Computer Graphics Assignment

Primitives

Name-Ashish Goyal

Id-2016ucp1100

Batch-A (1, 2)

LINE

Code:

```
from graphics import *
##############################
#   less_one   slope -1 to 1
def zero_to_one(x0,y0,x1,y1):  #slope 0 to 1
    a=y1-y0
    b=-1*(x1-x0)
    di=2*a+b
    dne=2*(a+b)
    de=2*a
    y=y0
    for x in range(x0,x1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
```

```
        if(di>0):
            y=y+1
            di=di+dne
        else:
            di=di+de
        print("point"+"["+str(x)+","+str(y)+"]")
def zero_to_n_one(x0,y0,x1,y1): #slope -1 to 0
    a=y1-y0
    b=-1*(x1-x0)
    di=2*a-b
    dne=2*(a-b)
    de=2*a
    y=y0
    for x in range(x0,x1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            di=di+de
        else:
            y=y-1
            di=di+dne
        print("point"+"["+str(x)+","+str(y)+"]")
#################################
#  greater_one   slope <-1 and >1
```

```
def pure_greater_one(x0,y0,x1,y1):  #slope >1
    b=-1*(y1-y0)
    a=x1-x0
    dne=2*(a+b)
    de=2*a
    di=2*a+b
    x=x0
    for y in range(y0,y1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            x=x+1
            di=di+dne
        else:
            di=di+de
        print("point"+"["+str(x)+","+str(y)+"]")
def less_negative_one(x0,y0,x1,y1):  #slope <-1
    a=x1-x0
    b=-1*(y1-y0)
    di=2*a-b
    dne=2*(a-b)
    de=2*a
    x=x0
    for y in range(y0,y1,1):
```

```
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            di=di+de
        else:
            x=x-1
            di=di+dne
        print("point"+"["+str(x)+","+str(y)+"]")
################################

def less_one(x0,y0,x1,y1):  #slope -1 to 1
    a=y1-y0
    b=-1*(x1-x0)
    if(a<0):
        zero_to_n_one(x0,y0,x1,y1)
    else:
        zero_to_one(x0,y0,x1,y1)

#the greater_one cases are mirror image of less_one cases so simply replace x and y

def greater_one(x0,y0,x1,y1):  #slope > 1 and <-1
    a=x1-x0
    b=-1*(y1-y0)
    if(a<0):
```

