```
package mat;
import java.util.*;
import javax.swing.JOptionPane;

/**
 * Classe criada com o intuito de lidar com os cálculos necessários no
programa
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 */

public class MatFunc {

	public static double func(double t, double[] a, double[] w) {
		return a[0] * Math.sin(w[0] * t) + a[1] * Math.sin(w[1] * t)
+ a[2] * Math.sin(w[2] * t);
	}

	public static double ed(double t, double y, double yderivado,
double c, double k, double m, double[] a, double[] w) {
		return (func(t, a, w) - c * yderivado - k * y) / m;
	}

	public static Resposta range (double h , double T , double x ,
double v , double[] a , double[] w , double m , double c , double k ) {
		//double h , double T , double x , double v , double[] a ,
double[] w , double m , double c , double k
		//double h = 0.1; double T = 250; double x = 0; double v = 0;
double m = 1; double c = 0.1;  double k = 2;
		/*double[] a= new double[3];
		double[] w= new double[3];
		a[0]= 1;
		a[1]=2;
		a[2] = 1.5;
		w[0]= 0.05;
		w[1]=1;
		w[2] = 2;*/
		x=0;
		v=0;
		double n = T / h;
		double tprevious = 0;
		//double[][] results =new double[3][1];
		double aceleration=0;
		double t =0 ;
		Resposta results = new Resposta();
		for (double i=1; i<n+1; i++) {
			t = i * h;
			double k1 = (h / 2) * ed(tprevious, x, v, c, k, m, a,
w);
			double K = (h / 2) * (v + k1 / 2);
			double k2 = (h / 2) * ed(tprevious + (h / 2), x + K, v +
k1, c, k, m, a, w);
			double k3 = (h / 2) * ed(tprevious + (h / 2), x + K, v +
k2, c, k, m, a, w);
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                double L = h * (v + k3);
                double k4 = (h / 2) * ed(tprevious + h, x + L, v + 2 *
k3, c, k, m, a, w);
                x = x + h * (v + (1 / 3) * (k1 + k2 + k3));
                v = v + (1 / 3)  * (k1 + 2 * k2 + 2 * k3 + k4);
                tprevious = t;
                aceleration = ed(t, x, v, c, k, m, a, w);

            }
            results.t=t;
            results.x=x;
            results.v=v;
            results.acel=aceleration;

            return results;
      }

      public static double runge(int n, double[] x, double[] y,double
xpy) {

            double soma_x = 0 , soma_y=0 , soma_xy=0 , soma_x2 = 0;
            for (int i = 0; i < n; i++) {
                  soma_x += x[i];
                  soma_y += y[i];
                  soma_xy += x[i]*y[i];
                  soma_x2 += Math.pow(x[i],2);
            }
            double alfa = (n*soma_xy - soma_x*soma_y)/(n*soma_x2 -
Math.pow(soma_x,2));
            double beta = soma_y/n - alfa*soma_x/n;
            double resp = alfa*xpy + beta;
            System.out.println(resp);
            return resp;
      }
}


package telas;
import  mat.MatFunc;
import mat.Resposta;

import java.awt.BorderLayout;
import java.awt.Button;
import java.awt.EventQueue;

import javax.swing.JFrame;
import javax.swing.JPanel;
import javax.swing.border.EmptyBorder;
import javax.swing.filechooser.FileNameExtensionFilter;

import java.awt.Toolkit;
import javax.swing.GroupLayout;
import javax.swing.GroupLayout.Alignment;
import javax.swing.JMenuBar;
```

```
import javax.swing.JMenu;
import javax.swing.JMenuItem;
import javax.swing.JOptionPane;
import javax.swing.SwingConstants;
import java.awt.event.ActionListener;
import java.io.BufferedReader;
import java.io.File;
import java.io.FileReader;
import java.io.FileWriter;
import java.io.IOException;
import java.io.PrintWriter;
import java.util.Scanner;
import java.awt.event.ActionEvent;
import javax.swing.JTabbedPane;
import java.awt.Color;
import java.awt.Font;
import java.awt.Image;

import javax.swing.JLabel;
import javax.swing.JTextArea;
import javax.swing.LayoutStyle.ComponentPlacement;
import javax.swing.JRadioButton;
import javax.swing.AbstractButton;
import javax.swing.DropMode;
import javax.swing.ButtonGroup;
import javax.swing.JSeparator;
import javax.swing.JButton;
import javax.swing.JFileChooser;
import java.awt.Dimension;
import javax.swing.JScrollPane;
import javax.swing.ScrollPaneConstants;
import javax.swing.border.SoftBevelBorder;
import javax.swing.border.BevelBorder;
import javax.swing.ImageIcon;
import java.awt.Rectangle;
import java.awt.SystemColor;

public class Tela_principal extends JFrame {
	private JPanel contentPane;
	private final ButtonGroup buttonGroup = new ButtonGroup();

	/**
	 * Launch the application.
