# Computer Graphics Assignment-4

# Transformations

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**Batch-A (1, 2)**

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## Translation

### Code:

```
from graphics import *



coordinate = []
def translation(tx1,ty1):
        print(coordinate)
        for i in range(c):
                coordinate[i][0]=coordinate[i][0]+tx1
                coordinate[i][1]=coordinate[i][1]+ty1


        print(coordinate)


print("Enter the number of vertices of polygon")
c=int(input())
```

```
for i in range(c):
    x = int(input("Enter x coordinate of vertex:"))
    y = int(input("Enter y coordinate of vertex:"))
    point=[]
    point.append(x)
    point.append(y)
    coordinate.append(point)

tx = int(input("Enter Translation factor in x direction:Tx="))
ty = int(input("Enter Translation factor in y direction:Ty="))

win_obj=GraphWin("Translation",700,700) #set viewport size  700,700 are device coordinates
win_obj.setBackground("Light Green")
win_obj.setCoords(-350,-350,350,350) #set window  use coordinates are set
x_axis=Line(Point(-350,0),Point(350,0))   #obj for x axis
y_axis=Line(Point(0,-350),Point(0,350))    #obj for y axis

x_axis.setOutline("Black")
y_axis.setOutline("Black")
x_axis.setArrow('both')
y_axis.setArrow('both')
x_axis.draw(win_obj)
y_axis.draw(win_obj)
```

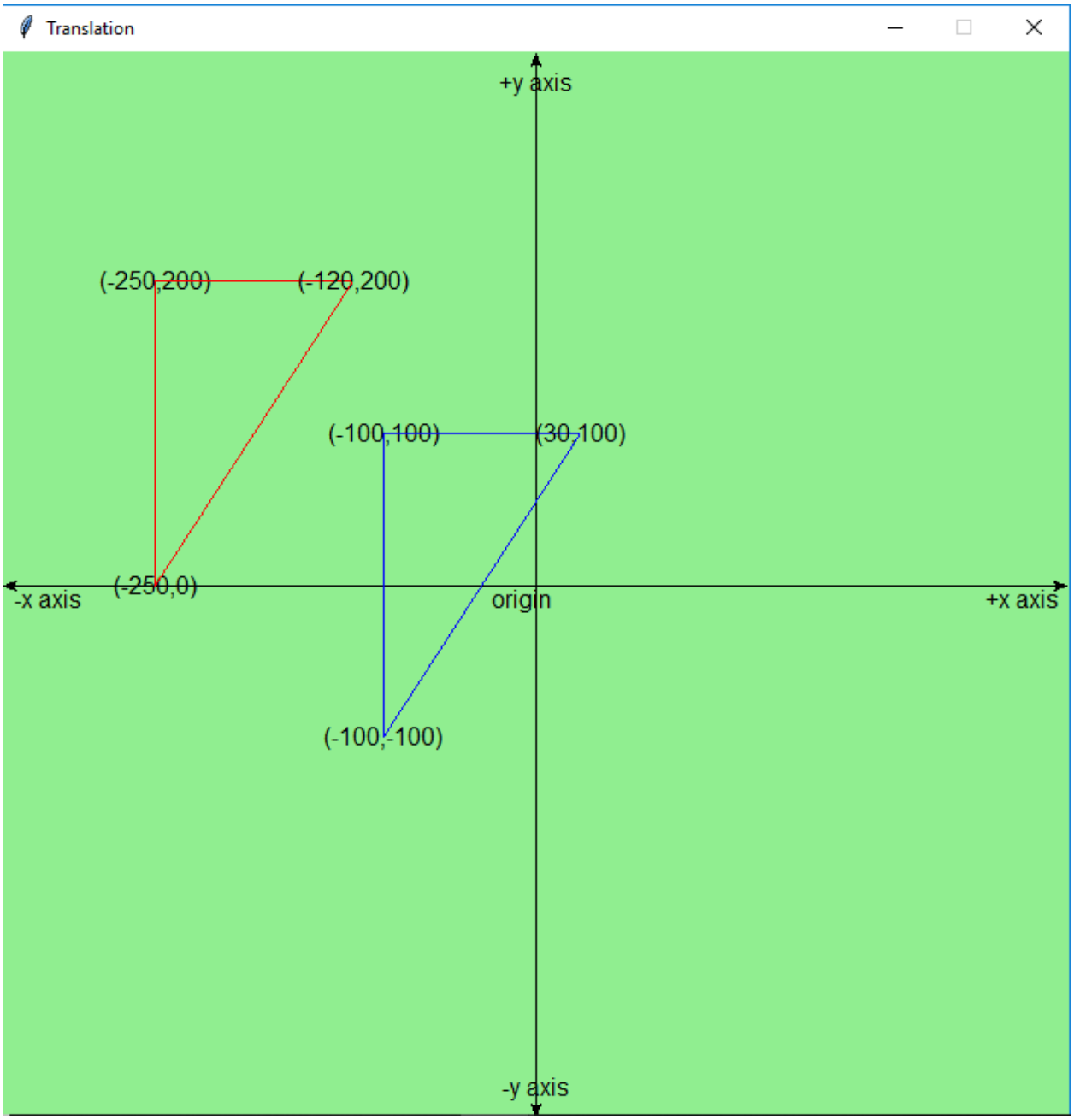
```
info_x=Text(Point(320,-10),"+x axis")
info_x.draw(win_obj)
info_nx=Text(Point(-320,-10),"-x axis")
info_nx.draw(win_obj)
info_y=Text(Point(0,330),"+y axis")
info_y.draw(win_obj)
info_ny=Text(Point(0,-330),"-y axis")
info_ny.draw(win_obj)

origin=Text(Point(-10,-10),"origin")
origin.draw(win_obj)



#previos
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("blue")
    line.draw(win_obj)
```

```
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("blue")
line.draw(win_obj)



translation(tx,ty)


#after translation
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("red")
```

```
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("red")
line.draw(win_obj)


win_obj.getMouse()
win_obj.close()
```

