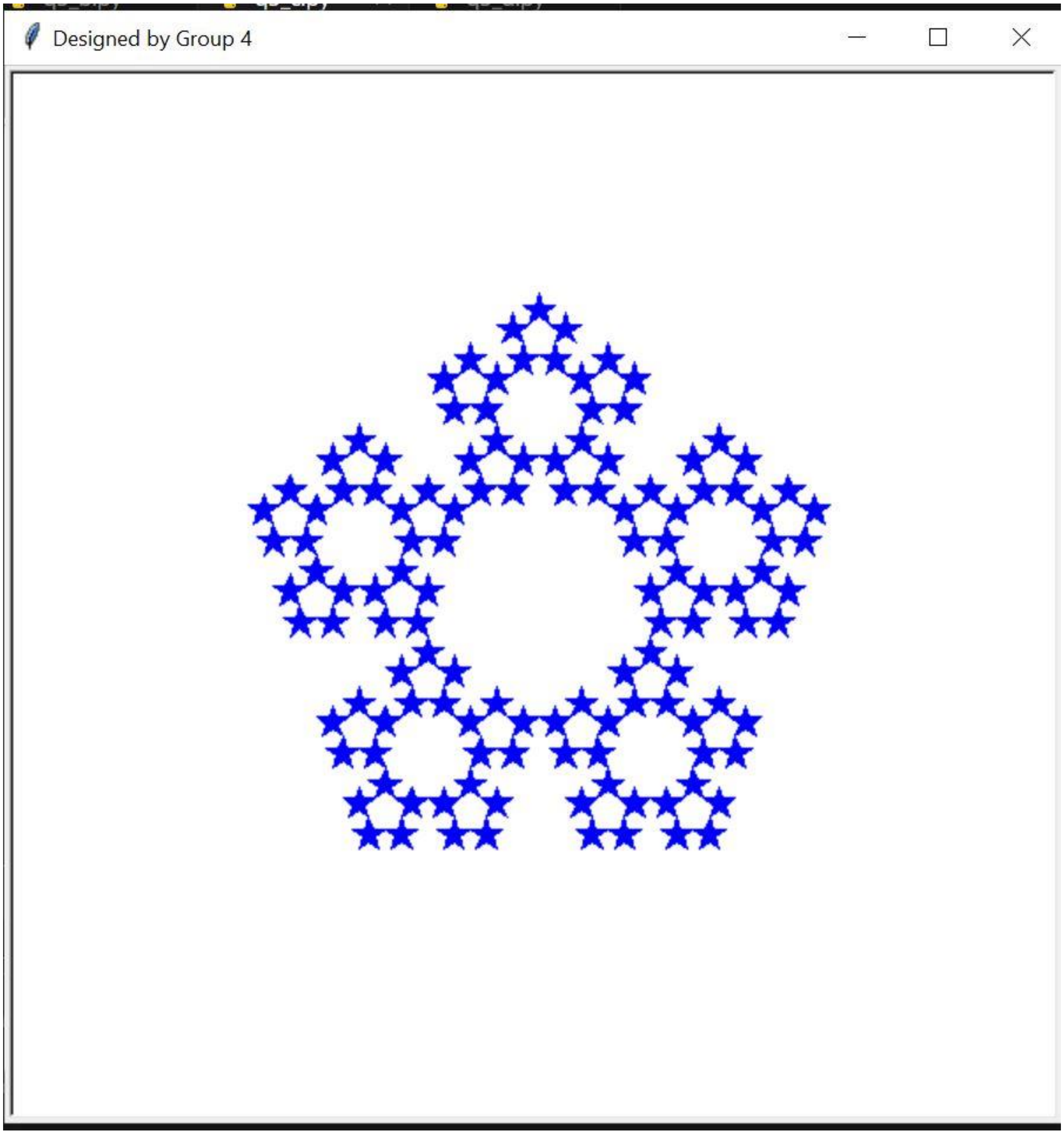


Designed by Group4

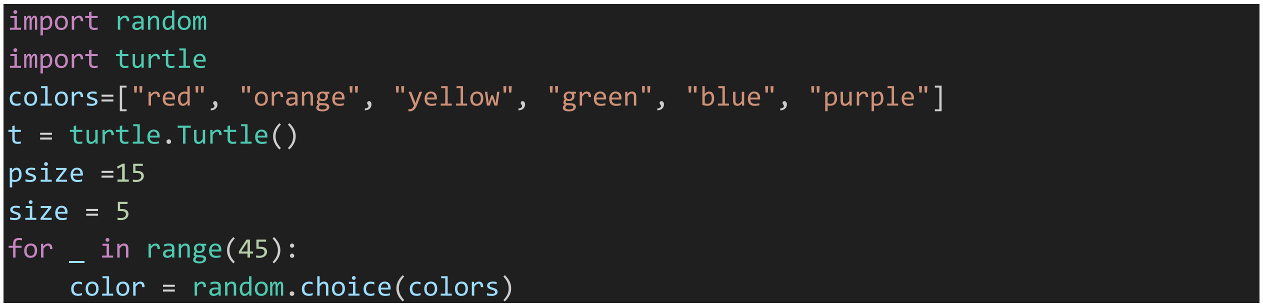
Question 3.c

```
import turtle
import math
# Set up the turtle screen
screen = turtle.Screen()
screen.title("Designed by Group 4")
screen.setup(600, 600)
screen.setworldcoordinates(-1000, -1000, 1000, 1000)
turtle.hideturtle()
turtle.speed(0)
turtle.bgcolor('white')
# Define a function to draw a star
def star(x, y, length, penc, fillc):
    turtle.up()
    turtle.goto(x, y)
    turtle.seth(90)
    turtle.fd(length)
    turtle.seth(180 + 36 / 2)
    L = length * math.sin(36 * math.pi / 180) / math.sin(54 * math.pi / 180)
    turtle.seth(180 + 72)
    turtle.down()
    turtle.fillcolor(fillc)
    turtle.pencolor(penc)
    turtle.begin_fill()
    for _ in range(5):
        turtle.fd(L)
        turtle.right(72)
        turtle.fd(L)
        turtle.left(144)
