Kathmandu University

Department of Computer Science and Engineering

Dhulikhel, Kavre

A Report on '**Lab Work 3'** [COMP 342]

Submitted by:

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III-year, II semester

Submitted to:

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Qlab1

1. ***Write a Program to implement mid-point Circle Drawing Algorithm***
2. ***Write a Program to implement mid-point Ellipse Drawing Algorithm***

Solution:

https://flagwebgl.netlify.app

I have used JavaScript as the programming language and WebGL as the graphics library. **JavaScript** is a popular programming language that is used for web development and has the capability of creating interactive graphics and animations on the web. **WebGL** is a graphics library that enables high-performance 3D graphics library that enables high-performance 3D graphics rendering in web browser using JavaScript. These technologies provide a powerful platform for creating engaging and interactive graphics, which is essential for my lab work.

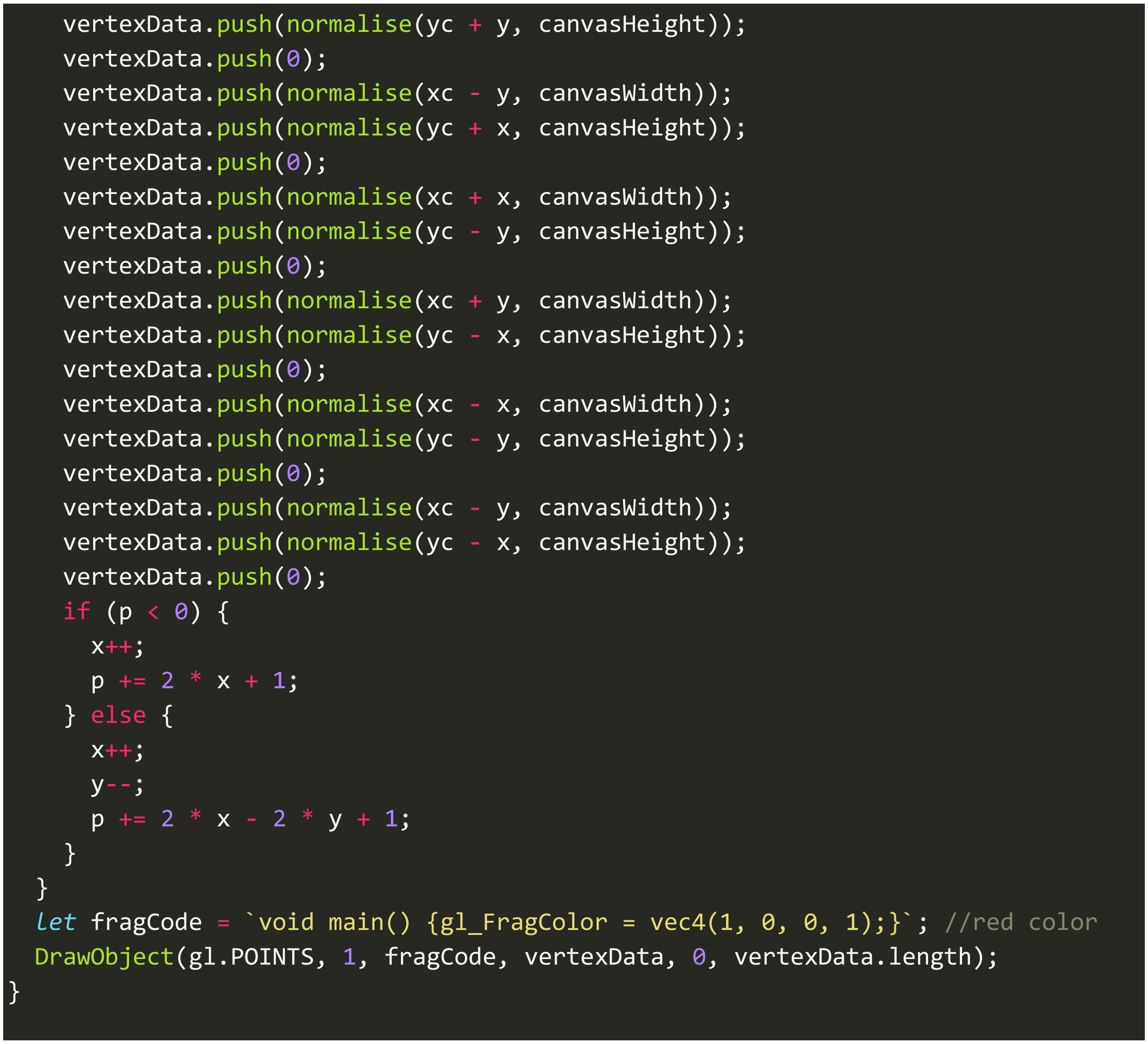
The code snippets for setting graphics environment in my chosen graphics library and programming language and display system resolution are as follow:

