ASSIGNMENT-3

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ENROLLMENT NUMBER-2020CSB102

SUBJECT-ASSIGNMENT 3 OF COMPUTER GRAPHICS

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1.Q. Develop a class for circle using Midpoint circle drawing algorithm.

Ans-Making Circle-

Circle.java

```
/*This is the program for zoom-out and zoom-in using graphics */
/*Thus program can run only on Java-jdk(8) */


import java.applet.*;
import java.awt.*;
import java.awt.event.*;
import java.util.*;

public class Circle extends Applet implements
ActionListener,MouseWheelListener{
    //It is for generating a rectangle corresponding to a particular
point in cartesian coordinate syatem
        int gap = 4;
        ArrayList<Circle1>arr=new ArrayList<Circle1>(1000);
    public void plotPoint(Graphics g,int x,int y,Color c)
    {
        g.setColor(c);
        g.fillRect(
            (getX()+getWidth())/2+(x*gap)-(gap),
            (getY()+getHeight())/2-(y*gap)-(gap),
            gap,gap
        );
    }
    //function to make grid
    public void paintGrid(Graphics g,int gap,int originx,int originy)
    {
        g.setColor(Color.yellow);

        for(int i = gap;i<=getWidth();i+=gap)
        {
            g.drawLine(originx+i, originy-getHeight()/2, originx+i,
originy+getHeight()/2);
            g.drawLine(originx-i, originy-getHeight()/2, originx-i,
originy+getHeight()/2);
        }
        for(int i = gap;i<=getHeight();i+=gap)
```

```
        {
            g.drawLine(originx-getWidth()/2, originy+i,
originx+getWidth()/2, originy+i);
            g.drawLine(originx-getWidth()/2, originy-i,
originx+getWidth()/2, originy-i);

        }
    }
    //function to return line
    public void Circles(Graphics g,int radius,int x1,int y1)
    {
        int x=0;
        int y=radius;
        double p=1.25-radius;
        plotPoint(g,x+x1,y+y1,Color.green);
        plotPoint(g,x+x1,-y+y1,Color.green);
        plotPoint(g,-x+x1,y+y1,Color.green);
        plotPoint(g,-x+x1,-y+y1,Color.green);
        while(x<y)
        {
            if(p<0)
                {
                    x=x+1;
                    p=p+2*x+1;

                }
            else
            {
                x=x+1;
                y=y-1;
                p=p+2*x+1-2*y;
            }
             plotPoint(g,x+x1,y+y1,Color.green);
             plotPoint(g,y+x1,x+y1,Color.green);
             plotPoint(g,x+x1,-y+y1,Color.green);
             plotPoint(g,-x+x1,y+y1,Color.green);
             plotPoint(g,y+x1,-x+y1,Color.green);
             plotPoint(g,-y+x1,x+y1,Color.green);
             plotPoint(g,-x+x1,-y+y1,Color.green);
             plotPoint(g,-y+x1,-x+y1,Color.green);
        }
    }

// }
    //It is for initialisation purpose
    public void init(){
        addMouseWheelListener(this);
        button1 = new Button("+");
```

```
        add(button1);
        button1.addActionListener(this);
        button2 = new Button("-");
        add(button2);
        button1.setBackground(Color.white);
        button2.setBackground(Color.white);