**Example1**:

```
>>>
============= RESTART: C:\Users\Ashish\Desktop\py\translation.py
Enter the number of vertices of polygon
3
Enter x coordinate of vertex:-100
Enter y coordinate of vertex:-100
Enter x coordinate of vertex:-100
Enter y coordinate of vertex:100
Enter x coordinate of vertex:30
Enter y coordinate of vertex:100
Enter Translation factor in x direction:Tx=-150
Enter Translation factor in y direction:Ty=100
[[-100, -100], [-100, 100], [30, 100]]
[[-250, 0], [-250, 200], [-120, 200]]
```




# Scaling

## Code:

from graphics import *

```
def getcenter():
    global cx,cy
    for i in range(c):
        cx += coordinate[i][0]
        cy += coordinate[i][1]
    cx = cx/c
    cy = cy/c
def translation(tx1,ty1):
    print(coordinate)
    for i in range(c):
        coordinate[i][0]=(int)(coordinate[i][0]+tx1)
        coordinate[i][1]=(int)(coordinate[i][1]+ty1)

    print(coordinate)

def scaling(sx1,sy1):
    for i in range(c):
        coordinate[i][0]=(int)(coordinate[i][0]*sx1)
        coordinate[i][1]=(int)(coordinate[i][1]*sy1)
    print(coordinate)

print("Enter the number of vertices of polygon")
c=int(input())
coordinate = []
for i in range(c):
```

```
    x = int(input("Enter x coordinate of vertex:"))
    y = int(input("Enter y coordinate of vertex:"))
    point=[]
    point.append(x)
    point.append(y)
    coordinate.append(point)

sx = float(input("Enter Scaling factor in x direction:Sx="))
sy = float(input("Enter Scaling factor in y direction:Sy="))

win_obj=GraphWin("Scaling",700,700) #set viewport size  700,700 are device coordinates
win_obj.setBackground("Light Green")
win_obj.setCoords(-350,-350,350,350) #set window  use coordinates are set
x_axis=Line(Point(-350,0),Point(350,0))   #obj for x axis
y_axis=Line(Point(0,-350),Point(0,350))    #obj for y axis

x_axis.setOutline("Black")
y_axis.setOutline("Black")
x_axis.setArrow('both')
y_axis.setArrow('both')
x_axis.draw(win_obj)
y_axis.draw(win_obj)

info_x=Text(Point(320,-10),"+x axis")
info_x.draw(win_obj)
```