Source Code

https://github.com/ChandankMahato/Graphics_Lab_6th_Sem

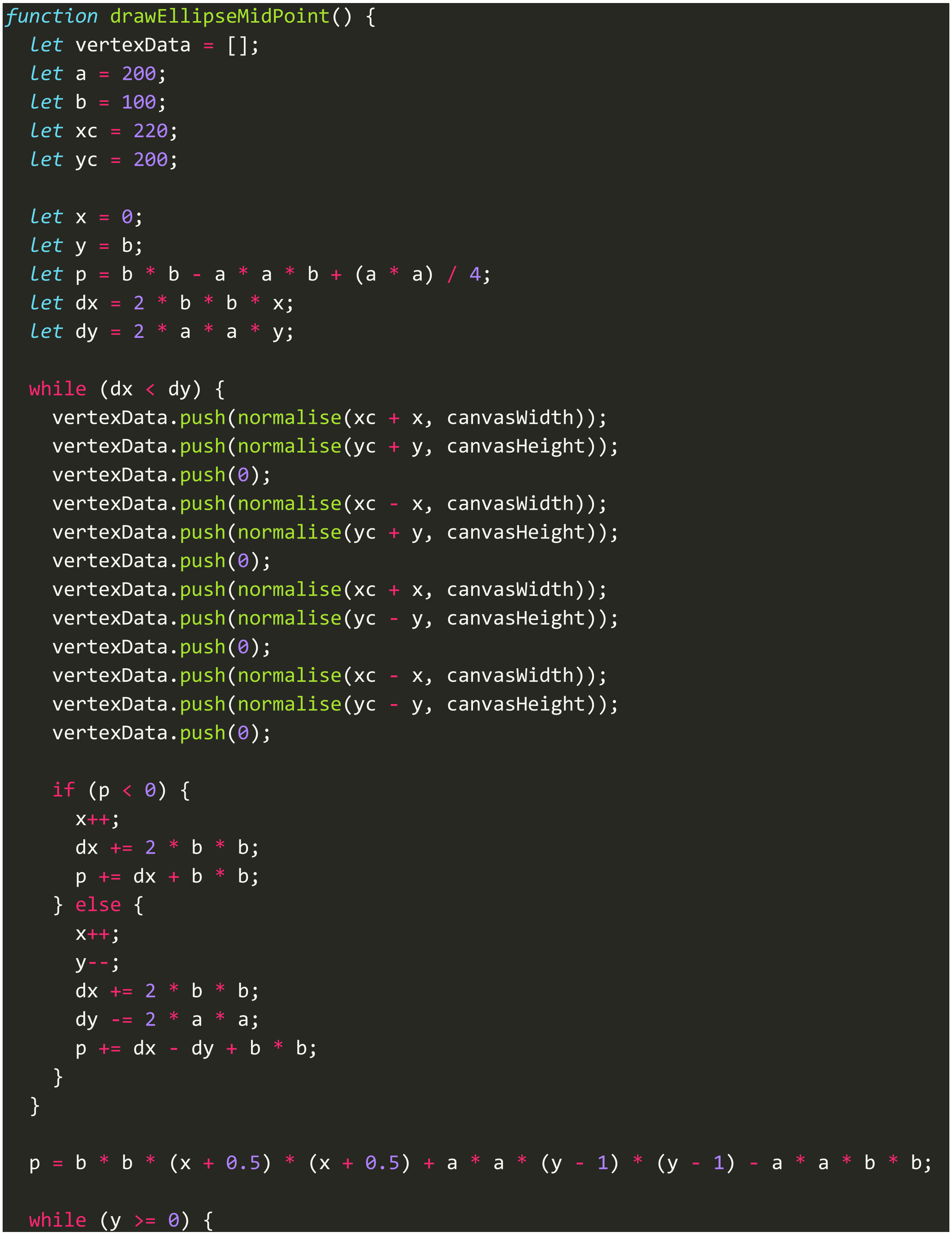
Circle Algorithm:

```
function drawCircleMidPoint() {
  let vertexData = [];
  let radius = 100;
  let xc = 300;
  let yc = 300;
  let x = 0;
  let y = radius;
  let p = 1 - radius;
  while (x <= y) {
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc + y, canvasWidth));
    vertexData.push(normalise(yc + x, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
```