        button2.addActionListener(this);
        setForeground(Color.green);
        setBackground(Color.black);
    }
    //it is for implementing button function
    public void actionPerformed(ActionEvent e)
    {
        if (e.getSource() == button1){
         gap+=gap+gap/10;
         repaint();
        }
        else if(e.getSource()==button2)
            {
             gap-=gap/10;
             repaint();
            }
    }
    //It is for mouse wheel operation
    public void mouseWheelMoved(MouseWheelEvent e)
    {
        int z=e.getWheelRotation();
        gap+=z;
        repaint();
    }

    Button button1, button2;
    public void paint(Graphics g){

        g.setColor(Color.orange);
        int originx=getX()+getWidth()/2;
        int originy=getY()+getHeight()/2;
        g.drawLine(originx-getWidth()/2, originy, originx+getWidth()/2,
originy);
        g.drawLine(originx, originy-getHeight()/2, originx,
originy+getHeight()/2);
        // paintGrid(g,gap,originx,originy);
        paintGrid(g,gap,originx,originy);
        Color c1=new Color(100,100,100);

        Circles(g,100,0,0);
        Circles(g,46,46,27);
        Circles(g,46,-46,27);
```

```
        Circles(g,46,0,-54);
        Circles(g,8,0,0);
        Circles(g,22,0,78);
        Circles(g,22,65,-38);
        Circles(g,22,-65,-38);
        Circles(g,10,33,82);
        Circles(g,10,-33,82);
        Circles(g,10,-88,-14);
        Circles(g,10,88,-14);
        Circles(g,10,-54,-70);
        Circles(g,10,54,-70);
        Circles(g,5,50,80);
        Circles(g,5,-50,80);
        Circles(g,6,94,3);
        Circles(g,6,-94,3);
        Circles(g,6,45,-83);
        Circles(g,6,-45,-83);
        Circles(g,4,58,76);
        Circles(g,4,-58,76);
        Circles(g,3,95,14);
        Circles(g,3,-95,14);
        Circles(g,3,36,-88);
        Circles(g,3,-36,-88);
        Circles(g,4,0,50);
        Circles(g,4,42,-24);
        Circles(g,4,-42,-24);
        Circles(g,2,65,72);
        Circles(g,2,-65,-72);
        Circles(g,3,95,22);
         Circles(g,3,-95,22);
         Circles(g,2,31,-92);
         Circles(g,2,-31,-92);
         Circles(g,4,23,92);
         Circles(g,4,-23,92);
         Circles(g,4,91,-30);
         Circles(g,4,-91,-30);
         Circles(g,4,69,-64);
         Circles(g,4,-69,-64);
        Circle1 c = new
        Circle1(100,0,0);
        arr.add(c);
        c = new Circle1(46,46,27);
        arr.add(c);
        c=new Circle1(46,-46,27);
        arr.add(c);
        c=new Circle1(46,0,-54);
        arr.add(c);
        //
```

```
        c=new Circle1(8,0,0);
        arr.add(c);
        c=new Circle1(22,0,78);
        arr.add(c);
        c=new Circle1(22,65,-38);
        arr.add(c);
        c=new Circle1(22,-65,-38);
        arr.add(c);
        c=new Circle1(10,33,82);
        arr.add(c);
        c=new Circle1(10,-33,82);
        arr.add(c);
        c=new Circle1(10,-88,-14);
        arr.add(c);
        c=new Circle1(10,88,-14);
        arr.add(c);
        c=new Circle1(10,-54,-70);
        arr.add(c);
        c=new Circle1(10,54,-70);
        arr.add(c);