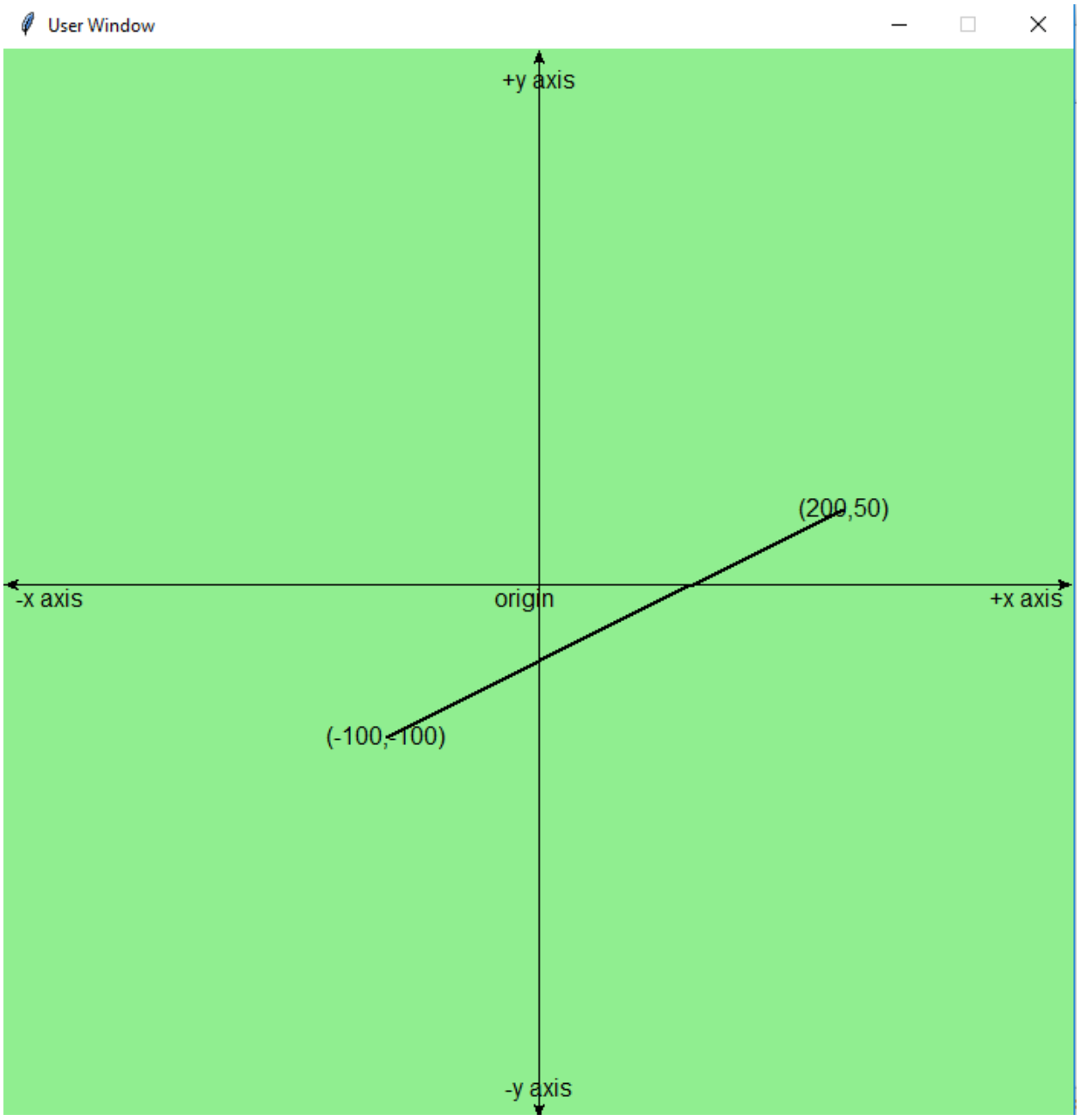
```
        less_negative_one(x0,y0,x1,y1)
    else:
        pure_greater_one(x0,y0,x1,y1)



def helper(x0,y0,x1,y1):
    initial_point=Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    initial_point.draw(win_obj)
    final_point=Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
    final_point.draw(win_obj)
    if(abs(x0-x1)<abs(y0-y1)):              #slope > 1 and <-1
        if(y1>y0):
            greater_one(x0,y0,x1,y1)
        else:
            greater_one(x1,y1,x0,y0)
    else:
        if(x1>x0):                          #slope -1 to 1
            less_one(x0,y0,x1,y1)
        else:                               #we always increase x by 1 therefore start point should always less,
so swap both points
            less_one(x1,y1,x0,y0)
```

```
x0=int(input("enter initial x coordinate x0:"))

y0=int(input("enter initial y coordinate y0:"))

x1=int(input("enter initial x coordinate x1:"))

y1=int(input("enter initial y coordinate y1:"))


#A GraphWin object represents a window on the screen


win_obj=GraphWin("User Window",700,700) #set viewport size  (700,700 are device coordinates)

win_obj.setBackground("Light Green")

win_obj.setCoords(-350,-350,350,350) #set window  user 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)

#function to manage coordinates
helper(x0,y0,x1,y1)



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

Example1:

```
Python 3.6.2 (v3.6.2:5fd33b5, Jul  8 2017, 04:14:34) [MSC v.1
 on win32
Type "copyright", "credits" or "license()" for more informati
>>>
================ RESTART: C:\Users\Ashish\Desktop\py\line.py
enter initial x coordinate x0:-100
enter initial y coordinate y0:-100
enter initial x coordinate x1:200
enter initial y coordinate y1:50
```



Example2:

```
Type "copyright", "credits" or "license()" for more information.
>>>
================ RESTART: C:\Users\Ashish\Desktop\py\line.py ====
enter initial x coordinate x0:-100
enter initial y coordinate y0:50
enter initial x coordinate x1:200
enter initial y coordinate y1:-300
```

CIRCLE

Code:

```
from graphics import *
```

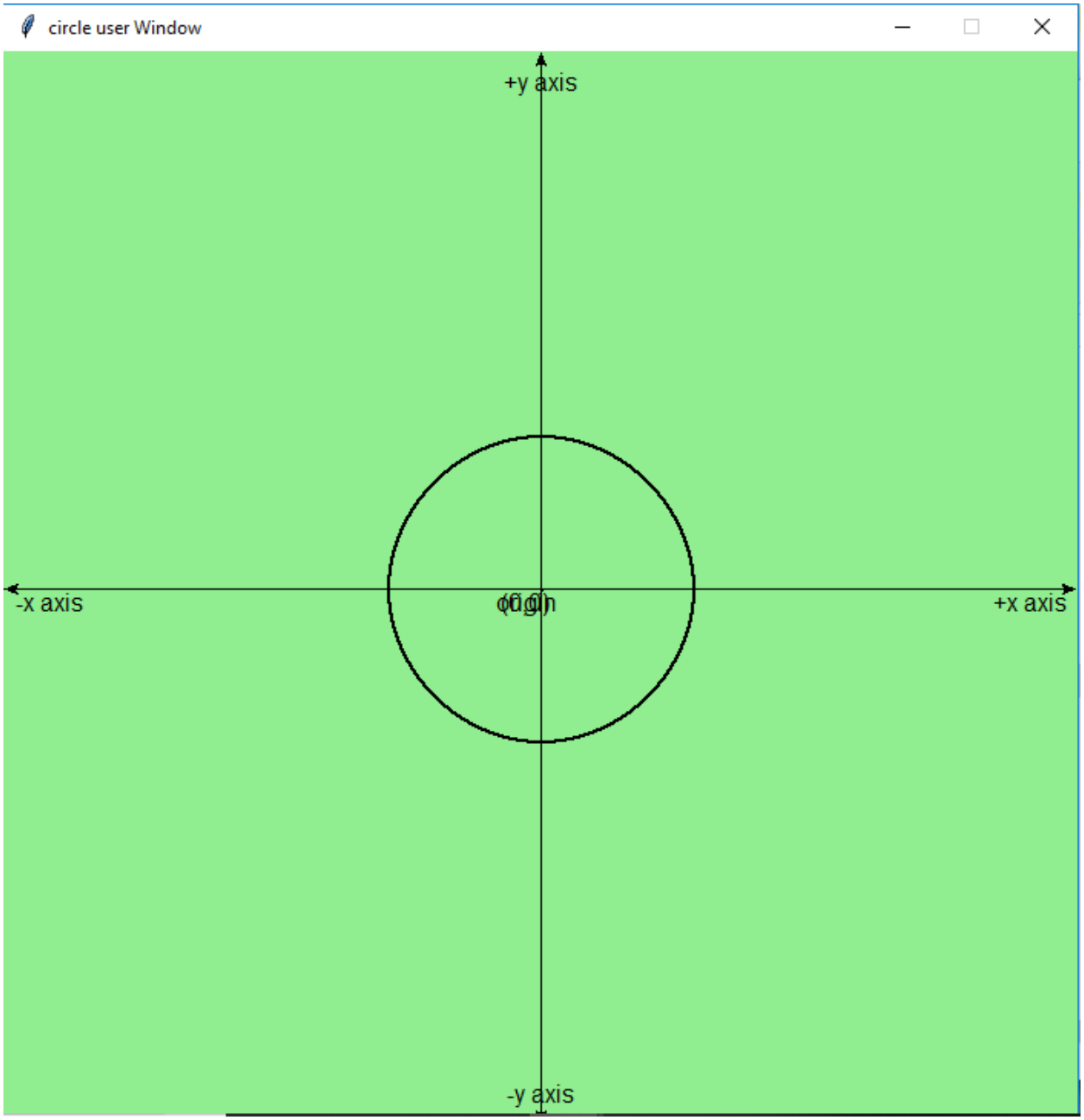
```
def symmetry(x,y):
    pixel=Point(x0+x,y0+y)
    pixel.draw(win_obj)
    pixel=Point(x0+y,y0+x)
    pixel.draw(win_obj)
    pixel=Point(x0+y,y0-x)
    pixel.draw(win_obj)
    pixel=Point(x0+x,y0-y)
    pixel.draw(win_obj)
    pixel=Point(x0-x,y0-y)
    pixel.draw(win_obj)
    pixel=Point(x0-y,y0-x)
    pixel.draw(win_obj)
    pixel=Point(x0-y,y0+x)
    pixel.draw(win_obj)
    pixel=Point(x0-x,y0+y)
    pixel.draw(win_obj)
    time.sleep(0.02)
    print("("+str(x)+","+str(y)+")")



x0=int(input("enter x coordinate of center:"))
y0=int(input("enter y coordinate of center:"))
radius=int(input("Radius of the circle:"))
```

```
#A GraphWin object represents a window on the screen


win_obj=GraphWin("circle user Window",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)
```

```
center_coord=Point(x0,y0)
center_coord.draw(win_obj)

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

center_text=Text(Point(x0-10,y0-10),"("+str(x0)+","+str(y0)+")")
center_text.draw(win_obj)