    turtle.end_fill()
# Define a recursive function to draw a star fractal
def star_fractal(x, y, length, penc, fillc, n):
    if n == 0:
        star(x, y, length, penc, fillc)
        return
    length2 = length / (1 + (math.sin(18 * math.pi / 180) + 1) / math.sin(54 *
math.pi / 180))
    L = length - length2 * math.sin(18 * math.pi / 180) / math.sin(54 * math.pi /
180)
    for i in range(5):
        star_fractal(x + math.cos((90 + i * 72) * math.pi / 180) * (length -
length2),
                     y + math.sin((90 + i * 72) * math.pi / 180) * (length -
length2),
                     length2, penc, fillc, n - 1)
# Draw a star fractal with specified parameters
star_fractal(0, 0, 600, 'blue', 'blue', 3)
screen.update()# Update the screen and finish the drawing
turtle.done()
```

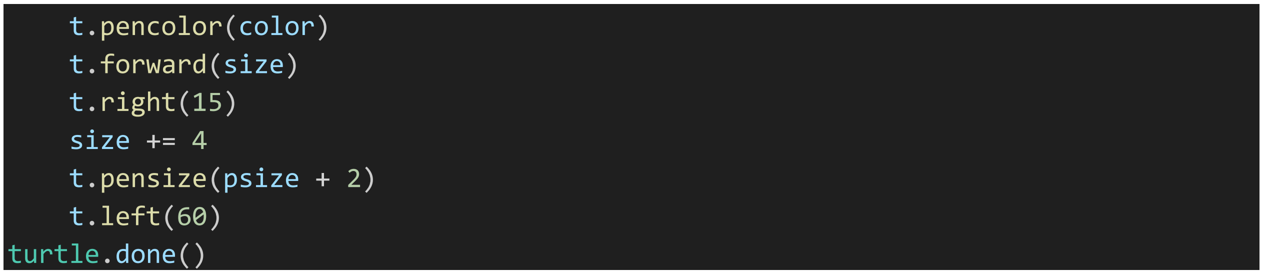
Output:



Question 3.D.

