EXPERIMENT 3: *LINE CLIPPING ALGORITHMS(Cohen Sutherland)*

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CODE:-

```
from turtle import *

INSIDE = 0
LEFT = 1
RIGHT = 2
BOTTOM = 4
TOP = 8

print('Input x_min, y_min, x_max, y_max in each line')
x_min = int(input())
y_min = int(input())
x_max = int(input())
y_max = int(input())


#printing rectangle

pencolor("black")
penup()
goto(x_min,y_min)
pendown()
goto(x_min,y_max)
goto(x_max,y_max)

penup()
goto(x_min,y_min)
pendown()
goto(x_max,y_min)
goto(x_max,y_max)
penup()


def get_bits_value(x, y):
    temp = INSIDE
    if int(x) < int(x_min):  # left
        temp  |= LEFT
    elif int(x) > int(x_max): #  right
        temp |= RIGHT
    if int(y) < int(y_min):  # below
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        temp |= BOTTOM
    elif int(y) > int(y_max): # above
        temp |= TOP

    #print(temp)
    return temp

print('Now print the no. of lines')

#input no. of lines
n = int(input())

for number in range(n):

    print('Now print value of  x1,y1,x2,y2 in each line')

    #input coordinates
    x1 = int(input())
    y1 = int(input())
    x2 = int(input())
    y2 = int(input())

    x1_temp = x1
    y1_temp = y1
    x2_temp = x2
    y2_temp = y2

    #to find the position of point
    temp1 = get_bits_value(x1, y1)
    temp2 = get_bits_value(x2, y2)
    indicate = False
    #print(temp1,temp2)

    while True:

        #inside totally
        if temp1 == 0 and temp2 == 0:
            indicate = True
            #print('inside totally')
            break

        #outside totally
        elif ((temp1 & temp2) != 0):
            #print('outside totally')
            break

        #partial case
        else:
```

```
            x = 1.0
            y = 1.0

            #choosing one of the point
            if temp1 != 0:
                code_out = temp1
            else:
                code_out = temp2

            #now check the position & find respective coordinates
            if code_out & TOP:
                x = x1 + (x2 - x1) *(y_max - y1) / (y2 - y1)
                y = y_max

            elif code_out & BOTTOM:
                x = x1 + (x2 - x1) *(y_min - y1) / (y2 - y1)
                y = y_min

            elif code_out & RIGHT:
                y = y1 + (y2 - y1) *(x_max - x1) / (x2 - x1)
                x = x_max

            elif code_out & LEFT:
                y = y1 + (y2 - y1) *(x_min - x1) / (x2 - x1)
                x = x_min



            if code_out == temp1:
                x1 = x
                y1 = y
                temp1 = get_bits_value(x1, y1)

            else:
                x2 = x
                y2 = y
                temp2 = get_bits_value(x2, y2)

    if indicate:
        print ("It lies between ", x1, " , " , y1 ," to " ,x2 ," , " ,y2)
        pencolor('red')
        penup()
        goto(x1_temp,y1_temp)
        pendown()
        goto(x1,y1)
        pencolor('green')
        goto(x2,y2)
```

```
        pencolor('red')
        goto(x2_temp,y2_temp)
    else:
        print("It is outside of this rectangle completely")
        pencolor('red')
        penup()
        goto(x1_temp,y1_temp)
        pendown()
        goto(x2_temp,y2_temp)

exitonclick()
```