di=1-radius
xp=0.0
yp=radius+0.0
while(yp>xp):
        xp=xp+1
        if(di>0):
                yp=yp-1
                di=di+2*(xp-yp)+5
        else:
                di=di+2*xp+3
        symmetry(xp,yp)
win_obj.getMouse()
win_obj.close()
```

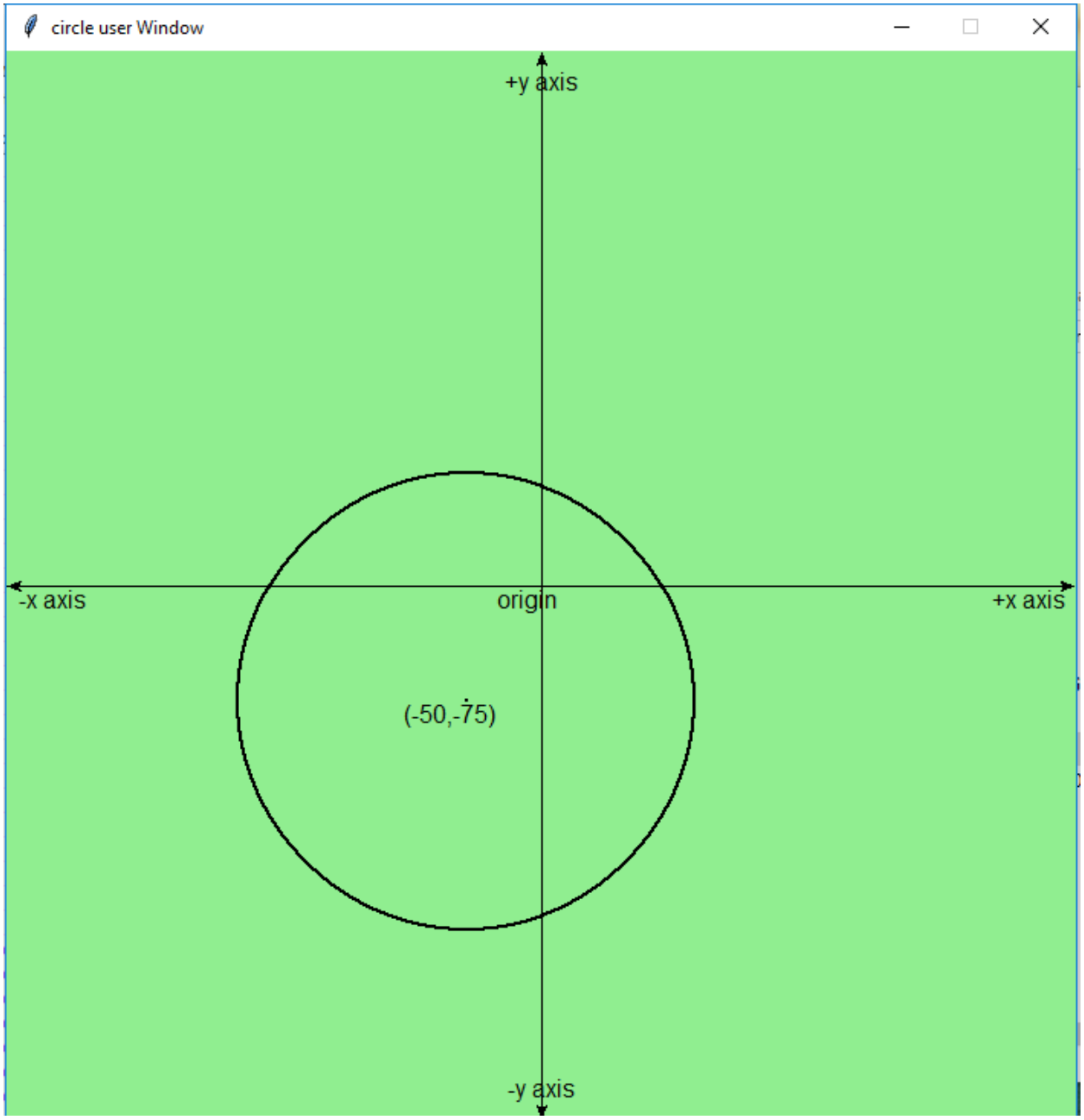
Example3:

```
Type "copyright", "credits" or "license()" for more information.
>>>
============== RESTART: C:\Users\Ashish\Desktop\py\circle.py ==
enter x coordinate of center:0
enter y coordinate of center:0
Radius of the circle:100
```



Example4:

```
Type "copyright", "credits" or "license()" for more information.
>>>
=============== RESTART: C:\Users\Ashish\Desktop\py\circle.py ===
enter x coordinate of center:-50
enter y coordinate of center:-75
Radius of the circle:150
```



ELLIPSE

Code:

```
from graphics import *
#symmetry in ellipse
def symm(x,y):
    pixel=Point(x0+x,y0+y)
    pixel.draw(win_obj)
    pixel=Point(x0+x,y0-y)
    pixel.draw(win_obj)
    pixel=Point(x0-x,y0+y)
    pixel.draw(win_obj)
    pixel=Point(x0-x,y0-y)
    pixel.draw(win_obj)
    time.sleep(0.02)
    print("("+str(x)+","+str(y)+")")
a=int(input("enter major axis:"))
b=int(input("enter minor axis:"))
x0=int(input("enter x coordinate:"))
y0=int(input("enter y coordinate:"))