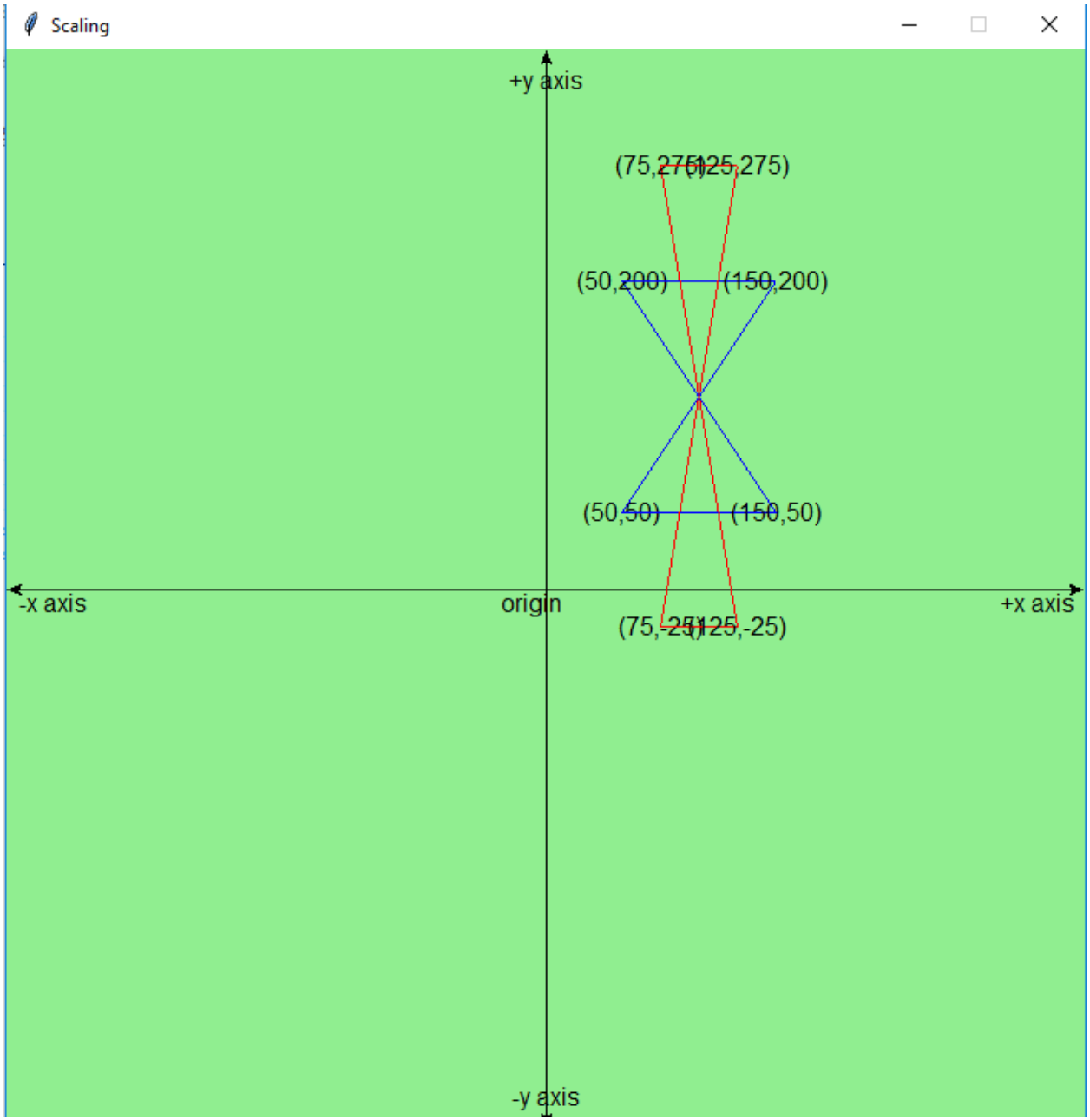
```
info_nx=Text(Point(-320,-10),"-x axis")
info_nx.draw(win_obj)
info_y=Text(Point(0,330),"+y axis")
info_y.draw(win_obj)
info_ny=Text(Point(0,-330),"-y axis")
info_ny.draw(win_obj)

origin=Text(Point(-10,-10),"origin")
origin.draw(win_obj)



#previous
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("blue")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
```

```
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("blue")
line.draw(win_obj)

cx = 0  #for x coordinate of center
cy = 0
getcenter()
print(cx,cy)
translation(-cx,-cy)
scaling(sx,sy)
translation(cx,cy)

#after scaling
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
```

```
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("red")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("red")
line.draw(win_obj)


win_obj.getMouse()
win_obj.close()
```

**Example2**:

```
============== RESTART: C:\Users\Ashish\Desktop\py\scaling.py
Enter the number of vertices of polygon
4
Enter x coordinate of vertex:50
Enter y coordinate of vertex:50
Enter x coordinate of vertex:150
Enter y coordinate of vertex:50
Enter x coordinate of vertex:50
Enter y coordinate of vertex:200
Enter x coordinate of vertex:150
Enter y coordinate of vertex:200
Enter Scaling factor in x direction:Sx=0.5
Enter Scaling factor in y direction:Sy=2
100.0 125.0
[[50, 50], [150, 50], [50, 200], [150, 200]]
[[-50, -75], [50, -75], [-50, 75], [50, 75]]
[[-25, -150], [25, -150], [-25, 150], [25, 150]]
[[-25, -150], [25, -150], [-25, 150], [25, 150]]
[[75, -25], [125, -25], [75, 275], [125, 275]]
```




# Rotation

## Code:

```
from graphics import *
import math
```

```
coordinate = []
def translation(tx1,ty1):
    print(coordinate)
    for i in range(c):
        coordinate[i][0]=(int)(coordinate[i][0]+tx1)
        coordinate[i][1]=(int)(coordinate[i][1]+ty1)

    print(coordinate)
    print()
def rotation(theta):
    for i in range(c):
        x0 =coordinate[i][0]
        y0=coordinate[i][1]
        coordinate[i][0]=(int)(x0*math.cos(math.radians(theta))-
y0*math.sin(math.radians(theta)))

    coordinate[i][1]=(int)(x0*math.sin(math.radians(theta))+y0*math.cos(math.radians(theta
)))

    print(coordinate)
    print()

print("Enter the number of vertices of polygon")
c=int(input())
```

```
for i in range(c):
    x = int(input("Enter x coordinate of vertex:"))
    y = int(input("Enter y coordinate of vertex:"))
    point=[]
    point.append(x)
    point.append(y)
    coordinate.append(point)



theta= float(input("Enter angle of rotation :theta="))

print("Enter pivot point coordinates")
a = int(input("Enter x coordinate of pivot:"))
b = int(input("Enter y coordinate of pivot:"))

win_obj=GraphWin("Rotation",700,700) #set viewport size  700,700 are device coordinates
win_obj.setBackground("Light Green")
win_obj.setCoords(-350,-350,350,350) #set window  use coordinates are set
x_axis=Line(Point(-350,0),Point(350,0))   #obj for x axis
y_axis=Line(Point(0,-350),Point(0,350))    #obj for y axis

x_axis.setOutline("Black")
y_axis.setOutline("Black")
x_axis.setArrow('both')
y_axis.setArrow('both')
```

