

Computer Graphics Lab

Lab 2 Manual

[You need to submit your source files for Task 1 and Task 2. Also, you'll need to submit a report in .txt format where you will mention the coordinates of the points in Task 1 and Task 2. Also, mention which approach you took for Task 2.

Write Task 3 in the report.

Don't zip the files, just add and hand in the assignment. Name the source file mentioning your registration number.

*** Provide screenshots also of your output for Task 1 and Task 2]*

Task 1:

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The equation of the circle is:

$$\left(x - \frac{9}{2}\right)^2 + \left(y - \frac{5}{3}\right)^2 = 57$$

Use the Midpoint Circle Algorithm to plot the circle.

[Hint: Look at the coordinates of the center of the circle. Do you recall anything about translation?]

Task 2:

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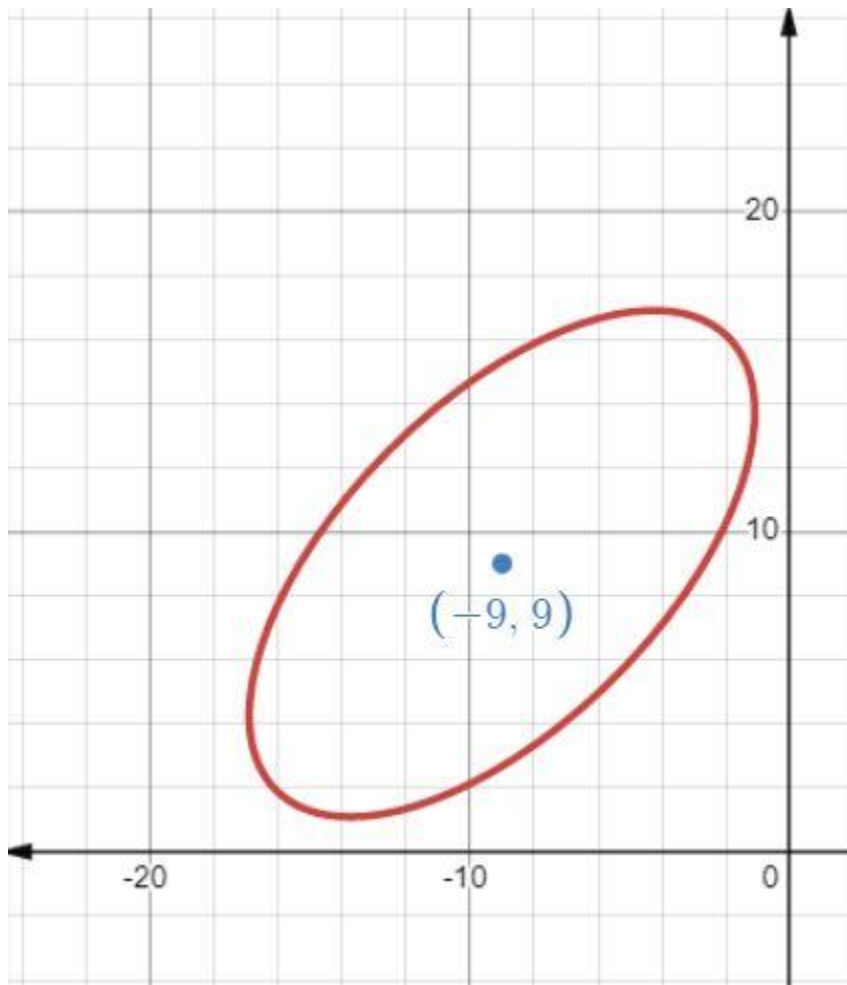
Let's assume, we have an equation for ellipse like below:

$$\begin{aligned}x &= 10 \cos(\theta) \cos(45) - 5 \sin(\theta) \sin(45) - 9 \\y &= 10 \cos(\theta) \sin(45) + 5 \sin(\theta) \cos(45) + 9\end{aligned}$$

Plot this using the Midpoint Ellipse algorithm

****Don't use the direct trigonometric function for plotting. You must use Midpoint Ellipse Algorithm somewhere**

A regular plot of the function is given for your convenience:



[Hint:

The regular (X-axis is the major axis) trigonometric form of an ellipse is:

$$x = a \cos(\theta) + h$$

$$y = b \sin(\theta) + k$$

If we rotate this ellipse by α angle counter clockwise, the equation becomes:

$$x = a \cos(\theta) \cos(\alpha) - b \sin(\theta) \sin(\alpha) + h$$

$$y = a \cos(\theta) \sin(\alpha) + b \sin(\theta) \cos(\alpha) + k$$

where,

(x,y) = coordinate of the current point

a = half of the major axis

b = half of the minor axis

θ = angle of the current point

α = rotation angle

- * $\sin(x)$, $\cos(x)$, $\tan(x)$ functions take x in radian as parameter
- * $\text{atan}(y/x)$ gives the angle of the point (x,y) created with the X-axis in radian where $x \neq 0$
- * 1 radian = $(\pi/180)$ degree
- * All trigonometric functions fall under the `<math.h>` header file in C and `<cmath>` header file in C++.

Task 3:

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Can the code for the Midpoint ellipse be used for the Midpoint circle algorithm also?
Why or why not?