Input:-

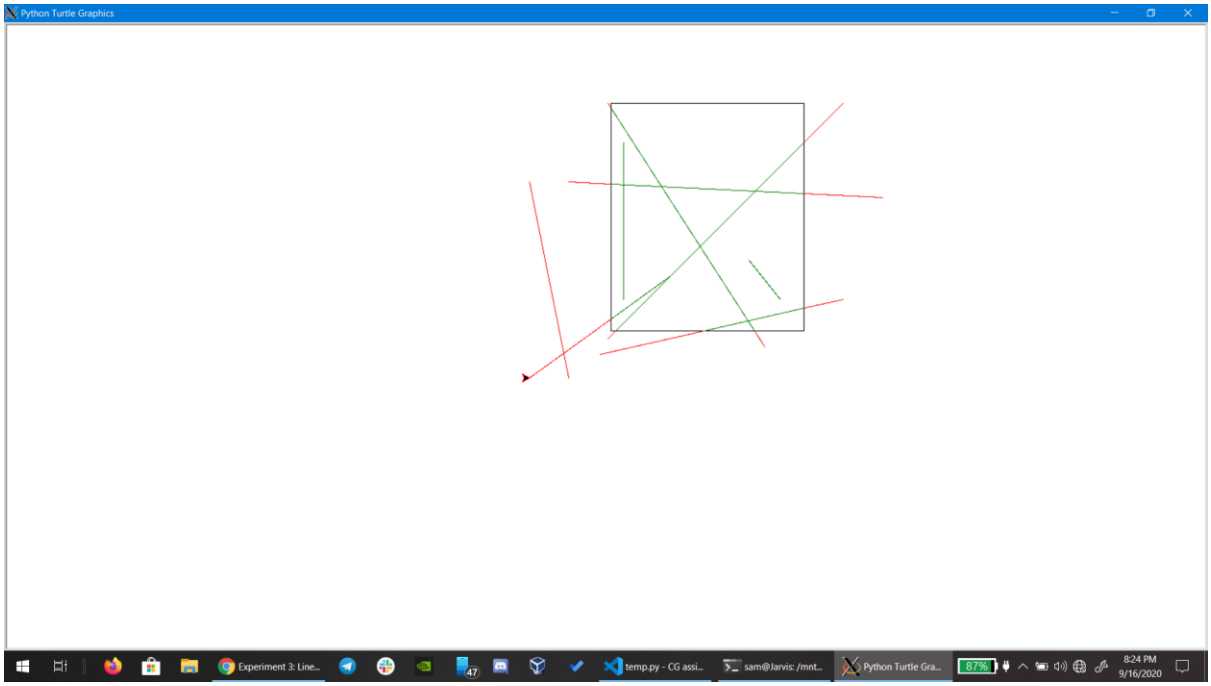
Dimension of Rectangle (Left and Bottom most point = 4,10 & Right and Topmost point = 250,300)

8 lines were drawn:

Their end points are:-

1. (0,0),(300,30)
2. (0,300),(200,-10)
3. (-50,200),(350,180)
4. (20,250),(20,50)
5. (-50,-50),(-100,200)
6. (-10,-20),(300,50)
7. (220,50),(180,100)
8. (80,80),(-100,-50)

Output:-




```
sam@Jarvis:/mnt/f/5th sem/CG assignment$ python3 temp.py
Input x_min, y_min, x_max, y_max in each line
4
10
250
300
Now print the no. of lines
8
Now print value of  x1,y1,x2,y2 in each line
0
0
300
300
It lies between  10.0  ,  10  to  250  ,  250.0
Now print value of  x1,y1,x2,y2 in each line
0
300
200
-10
It lies between  4  ,  293.8  to  187.09677419354838  ,  10
Now print value of  x1,y1,x2,y2 in each line
-50
200
350
180
It lies between  4  ,  197.3  to  250  ,  185.0
Now print value of  x1,y1,x2,y2 in each line
20
250
20
50
It lies between  20  ,  250  to  20  ,  50
Now print value of  x1,y1,x2,y2 in each line
-50
-50
-100
200
It is outside of this rectangle completely
Now print value of  x1,y1,x2,y2 in each line
-10
-20
300
50
It lies between  122.85714285714286  ,  10  to  250  ,  38.70967741935483
Now print value of  x1,y1,x2,y2 in each line
220
50
180
100
It lies between  220  ,  50  to  180  ,  100
Now print value of  x1,y1,x2,y2 in each line
80
80
-100
-50
It lies between  80  ,  80  to  4  ,  25.111111111111107
sam@Jarvis:/mnt/f/5th sem/CG assignment$
```

Note:- 1.It also shows the starting and end point in rectangle for a line.

2.Also I took black color for rectangle, Green for part of line inside the rectangle and Red for part of line outside the rectangle for better visualization.