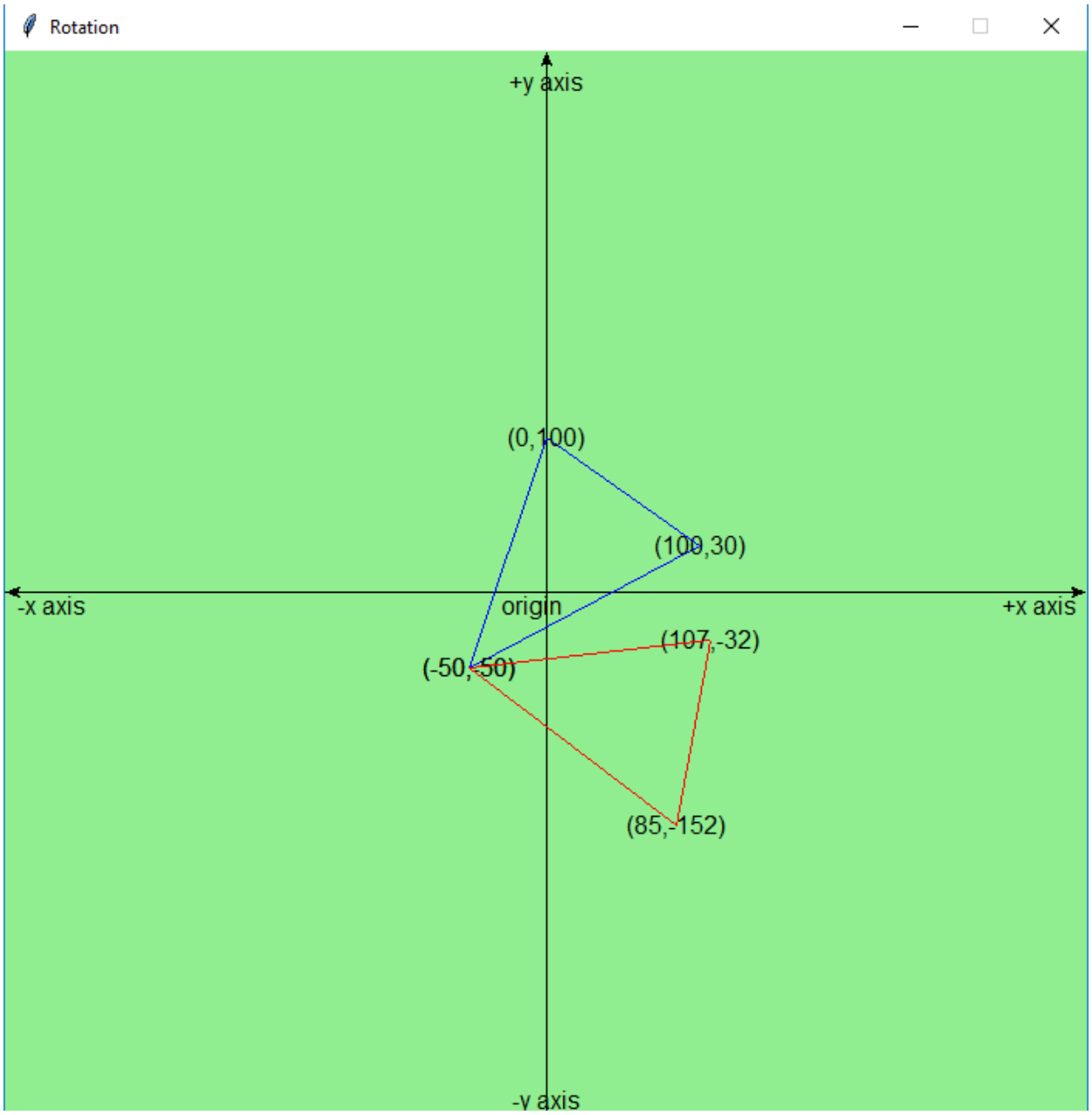
```
x_axis.draw(win_obj)
y_axis.draw(win_obj)

info_x=Text(Point(320,-10),"+x axis")
info_x.draw(win_obj)
info_nx=Text(Point(-320,-10),"-x axis")
info_nx.draw(win_obj)
info_y=Text(Point(0,330),"+y axis")
info_y.draw(win_obj)
info_ny=Text(Point(0,-330),"-y axis")
info_ny.draw(win_obj)

origin=Text(Point(-10,-10),"origin")
origin.draw(win_obj)



#previous
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
```

```
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("blue")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("blue")
line.draw(win_obj)



translation(-1*a,-1*b)
rotation(theta)
translation(a,b)

#after rotation
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
```

```
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setOutline("red")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setOutline("red")
line.draw(win_obj)

win_obj.getMouse()
win_obj.close()
```