#radius=int(input("Radius of the circle:"))
#A GraphWin object represents a window on the screen
```

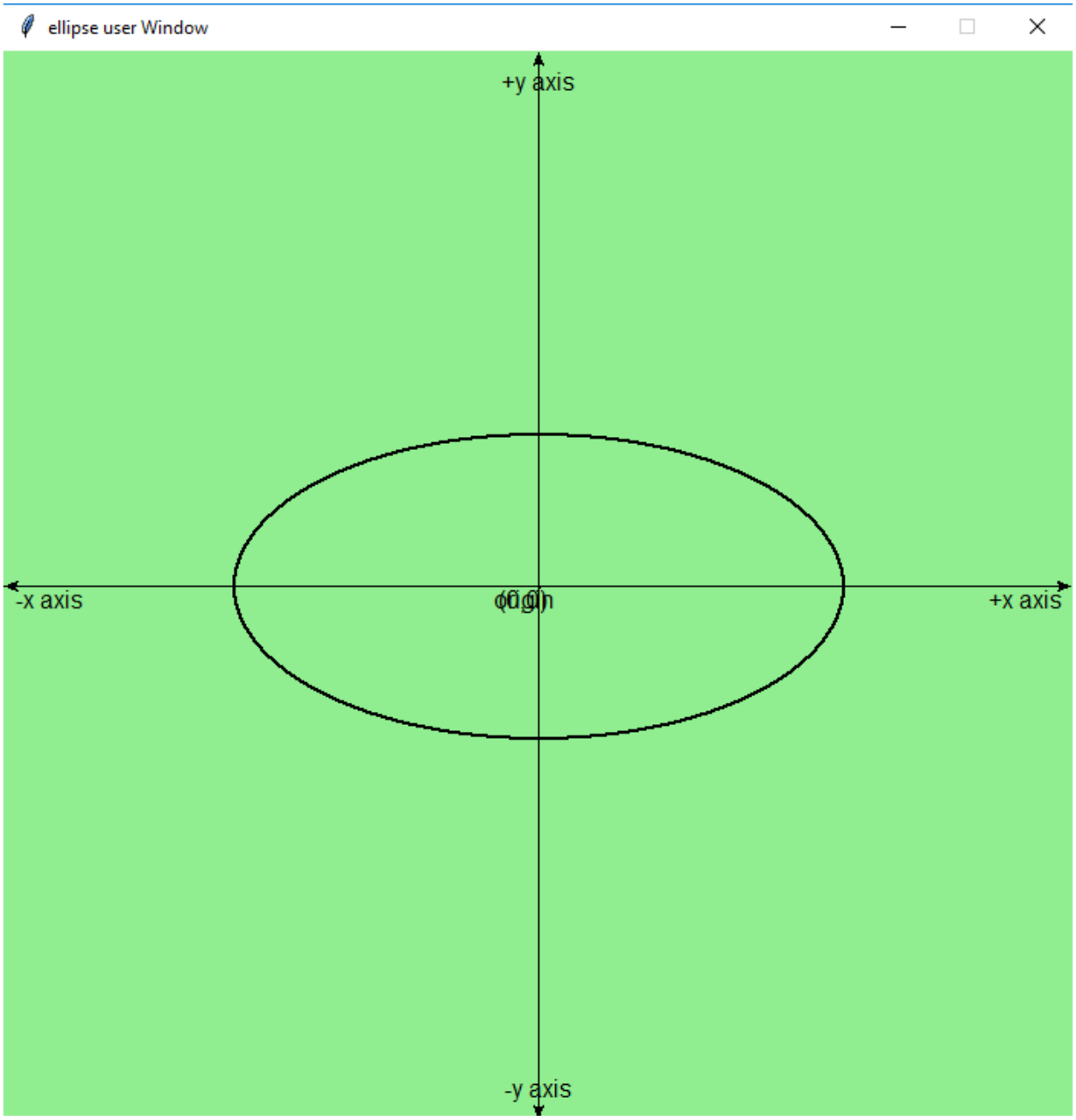
```
win_obj=GraphWin("ellipse user Window",700,700) #set viewport size  700,700 are device coordinates

