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import java.awt.*;
import java.applet.Applet;

////////////////////////////////////
//
//      The following program make a Bifurcation Pattern.
//
//      WRITTEN BY:
//      ALAIN DADAIAN
//
////////////////////////////////////

public class Bifurcation extends Applet
{

    public static double round(double a)
    {
        return a += 0.5;
    }

    public void init()
    {
        setBackground(Color.white);
    }

    public void paint (Graphics g)
    {

        int x_resolution = 799, y_resolution = 599;
        double r_low = 1.9, r_high = 3.0, p_low = 0.0, p_high = 1.4;
        double p_range = p_high - p_low, p, y, r;
        int n = 200;
        double r_range = r_high - r_low;
        double x_interval = (r_range) / x_resolution;

        g.setColor(Color.black);

        for (int x = 0; x < x_resolution; x++)
        {
            r = r_low + x_interval * x;

p = 0.1;

            for (int i = 0; i < n; i++)
                p = p * ((1 + r) - r * p);

            for (int i = 0; i < n; i++)
            {
                p = p * ((1 + r) - r * p);

                if (p >= p_low && p <= p_high)
                {
                    y = round(y_resolution * (p - p_low) / (p_range));
                    g.drawRect(x, (int)y, 1, 1);
                }
            }
        }
    } // end of class Bifurcation

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