**Example3**:

```
============== RESTART: C:\Users\Ashish\Desktop\py\rotation.py
Enter the number of vertices of polygon
3
Enter x coordinate of vertex:-50
Enter y coordinate of vertex:-50
Enter x coordinate of vertex:100
Enter y coordinate of vertex:30
Enter x coordinate of vertex:0
Enter y coordinate of vertex:100
Enter angle of rotation :theta=-65
Enter pivot point coordinates
Enter x coordinate of pivot:-50
Enter y coordinate of pivot:-50
[[-50, -50], [100, 30], [0, 100]]
[[0, 0], [150, 80], [50, 150]]

[[0, 0], [135, -102], [157, 18]]

[[0, 0], [135, -102], [157, 18]]
[[-50, -50], [85, -152], [107, -32]]
```




# Shearing

## Code:

```
from graphics import *

import math

coordinate = []
```

```
def translation(tx1,ty1):
        print(coordinate)
        for i in range(c):
                coordinate[i][0]=(int)(coordinate[i][0]+tx1)
                coordinate[i][1]=(int)(coordinate[i][1]+ty1)

        print(coordinate)
        print()

def rotation(theta):
        for i in range(c):
                x0 =coordinate[i][0]
                y0=coordinate[i][1]
                coordinate[i][0]=(int)(x0*math.cos(theta)-y0*math.sin(theta))
                coordinate[i][1]=(int)(x0*math.sin(theta)+y0*math.cos(theta))

        print(coordinate)
        print()


def shear(shx1,shy1):
      print(coordinate)
      for i in range(c):

          temp_x=coordinate[i][0]
```

```
            temp_y=coordinate[i][1]
            coordinate[i][0]=(int)(temp_x+shx1*temp_y)
            coordinate[i][1]=(int)(temp_y+shy1*temp_x)

        print(coordinate)


print("Enter the number of vertices of polygon")
c=int(input())

for i in range(c):
    x = int(input("Enter x coordinate of vertex:"))
    y = int(input("Enter y coordinate of vertex:"))
    point=[]
    point.append(x)
    point.append(y)
    coordinate.append(point)

print("enter 1 for shear in x-axis and 2 for shear in y axis and 3 for arbitrary line")
temp=(int)(input())


if temp==1:
            shx = float(input("Enter shear factor in x direction:shx="))
            shy=0
```

```
elif temp==2:
        shx=0
        shy = float(input("Enter shear factor in y direction:shy="))


win_obj=GraphWin("Shear",700,700) #set viewport size  700,700 are device coordinates
win_obj.setBackground("Light Green")
win_obj.setCoords(-350,-350,350,350) #set window  use coordinates are set
x_axis=Line(Point(-350,0),Point(350,0))   #obj for x axis
y_axis=Line(Point(0,-350),Point(0,350))    #obj for y axis

x_axis.setOutline("Black")
y_axis.setOutline("Black")
x_axis.setArrow('both')
y_axis.setArrow('both')
x_axis.draw(win_obj)
y_axis.draw(win_obj)

info_x=Text(Point(320,-10),"+x axis")
info_x.draw(win_obj)
info_nx=Text(Point(-320,-10),"-x axis")
info_nx.draw(win_obj)
info_y=Text(Point(0,330),"+y axis")
info_y.draw(win_obj)
info_ny=Text(Point(0,-330),"-y axis")
```

```
info_ny.draw(win_obj)


origin=Text(Point(-10,-10),"origin")
origin.draw(win_obj)



#previos
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setFill("blue")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
```