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)



pixel=Point(x0,y0)
```

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

info=Text(Point(x0-10,y0-10),"("+str(x0)+","+str(y0)+")")
info.draw(win_obj)



x=0
y=b
symm(x,y)
#Region 1
d1=b*b-(a*a*b)+(0.25*a*a)
while((a*a*(y-0.5))>(b*b*(x+1))):
    if(d1<0):
        d1=d1+(b*b)*(2*x+3)
    else:
        d1=d1+(b*b)*(2*x+3)+(a*a)*(-2*y+2)
        y=y-1
    x=x+1
    symm(x,y)
#Region 2
d2=b*b*(x+0.5)*(x+0.5)+a*a*(y-1)*(y-1)-a*a*b*b
while(y>0):
```

```
    if (d2<0):
        d2=d2+(b*b)*(2*x+2)+(a*a)*(-2*y+3)
        x=x+1
    else:
        d2=d2+(a*a)*(-2*y+3)
    y=y-1
    symm(x,y)



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

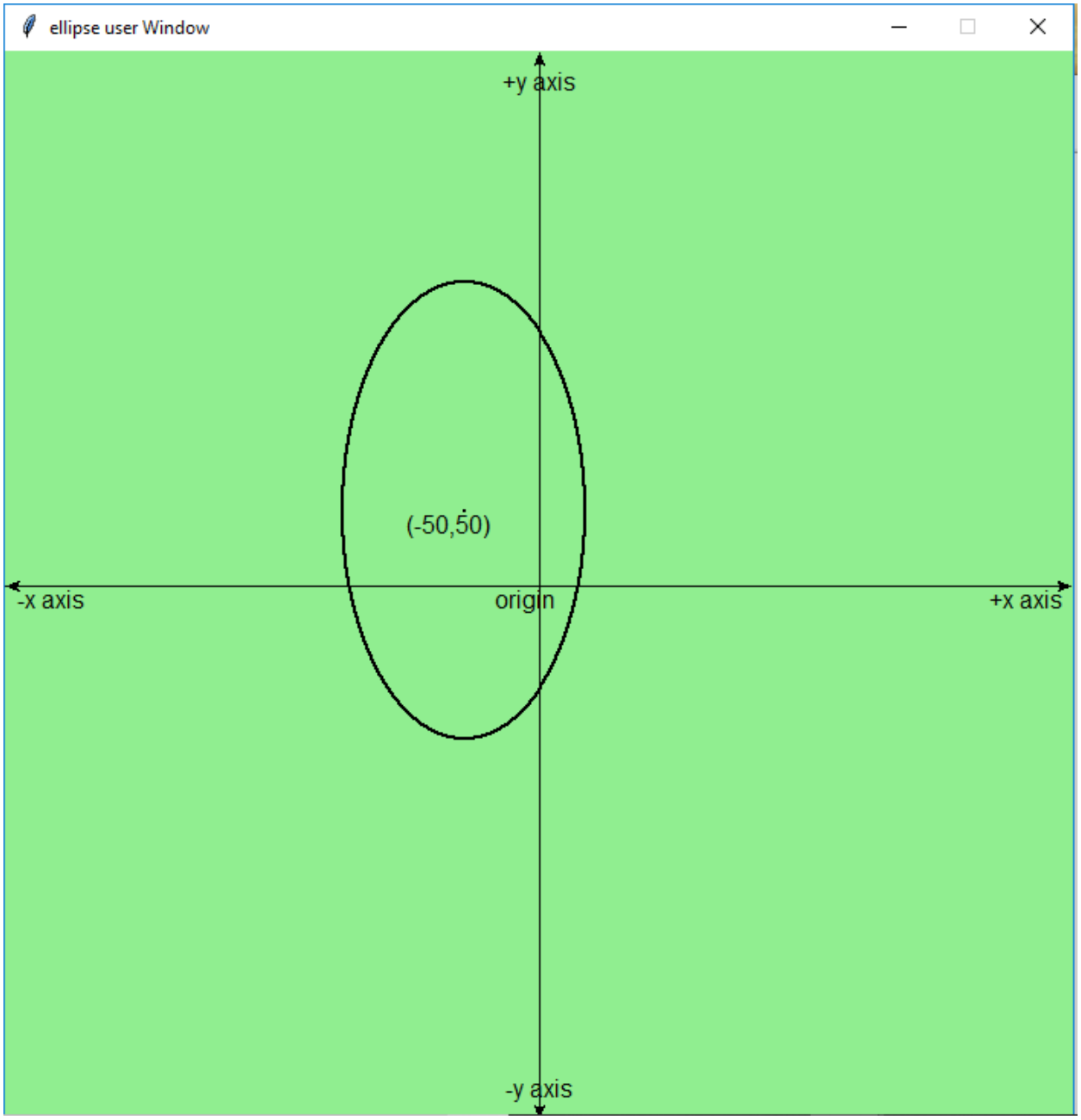
Example5:

```
Type "copyright", "credits" or "license()" for more information.
>>>
=============== RESTART: C:\Users\Ashish\Desktop\py\ellipse.py ==
enter major axis:200
enter minor axis:100
enter x coordinate:0
enter y coordinate:0
```



Example6:

```
Type "copyright", "credits" or "license()" for more information.
>>>
============== RESTART: C:\Users\Ashish\Desktop\py\ellipse.py ==
enter major axis:80
enter minor axis:150
enter x coordinate:-50
enter y coordinate:50
```



POLYGON

Code:

```
from graphics import *
##############################
#   less_one   slope -1 to 1
def zero_to_one(x0,y0,x1,y1):  #slope 0 to 1
    a=y1-y0
    b=-1*(x1-x0)
    di=2*a+b
    dne=2*(a+b)
    de=2*a
    y=y0
    for x in range(x0,x1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            y=y+1
            di=di+dne
        else:
            di=di+de
        print("point"+"["+str(x)+","+str(y)+"]")
def zero_to_n_one(x0,y0,x1,y1): #slope -1 to 0
    a=y1-y0
    b=-1*(x1-x0)
    di=2*a-b
```

```
    dne=2*(a-b)
    de=2*a
    y=y0
    for x in range(x0,x1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            di=di+de
        else:
            y=y-1
            di=di+dne
        print("point"+"["+str(x)+","+str(y)+"]")
################################
#  greater_one   slope <-1 and >1
def pure_greater_one(x0,y0,x1,y1):  #slope >1
    b=-1*(y1-y0)
    a=x1-x0
    dne=2*(a+b)
    de=2*a
    di=2*a+b
    x=x0
    for y in range(y0,y1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
```

```
        time.sleep(0.02)
        if(di>0):
            x=x+1
            di=di+dne
        else:
            di=di+de
        print("point"+"["+str(x)+","+str(y)+"]")
def less_negative_one(x0,y0,x1,y1):  #slope <-1
    a=x1-x0
    b=-1*(y1-y0)
    di=2*a-b
    dne=2*(a-b)
    de=2*a
    x=x0
    for y in range(y0,y1,1):
        pixel=Point(x,y)
        pixel.draw(win_obj)
        time.sleep(0.02)
        if(di>0):
            di=di+de
        else:
            x=x-1
            di=di+dne
        print("point"+"["+str(x)+","+str(y)+"]")
################################
```

```
def less_one(x0,y0,x1,y1):  #slope -1 to 1
    a=y1-y0
    b=-1*(x1-x0)
    if(a<0):
        zero_to_n_one(x0,y0,x1,y1)
    else:
        zero_to_one(x0,y0,x1,y1)

#the greater_one cases are mirror image of less_one cases so simply replace x and y

def greater_one(x0,y0,x1,y1):  #slope > 1 and <-1
    a=x1-x0
    b=-1*(y1-y0)
    if(a<0):
        less_negative_one(x0,y0,x1,y1)
    else:
        pure_greater_one(x0,y0,x1,y1)
```

```
def helper(x0,y0,x1,y1):
    initial_point=Text(Point(x0,y0),"("+str(x0)+","+str(y0)+")")
    initial_point.draw(win_obj)
    final_point=Text(Point(x1,y1),"("+str(x1)+","+str(y1)+")")
    final_point.draw(win_obj)
    if(abs(x0-x1)<abs(y0-y1)):              #slope > 1 and <-1
        if(y1>y0):
            greater_one(x0,y0,x1,y1)
        else:
            greater_one(x1,y1,x0,y0)
    else:
        if(x1>x0):                          #slope -1 to 1
            less_one(x0,y0,x1,y1)
        else:                               #we always increase x by 1 therefore start point should always less, so swap both points
            less_one(x1,y1,x0,y0)



#A GraphWin object represents a window on the screen



t=int(input("enter sides:"))
```

```
lista=[]
for i in range(t):
    x01=int(input("enter "+str(i+1)+" point x coordinate x0:"))
    y01=int(input("enter "+str(i+1)+"th point y coordinate y0:"))
    list_temp=[x01,y01]
    lista.append(list_temp)
list_ini_point=lista[0]
x0=list_ini_point[0]
y0=list_ini_point[1]