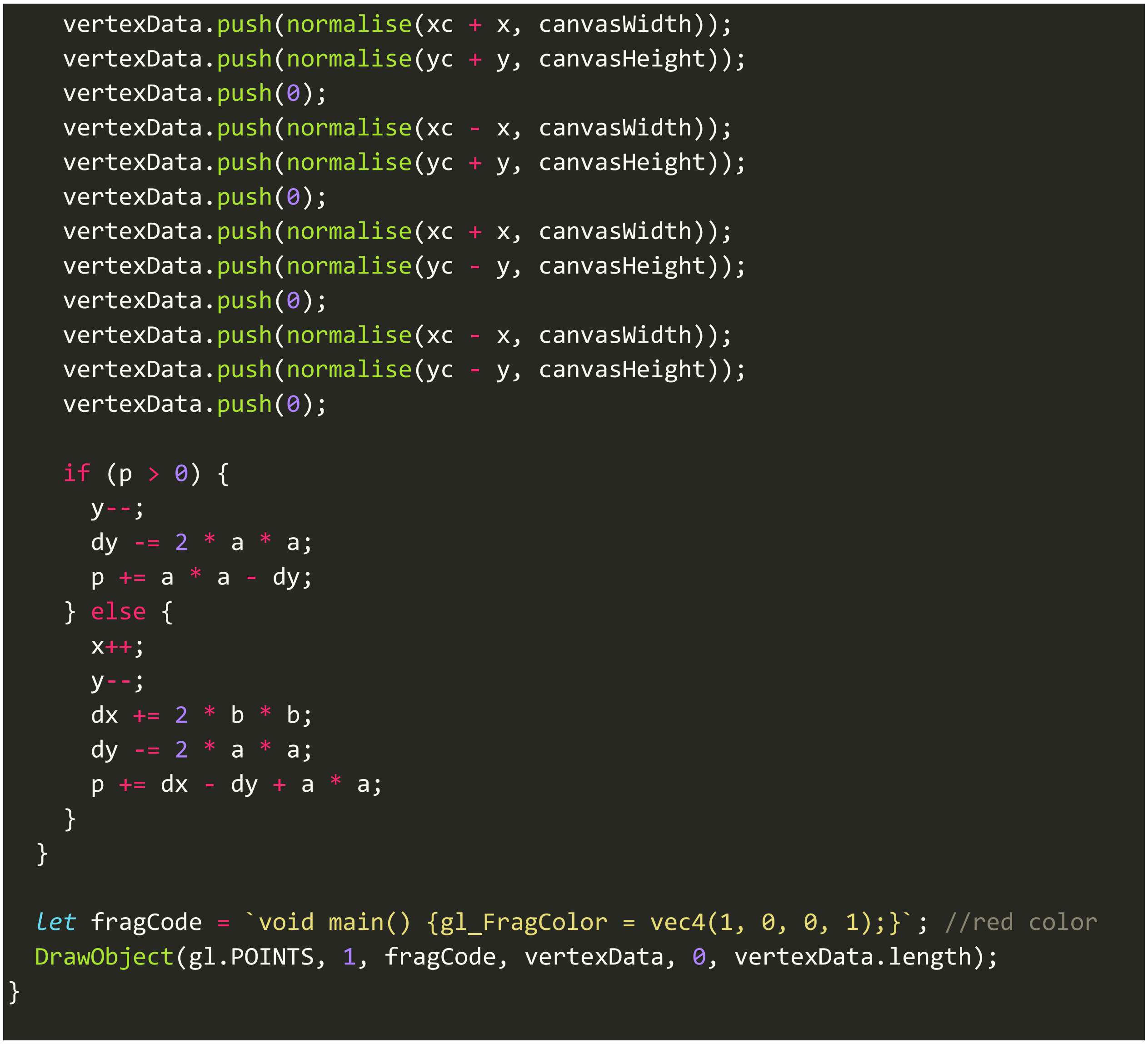


```
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - y, canvasWidth));
    vertexData.push(normalise(yc + x, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc + y, canvasWidth));
    vertexData.push(normalise(yc - x, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - y, canvasWidth));
    vertexData.push(normalise(yc - x, canvasHeight));
    vertexData.push(0);
    if (p < 0) {
      x++;
      p += 2 * x + 1;
    } else {
      x++;
      y--;
      p += 2 * x - 2 * y + 1;
    }
  }
  let fragCode = `void main() {gl_FragColor = vec4(1, 0, 0, 1);}`; //red color
  DrawObject(gl.POINTS, 1, fragCode, vertexData, 0, vertexData.length);
}
```

Ellipse Algorithm:

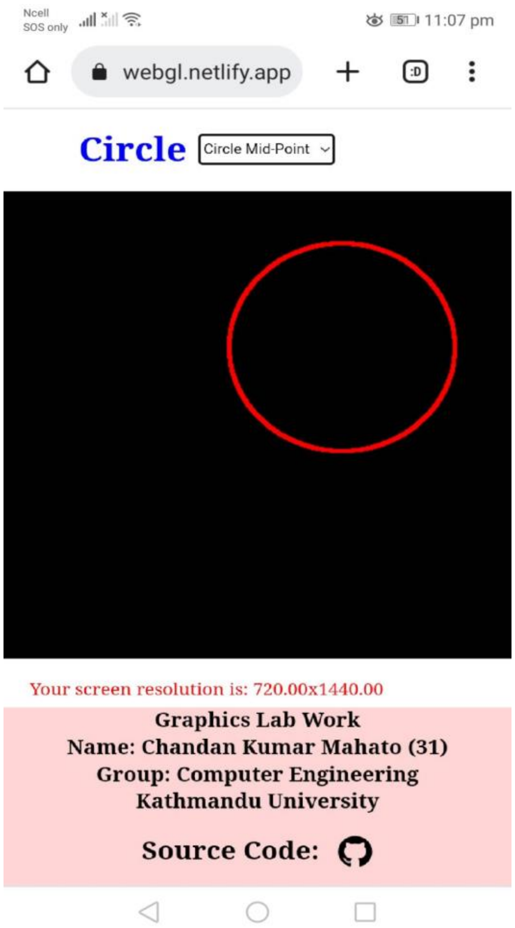


```
function drawEllipseMidPoint() {
  let vertexData = [];
  let a = 200;
  let b = 100;
  let xc = 220;
  let yc = 200;

  let x = 0;
  let y = b;
  let p = b * b - a * a * b + (a * a) / 4;
  let dx = 2 * b * b * x;
  let dy = 2 * a * a * y;

  while (dx < dy) {
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);

    if (p < 0) {
      x++;
      dx += 2 * b * b;
      p += dx + b * b;
    } else {
      x++;
      y--;
      dx += 2 * b * b;
      dy -= 2 * a * a;
      p += dx - dy + b * b;
    }
  }

  p = b * b * (x + 0.5) * (x + 0.5) + a * a * (y - 1) * (y - 1) - a * a * b * b;

  while (y >= 0) {
```



```
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
    vertexData.push(normalise(yc + y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc + x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);
    vertexData.push(normalise(xc - x, canvasWidth));
    vertexData.push(normalise(yc - y, canvasHeight));
    vertexData.push(0);

    if (p > 0) {
      y--;
      dy -= 2 * a * a;
      p += a * a - dy;
    } else {
      x++;
      y--;
      dx += 2 * b * b;
      dy -= 2 * a * a;
      p += dx - dy + a * a;
    }
  }

  let fragCode = `void main() {gl_FragColor = vec4(1, 0, 0, 1);}`; //red color
  DrawObject(gl.POINTS, 1, fragCode, vertexData, 0, vertexData.length);
}
```

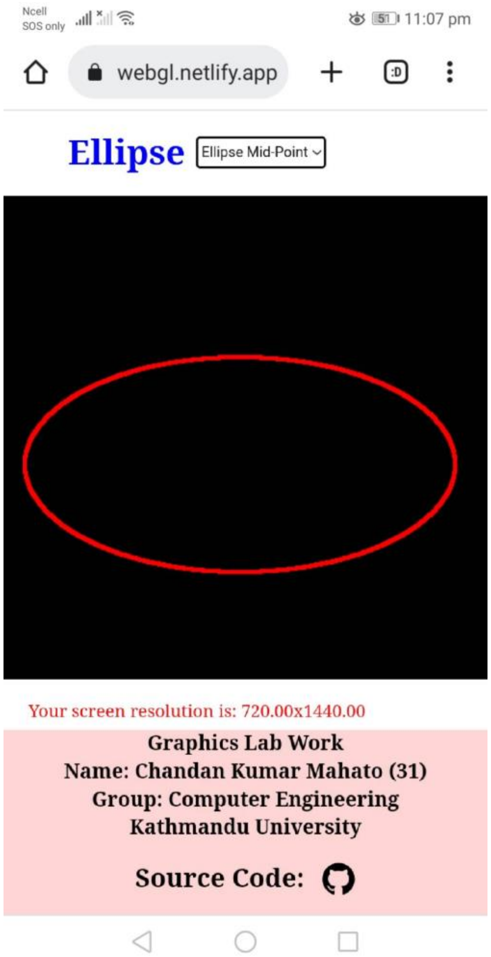
Output and Screenshots:



Your screen resolution is: 720.00x1440.00

Graphics Lab Work
Name: Chandan Kumar Mahato (31)
Group: Computer Engineering
Kathmandu University

Source Code:



Your screen resolution is: 720.00x1440.00

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Source Code:

Fig 1: Circle

Fig 2: Ellipse

Conclusion

By getting familiar with the coordinate system and utilizing the graphics geometrical functions and classes provided by our chosen graphics library, I was able to successfully draw the circle using mid-point algorithm and Ellipse using mid-point algorithm.

This exercise helped me to develop a better understanding of the coordinate system and the use of graphics geometrical functions and classes to create visually appealing graphics.