        c=new Circle1(5,50,80);
        arr.add(c);
        c=new Circle1(5,-50,80);
        arr.add(c);
        c=new Circle1(6,94,3);
        arr.add(c);
        c=new Circle1(6,-94,3);
        arr.add(c);
        c=new Circle1(6,45,-83);
        arr.add(c);
        c=new Circle1(6,-45,-83);
        arr.add(c);
        c=new Circle1(4,58,76);
        arr.add(c);
        c=new Circle1(4,-58,76);
        arr.add(c);
        c=new Circle1(3,95,14);
        arr.add(c);
        c=new Circle1(3,-95,14);
        arr.add(c);
        c=new Circle1(3,36,-88);
        arr.add(c);
        c=new Circle1(3,-36,-88);
        arr.add(c);
        c=new Circle1(4,0,50);
        arr.add(c);
        c=new Circle1(4,42,-24);
        arr.add(c);
```

```
        c=new Circle1(4,-42,-24);
        arr.add(c);
         c=new Circle1(2,65,72);
        arr.add(c);
         c=new Circle1(2,-65,-72);
        arr.add(c);
         c=new Circle1(3,95,22);
        arr.add(c);
         c=new Circle1(3,-95,22);
        arr.add(c);
         c=new Circle1(2,31,-92);
        arr.add(c);
         c=new Circle1(2,-31,-92);
        arr.add(c);
         c=new Circle1(4,23,92);
        arr.add(c);
        c=new Circle1(4,-23,92);
        arr.add(c);
        c=new Circle1(4,91,-30);
        arr.add(c);
        c=new Circle1(4,-91,-30);
        arr.add(c);
        c=new Circle1(4,69,-64);
        arr.add(c);
        c=new Circle1(4,-69,-64);
        arr.add(c);
        int p,q,r1=0;

        int i=0;
        Circle1 largec = arr.get(0);
        int flag=0;
        while(i<200){
            try
            {
                Thread.sleep(5);
            }
            catch(Exception e)
            {

            }
            flag=0;
            p=(int)(Math.random()*200)-100;
            q=(int)(Math.random()*200)-100;
            r1 = 0;
            while(true){
                for(int it=0;it<arr.size();it++)
                {
                    Circle1 m=arr.get(it);
```

```
                    int r=m.r;
                    int x1=m.x1;
                    int y1=m.y1;
                    int f=0;
                    if(it>0)
                    {
                        int d=(int)(Math.sqrt(Math.pow(p-
x1,2)+Math.pow(q-y1,2)));
                        if(r+r1>d)
                        {
                            flag=1;
                            break;
                        }
                    }
                    else{
                        int d=(int)(Math.sqrt(Math.pow(p-
x1,2)+Math.pow(q-y1,2)));
                        if(r-r1<d)
                        {
                            flag=1;
                            break;
                        }
                    }
                }

                if(flag==1)
                    break;
                r1++;
            }

            if(r1>0){
                Circles(g,r1,p,q);
                c = new Circle1(r1,p,q);
                arr.add(c);
                // System.out.println("c ="+p+" "+q+" r="+r1);
            }
            i++;
        }
        arr.clear();
    }
}
```