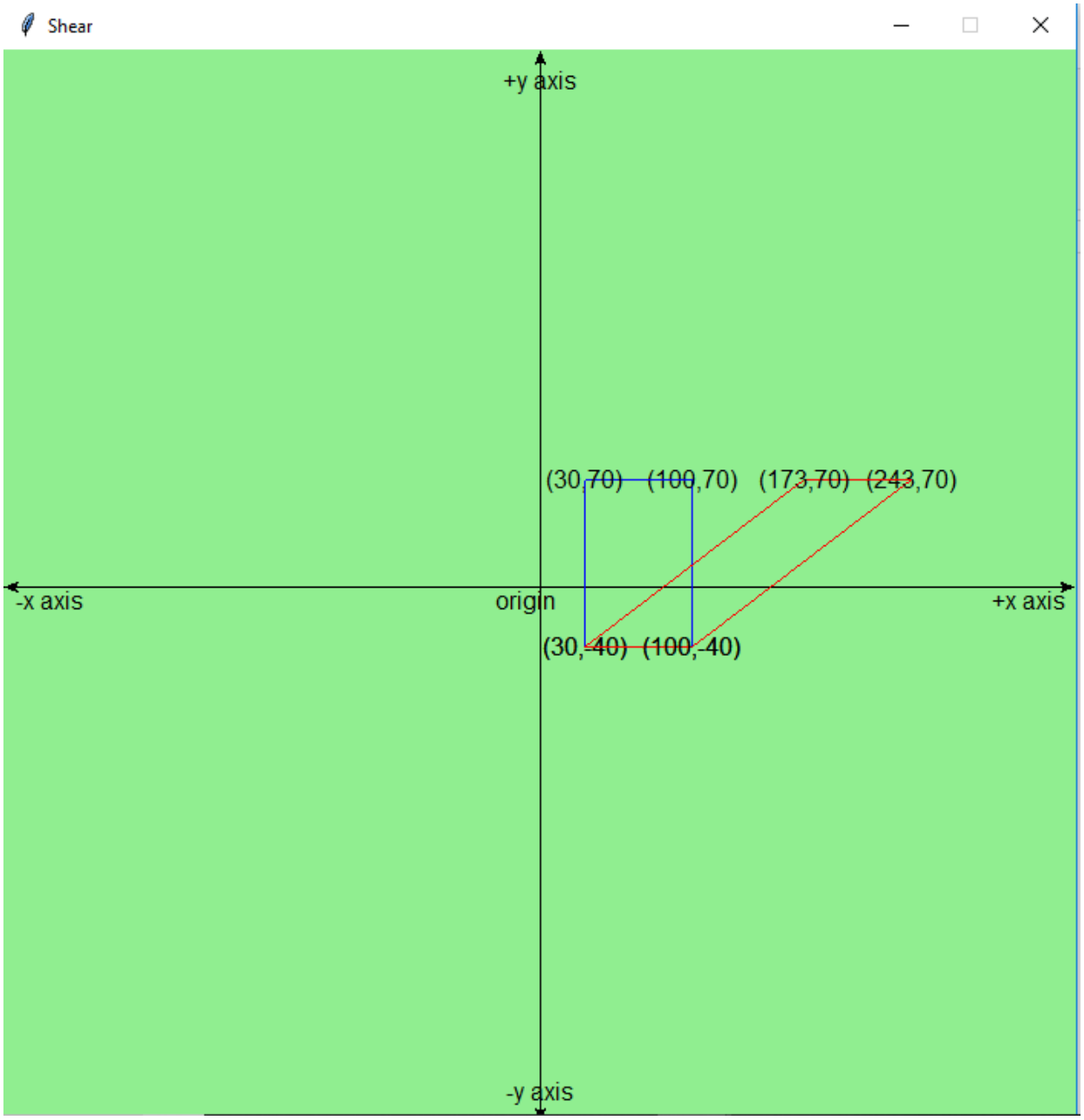
```
line=Line(Point(x0,y0),Point(x1,y1))
line.setFill("blue")
line.draw(win_obj)

if temp==1:
        shear(shx,shy)
elif temp==2:
        shear(shx,shy)
elif temp==3:
    shx = float(input("Enter shear factor in x direction:shx="))
    shy = float(input("Enter shear factor in y direction:shy="))
    print("Enter coordinates of line about which shear is to taken")
    a0=float(input("enter x0 coordinate of shear line"))
    b0=float(input("enter y0 coordinate of shear line"))
    a1=float(input("enter x1 coordinate of shear line"))
    b1=float(input("enter y1 coordinate of shear line"))

    if a1-a0 ==0:
        theta = (90*math.pi)/180
    elif b1-b0==0:
        theta=0
    else:
        theta=math.atan((b1-b0)/(a1-a0))
    translation(-a0,-b0)
```

```
        if theta ==0:   #shear parallel to x axis
                rotation(-theta)
                shear(shx,0)
                rotation(theta)
        else:
                theta=math.radians(90)-theta
                rotation(theta)
                shear(0,shy)
                rotation(-theta)

        translation(a0,b0)



#after shear
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setFill("red")
    line.draw(win_obj)
```

```
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setFill("red")
line.draw(win_obj)

win_obj.getMouse()
win_obj.close()
```

**Example4**:

```
================ RESTART: C:\Users\Ashish\Desktop\py\shear.py ================
Enter the number of vertices of polygon
4
Enter x coordinate of vertex:30
Enter y coordinate of vertex:-40
Enter x coordinate of vertex:100
Enter y coordinate of vertex:-40
Enter x coordinate of vertex:100
Enter y coordinate of vertex:70
Enter x coordinate of vertex:30
Enter y coordinate of vertex:70
enter 1 for shear in x-axis and 2 for shear in y axis and 3 for arbitrary line
3
Enter shear factor in x direction:shx=1.3
Enter shear factor in y direction:shy=0
Enter coordinates of line about which shear is to taken
enter x0 coordinate of shear line30
enter y0 coordinate of shear line-40
enter x1 coordinate of shear line100
enter y1 coordinate of shear line-40
[[30, -40], [100, -40], [100, 70], [30, 70]]
[[0, 0], [70, 0], [70, 110], [0, 110]]

[[0, 0], [70, 0], [70, 110], [0, 110]]

[[0, 0], [70, 0], [70, 110], [0, 110]]
[[0, 0], [70, 0], [213, 110], [143, 110]]
[[0, 0], [70, 0], [213, 110], [143, 110]]

[[0, 0], [70, 0], [213, 110], [143, 110]]
[[30, -40], [100, -40], [243, 70], [173, 70]]
```