x01=x0
y01=y0



win_obj=GraphWin("Polygon User Window",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')
```

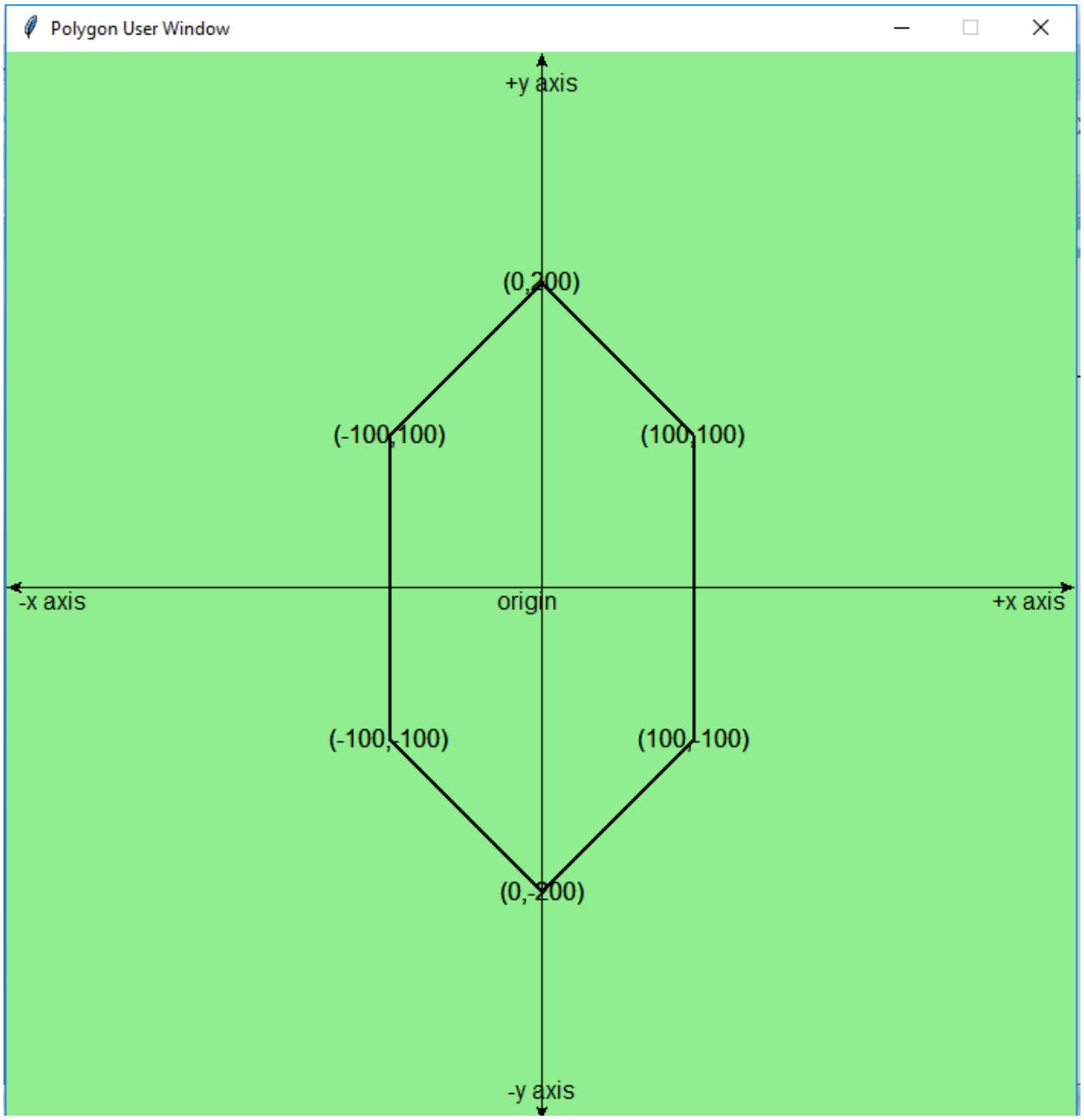
```
x_axis.draw(win_obj)
y_axis.draw(win_obj)

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)

j=1
while (j!=t):
    list_t=lista[j]
    x02=list_t[0]
    y02=list_t[1]
    j=j+1
    helper(x01,y01,x02,y02)
    x01=x02
    y01=y02
helper(x01,y01,x0,y0)
```

win_obj.getMouse()

win_obj.close()

Example7:

```
Type "copyright", "credits" or "license()" for more information.
>>>
============== RESTART: C:\Users\Ashish\Desktop\py\polygon.py =
enter sides:6
enter 1 point x coordinate x0:100
enter 1th point y coordinate y0:100
enter 2 point x coordinate x0:0
enter 2th point y coordinate y0:200
enter 3 point x coordinate x0:-100
enter 3th point y coordinate y0:100
enter 4 point x coordinate x0:-100
enter 4th point y coordinate y0:-100
enter 5 point x coordinate x0:0
enter 5th point y coordinate y0:-200
enter 6 point x coordinate x0:100
enter 6th point y coordinate y0:-100
```


Polygon User Window
+y axis
(0,200)
(-100,100)
(100,100)
-x axis
origin
+x axis
(-100,-100)
(100,-100)
(0,-200)
-y axis

Example8:

```
Type "copyright", "credits" or "license()" for more information.
>>>
============== RESTART: C:\Users\Ashish\Desktop\py\polygon.py ==
enter sides:3
enter 1 point x coordinate x0:100
enter 1th point y coordinate y0:67
enter 2 point x coordinate x0:-143
enter 2th point y coordinate y0:-188
enter 3 point x coordinate x0:139
enter 3th point y coordinate y0:-100
```