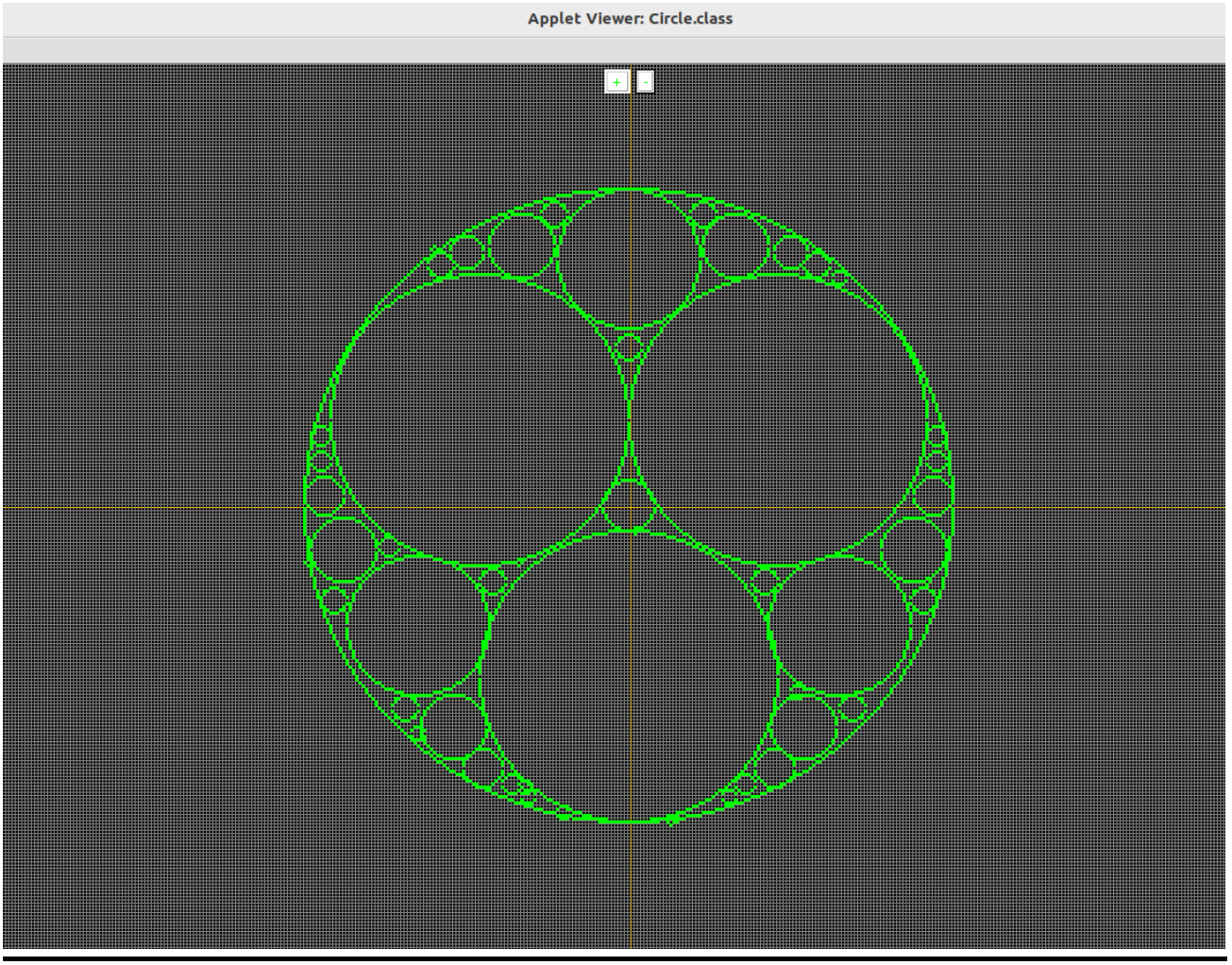
Circle.html-

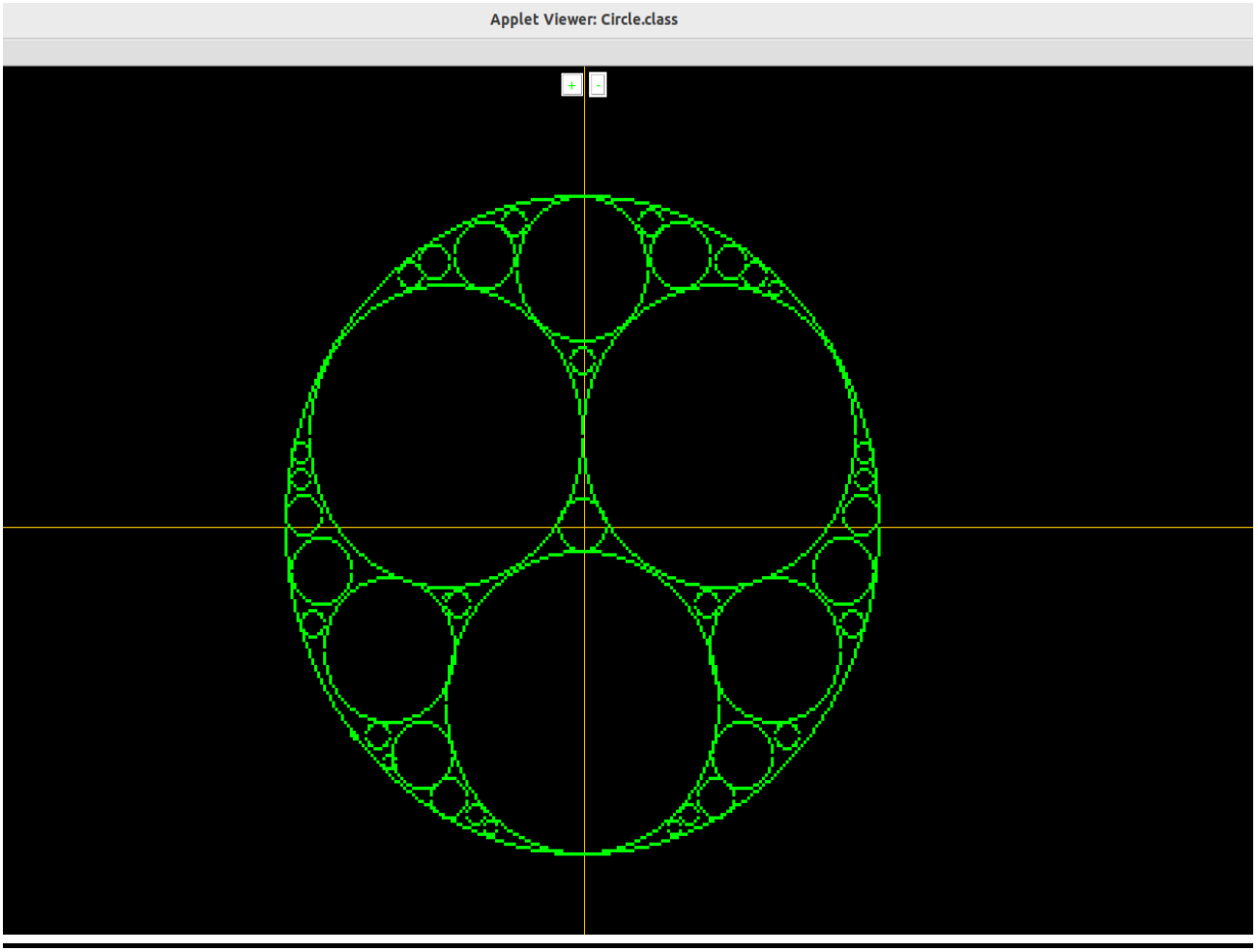
```
<html>
    <head></head>
    <body>
        <applet code ="Circle.class"  height="1000"
width="1000"></applet>
    </body>
</html>
```

Circle1.java-

```
public class Circle1{
    int r,x1,y1;
    Circle1(int a,int b,int c)
    {
        r=a;
        x1=b;
        y1=c;
    }
}
```

Now output-




Applet Viewer: Circle.class

2>Q. Develop a class for ellipse using Midpoint ellipse drawing algorithm.