# Reflection

## Code:

```
from graphics import *
import math
```

```
coordinate = []
def translation(tx1,ty1):
    print(coordinate)
    for i in range(c):
        coordinate[i][0]=(int)(coordinate[i][0]+tx1)
        coordinate[i][1]=(int)(coordinate[i][1]+ty1)

    print(coordinate)
    print()

def rotation(theta):
    for i in range(c):
        x0 =coordinate[i][0]
        y0=coordinate[i][1]
        coordinate[i][0]=(int)(x0*math.cos(theta)-y0*math.sin(theta))
        coordinate[i][1]=(int)(x0*math.sin(theta)+y0*math.cos(theta))

    print(coordinate)
    print()

def ref_x():
    print(coordinate)
    for i in range(c):
        coordinate[i][0]=coordinate[i][0]
        coordinate[i][1]=coordinate[i][1]*-1
```

```
        print(coordinate)

def ref_y():
        print(coordinate)
        for i in range(c):
                coordinate[i][0]=coordinate[i][0]*-1
                coordinate[i][1]=coordinate[i][1]

        print(coordinate)

def ref_O():
        print(coordinate)
        for i in range(c):
                coordinate[i][0]=coordinate[i][0]*-1
                coordinate[i][1]=coordinate[i][1]*-1

        print(coordinate)

print("Enter the number of vertices of polygon")
c=int(input())

for i in range(c):
    x = int(input("Enter x coordinate of vertex:"))
    y = int(input("Enter y coordinate of vertex:"))
```

```
    point=[]
    point.append(x)
    point.append(y)
    coordinate.append(point)



print("enter 1:reflect in x :: 2:reflect in y :: 3:reflect in origin :: 4:arbitrary")
temp=(int)(input())

win_obj=GraphWin("reflect",700,700) #set viewport size  700,700 are device coordinates
win_obj.setBackground("Light Green")
win_obj.setCoords(-350,-350,350,350) #set window  use coordinates are set
x_axis=Line(Point(-350,0),Point(350,0))   #obj for x axis
y_axis=Line(Point(0,-350),Point(0,350))    #obj for y axis

x_axis.setOutline("Black")
y_axis.setOutline("Black")
x_axis.setArrow('both')
y_axis.setArrow('both')
x_axis.draw(win_obj)
y_axis.draw(win_obj)

info_x=Text(Point(320,-10),"+x axis")
info_x.draw(win_obj)
```

```
info_nx=Text(Point(-320,-10),"-x axis")
info_nx.draw(win_obj)
info_y=Text(Point(0,330),"+y axis")
info_y.draw(win_obj)
info_ny=Text(Point(0,-330),"-y axis")
info_ny.draw(win_obj)

origin=Text(Point(-10,-10),"origin")
origin.draw(win_obj)



#previos
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setFill("blue")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
```