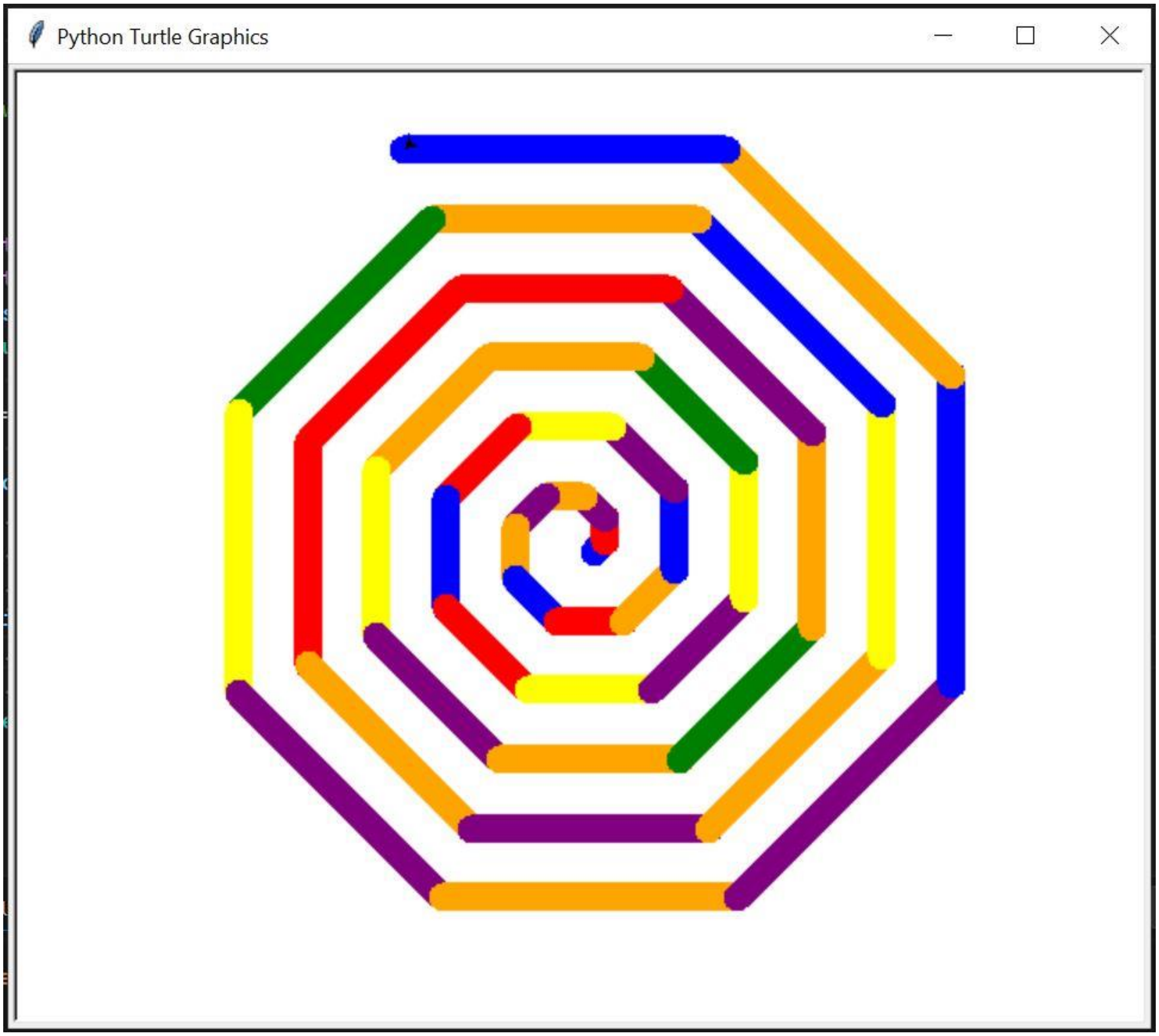


```
import random
import turtle
colors=["red", "orange", "yellow", "green", "blue", "purple"]
t = turtle.Turtle()
psize =15
size = 5
for _ in range(45):
    color = random.choice(colors)
```



```
    t.pencolor(color)
    t.forward(size)
    t.right(15)
    size += 4
    t.pensize(psize + 2)
    t.left(60)
turtle.done()
```

Output:


Python Turtle Graphics