Ans-

Ellipse Making-

Ellipse.java-

```
import java.applet.*;
import java.awt.*;
import java.awt.event.*;
import java.util.*;

public class Ellipse extends Applet implements
ActionListener,MouseWheelListener{
    //It is for generating a rectangle corresponding to a particular
point in cartesian coordinate syatem
        int gap = 100;
    public void plotPoint(Graphics g,int x,int y,Color c)
    {
        g.setColor(c);
        g.fillRect(
            (getX()+getWidth())/2+(x*gap)-(gap/4),
            (getY()+getHeight())/2-(y*gap)-(gap/4),
            gap/2,gap/2
        );
    }
    public int slope(int x1,int x2,int y1,int y2)
    {
        int x=x2-x1;
        int y=y2-y1;
        int m=y/x;
        return m;
    }


//Ellipse drawing algorithm
public void midptellipse(Graphics g,float rx, float ry,
```

```
                        float xc, float yc)
{

    float dx, dy, d1, d2, x, y;
    x = 0;
    y = ry;

    // Initial decision parameter of region 1
    d1 = (ry * ry) - (rx * rx * ry) +
                    (0.25f * rx * rx);
    dx = 2 * ry * ry * x;
    dy = 2 * rx * rx * y;
    // DecimalFormat df = new DecimalFormat("#,###,##0.00000");

    // For region 1
    while (dx < dy)
    {

     plotPoint(g,(int)(x+xc),(int)(y+yc),Color.red);
     plotPoint(g,(int)(-x+xc),(int)(y+yc),Color.red);
     plotPoint(g,(int)(x+xc),(int)(-y+yc),Color.red);
     plotPoint(g,(int)(-x+xc),(int)(-y+yc),Color.red);

        if (d1 < 0)
        {
            x++;
            dx = dx + (2 * ry * ry);
            d1 = d1 + dx + (ry * ry);
        }
        else
        {
            x++;
            y--;
            dx = dx + (2 * ry * ry);
            dy = dy - (2 * rx * rx);
            d1 = d1 + dx - dy + (ry * ry);
        }
    }

    // Decision parameter of region 2
    d2 = ((ry * ry) * ((x + 0.5f) * (x + 0.5f)))
        + ((rx * rx) * ((y - 1) * (y - 1)))
        - (rx * rx * ry * ry);

    // Plotting points of region 2
    while (y >= 0) {

        // printing points based on 4-way symmetry
```

```
        plotPoint(g,(int)(x+xc),(int)(y+yc),Color.red);
        plotPoint(g,(int)(-x+xc),(int)(y+yc),Color.red);
        plotPoint(g,(int)(x+xc),(int)(-y+yc),Color.red);
        plotPoint(g,(int)(-x+xc),(int)(-y+yc),Color.red);

        if (d2 > 0) {
            y--;
            dy = dy - (2 * rx * rx);
            d2 = d2 + (rx * rx) - dy;
        }
        else {
            y--;
            x++;
            dx = dx + (2 * ry * ry);
            dy = dy - (2 * rx * rx);
            d2 = d2 + dx - dy + (rx * rx);
        }
    }
}
public void paintGrid(Graphics g,int gap,int originx,int originy)
    {
        g.setColor(Color.yellow);

        for(int i = gap;i<=getWidth();i+=gap)
        {
            g.drawLine(originx+i, originy-getHeight()/2, originx+i,
originy+getHeight()/2);
            g.drawLine(originx-i, originy-getHeight()/2, originx-i,
originy+getHeight()/2);
        }
        for(int i = gap;i<=getHeight();i+=gap)
        {
            g.drawLine(originx-getWidth()/2, originy+i,
originx+getWidth()/2, originy+i);
            g.drawLine(originx-getWidth()/2, originy-i,
originx+getWidth()/2, originy-i);

        }
    }









    //It is for initialisation purpose
    public void init(){
```