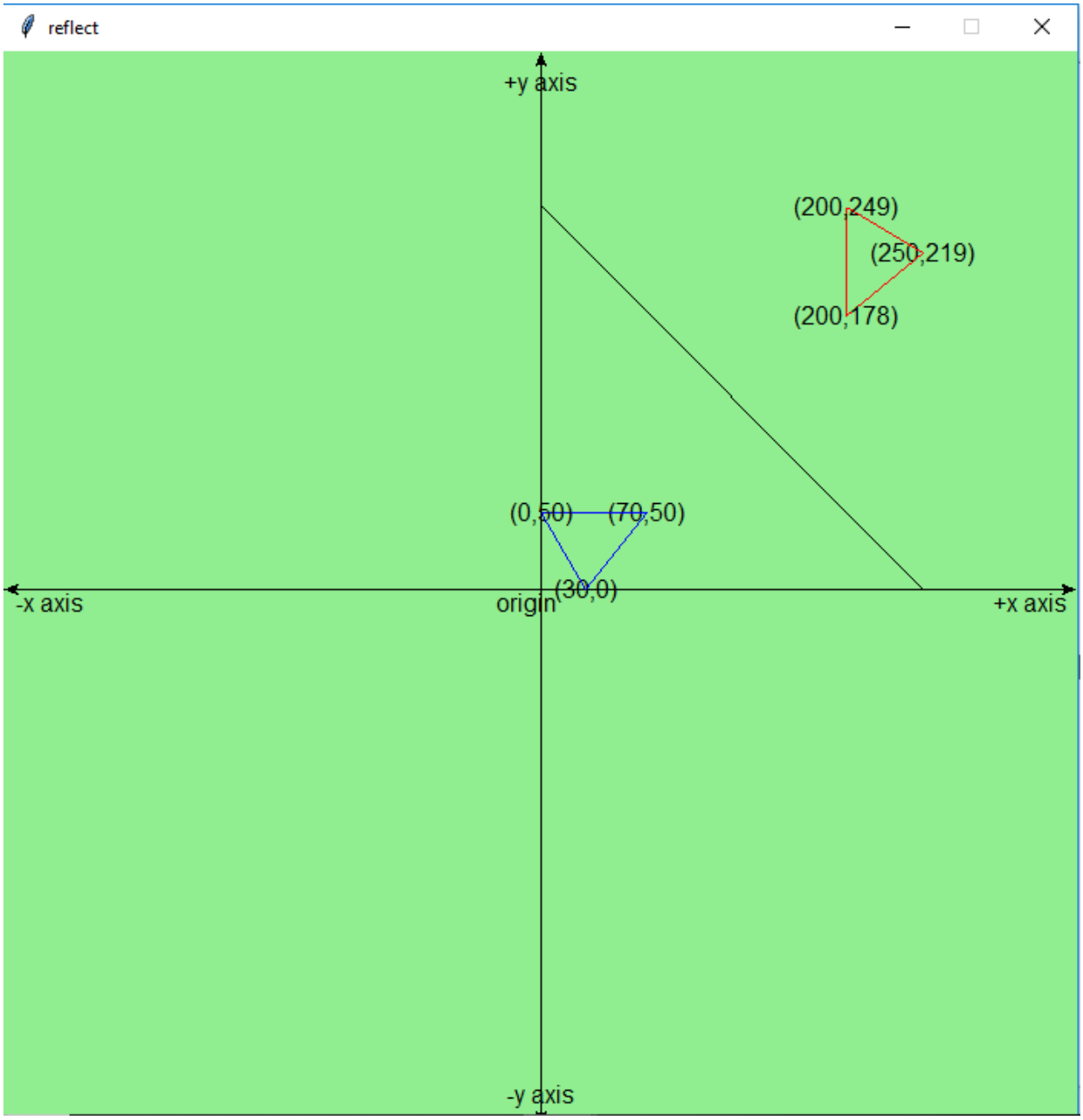
```
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setFill("blue")
line.draw(win_obj)

if temp==1:
        ref_x()
elif temp==2:
        ref_y()
elif temp==3:
        ref_O()
elif temp==4:
    print("Enter coordinates of line about which reflection is to taken")
    a0=float(input("enter x0 coordinate of reflection line"))
    b0=float(input("enter y0 coordinate of reflection line"))
    a1=float(input("enter x1 coordinate of reflection line"))
    b1=float(input("enter y1 coordinate of reflection line"))
    line=Line(Point(a0,b0),Point(a1,b1))
    line.setFill("black")
    line.draw(win_obj)
    if a1-a0 ==0:
```

```
            theta = (90*math.pi)/180
        else:
            theta=math.atan((b1-b0)/(a1-a0))
        translation(-a0,-b0)
        rotation(-theta)
        ref_x()
        rotation(theta)
        translation(a0,b0)

#after reflect
for i in range(c-1):
    x0 = coordinate[i][0]
    y0 = coordinate[i][1]
    x1 = coordinate[i+1][0]
    y1 = coordinate[i+1][1]
    #Point(x0,y0).draw(win_obj)
    display = Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    display.draw(win_obj)
    line=Line(Point(x0,y0),Point(x1,y1))
    line.setFill("red")
    line.draw(win_obj)
x0 = coordinate[0][0]
y0 = coordinate[0][1]
x1 = coordinate[c-1][0]
y1 = coordinate[c-1][1]
```

```
#Point(x0,y0).draw(win_obj)
display = Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
display.draw(win_obj)
line=Line(Point(x0,y0),Point(x1,y1))
line.setFill("red")
line.draw(win_obj)


win_obj.getMouse()
win_obj.close()
```

**Example5**:

```
============= RESTART: C:\Users\Ashish\Desktop\py\reflection.py =============
Enter the number of vertices of polygon
3
Enter x coordinate of vertex:30
Enter y coordinate of vertex:0
Enter x coordinate of vertex:70
Enter y coordinate of vertex:50
Enter x coordinate of vertex:0
Enter y coordinate of vertex:50
enter 1:reflect in x :: 2:reflect in y :: 3:reflect in origin :: 4:arbitrary
4
Enter coordinates of line about which reflection is to taken
enter x0 coordinate of reflection line250
enter y0 coordinate of reflection line0
enter x1 coordinate of reflection line0
enter y1 coordinate of reflection line250
[[30, 0], [70, 50], [0, 50]]
[[-220, 0], [-180, 50], [-250, 50]]

[[-155, -155], [-162, -91], [-212, -141]]

[[-155, -155], [-162, -91], [-212, -141]]
[[-155, 155], [-162, 91], [-212, 141]]
[[0, 219], [-50, 178], [-50, 249]]

[[0, 219], [-50, 178], [-50, 249]]
[[250, 219], [200, 178], [200, 249]]
```


reflect
+y axis
(200,249)
(250,219)
(200,178)
(0,50)
(70,50)
(30,0)
-x axis
origin
+x axis
-y axis