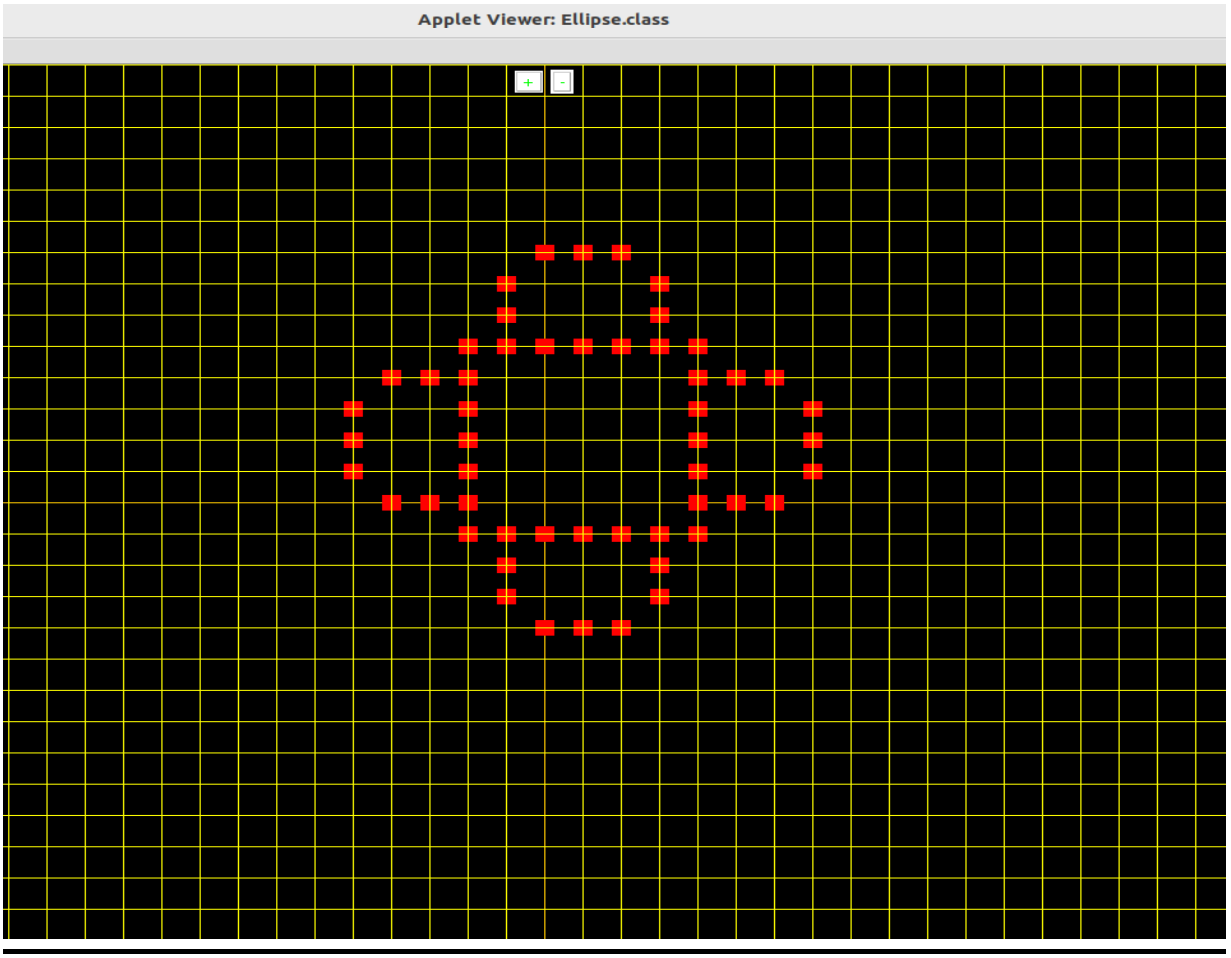
```
        addMouseWheelListener(this);
        button1 = new Button("+");
        add(button1);
        button1.addActionListener(this);
        button2 = new Button("-");
        add(button2);
        button1.setBackground(Color.white);
        button2.setBackground(Color.white);
        button2.addActionListener(this);
        setForeground(Color.green);
        setBackground(Color.black);
    }
    //it is for implementing button function
    public void actionPerformed(ActionEvent e)
    {
        if (e.getSource() == button1){
         gap+=gap+gap/10;
         repaint();
        }
        else if(e.getSource()==button2)
            {
             gap-=gap/10;
             repaint();
            }
    }
    //It is for mouse wheel operation
    public void mouseWheelMoved(MouseWheelEvent e)
    {
        int z=e.getWheelRotation();
        gap+=z;
        repaint();
    }

    Button button1, button2;
    public void paint(Graphics g){

            g.setColor(Color.orange);
            int originx=getX()+getWidth()/2;
            int originy=getY()+getHeight()/2;
            g.drawLine(originx-getWidth()/2, originy,
originx+getWidth()/2, originy);
            g.drawLine(originx, originy-getHeight()/2, originx,
originy+getHeight()/2);
            // paintGrid(g,gap,originx,originy);
            Color c=new Color(100,100,100);
            int i=0;
            int x1=200,y1=101;
            midptellipse(g,(float)6,(float)3,(float)1,(float)2);
```

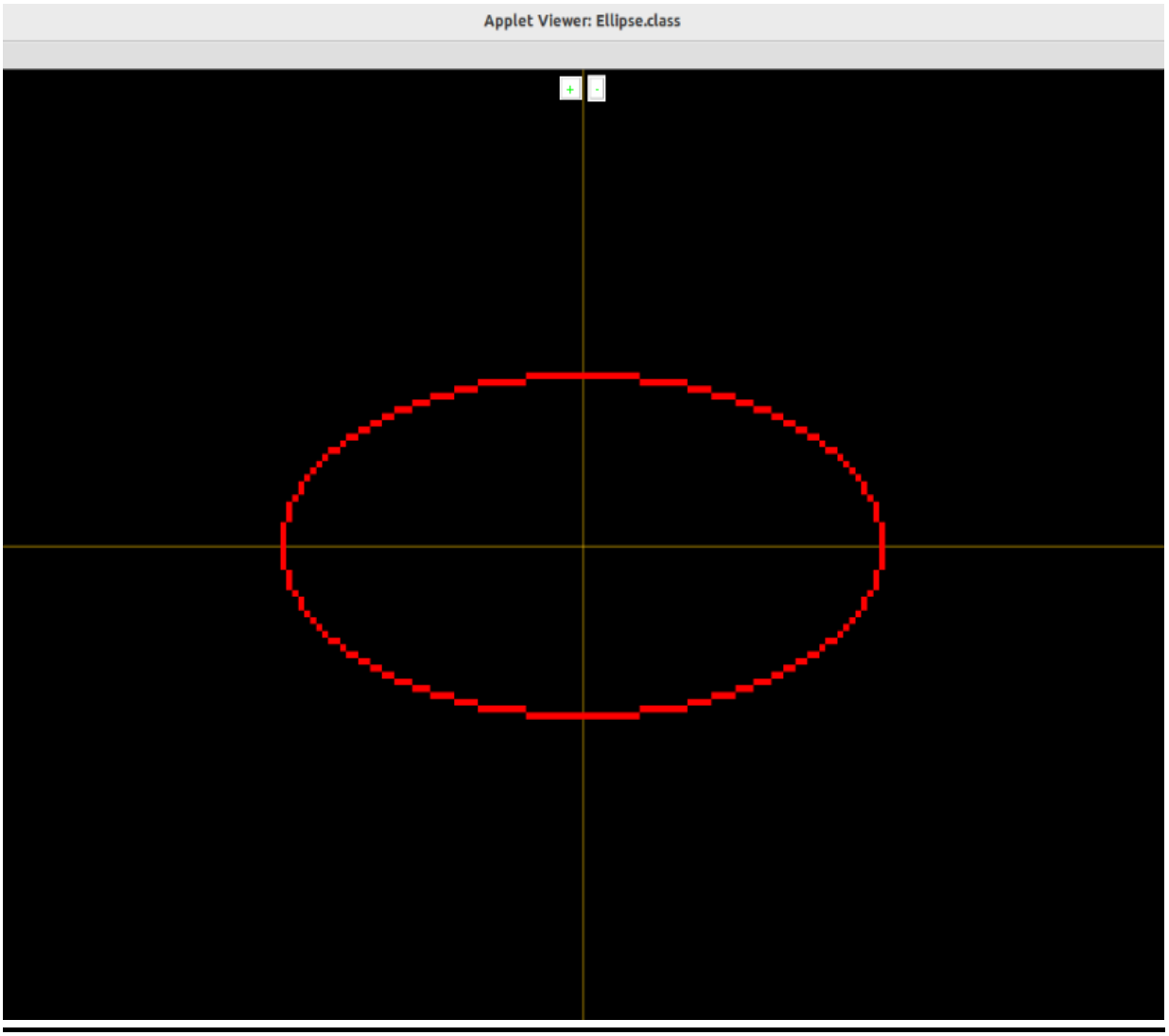
```
            midptellipse(g,(float)10,(float)20,(float)1,(float)2);
            paintGrid(g,gap,originx,originy);
    }
}
```

Ellipse.html-

```
<html>
    <head></head>
    <body>
        <applet code ="Ellipse.class"  height="1000"
width="1000"></applet>
    </body>
</html>
```

Ellipse Diagram-


Applet Viewer: Ellipse.class
+
-


Applet Viewer: Ellipse.class