	 */
	public static void main(String[] args) {
		EventQueue.invokeLater(new Runnable() {
			public void run() {
				try {
					Tela_principal frame = new Tela_principal();
					frame.setVisible(true);

				} catch (Exception e) {
					e.printStackTrace();
				}
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                }
            });
      }

      public static void calc(String caminhosaida , String
parametros_string, String tempo_string, String passo_string) throws
Exception {
            int size=0;
            double [] pontos = new double[9];

            String[] parts = parametros_string.split(",");
            for(int i = 0; i < 2; i++ ) {
                  pontos[i]=Double.parseDouble(parts[i]);
                  //System.out.printf("%.2f ", pontos[i]);
            }

            double T = Double.parseDouble(tempo_string);
            double h = Double.parseDouble(tempo_string);
            double m=pontos[0];
            double c=pontos[1];
            double k=pontos[2];
            double[] a = new double [3];
            double[] w = new double [3];
            for(int i = 3; i< 6; i++) {
                  a[i-3]=pontos[i];
            }
            for(int i = 6; i< 9; i++) {
                  a[i-6]=pontos[i];
            }


            FileWriter arquivo_saida = new FileWriter(caminhosaida);
            PrintWriter escritor = new PrintWriter(arquivo_saida);

            escritor.print("Intervalo lido [a, b] : ");
            escritor.printf("(%.2f, %.2f)", pontos[0],pontos[1]);
            escritor.println();
            double x = 0;
            double v =0;
            //escritor.close();

            Resposta resp = MatFunc.range(h,T,x,v,a,w,m,c,k); // VER ISSO
            escritor.printf("Passo estabelecido: %f\n",h);
            escritor.println("Método de Runge-Kutta-Nystron.");
            escritor.printf("Tempo, posição, velocidade e aceleração:
%.3f, %.3f, %.3f, %.3f", resp.t, resp.x, resp.v, resp.acel);
            arquivo_saida.close();
            JOptionPane.showMessageDialog(null,"Arquivo gerado com
sucesso em: "+caminhosaida);

      }


      /**
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       * Create the frame.
       */
      public Tela_principal() {
            setResizable(false);

      setIconImage(Toolkit.getDefaultToolkit().getImage(Tela_principal.cl
ass.getResource("/imagens/logo1.jpg")));
            setTitle("Runge-Kutta-Nystron");
            setDefaultCloseOperation(JFrame.DISPOSE_ON_CLOSE);
            setBounds(100, 100, 722, 274); // tamanho da tela

            JFileChooser openFileChooser;
            openFileChooser = new JFileChooser();
            openFileChooser.setCurrentDirectory(new File ("c:\\temp"));
            openFileChooser.setFileFilter(new
FileNameExtensionFilter("arquivos em texto","txt"));
            contentPane = new JPanel();
            contentPane.setBorder(new EmptyBorder(5, 5, 5, 5));
            setContentPane(contentPane);
            contentPane.setLayout(new BorderLayout(0, 0));

            JTabbedPane tabbedPane = new JTabbedPane(JTabbedPane.TOP);
            tabbedPane.setBackground(Color.LIGHT_GRAY);
            contentPane.add(tabbedPane, BorderLayout.CENTER);


            JLabel tolmax = new JLabel("Tempo total de
integra\u00E7\u00E3o");
            tolmax.setBounds(48, 54, 202, 45);
            tolmax.setEnabled(true);
            tolmax.setHorizontalTextPosition(SwingConstants.CENTER);
            tolmax.setHorizontalAlignment(SwingConstants.CENTER);
            tolmax.setFont(new Font("Segoe UI", Font.BOLD, 16));

            JScrollPane scrollPane_texttol = new JScrollPane();
            scrollPane_texttol.setBounds(260, 66, 89, 27);

      scrollPane_texttol.setVerticalScrollBarPolicy(ScrollPaneConstants.V
ERTICAL_SCROLLBAR_NEVER);

      scrollPane_texttol.setHorizontalScrollBarPolicy(ScrollPaneConstants
.HORIZONTAL_SCROLLBAR_NEVER);
            scrollPane_texttol.setBorder(new
SoftBevelBorder(BevelBorder.LOWERED, null, null, null, null));


            JTextArea textotempo = new JTextArea();
            scrollPane_texttol.setViewportView(textotempo);
            textotempo.setBorder(null);
            textotempo.setEnabled(true);
            textotempo.setDropMode(DropMode.INSERT);
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```
            ActionListener iterativoActionListener = new ActionListener()
{
                  public void actionPerformed(ActionEvent actionEvent) {
                        AbstractButton butjacobi = (AbstractButton)
actionEvent.getSource();
                        AbstractButton butpot = (AbstractButton)
actionEvent.getSource();
                  }
            };

            ActionListener decActionListener = new ActionListener() {
                  public void actionPerformed(ActionEvent actionEvent) {
                        AbstractButton butpot = (AbstractButton)
actionEvent.getSource();
                  }
            };


            JPanel panel = new JPanel();
            panel.setFont(new Font("Segoe UI", Font.PLAIN, 14));
            panel.setBackground(new Color(211, 211, 211));
            tabbedPane.addTab("Dados da aplicação", null, panel, null);

            JLabel lblOrdemDaMatriz = new JLabel("Passo");
            lblOrdemDaMatriz.setBounds(409, 54, 58, 45);
            lblOrdemDaMatriz.setFont(new Font("Segoe UI", Font.BOLD,
16));

      lblOrdemDaMatriz.setHorizontalTextPosition(SwingConstants.CENTER);

      lblOrdemDaMatriz.setHorizontalAlignment(SwingConstants.CENTER);

            JSeparator separator = new JSeparator();
            separator.setBounds(21, 110, 632, 2);
            separator.setForeground(Color.GRAY);

            JScrollPane scrollPane = new JScrollPane();
            scrollPane.setBounds(471, 66, 65, 28);
            scrollPane.setBorder(new SoftBevelBorder(BevelBorder.LOWERED,
null, null, null, null));

      scrollPane.setHorizontalScrollBarPolicy(ScrollPaneConstants.HORIZON
TAL_SCROLLBAR_NEVER);

      scrollPane.setVerticalScrollBarPolicy(ScrollPaneConstants.VERTICAL_
SCROLLBAR_NEVER);
            ImageIcon icon = (new
ImageIcon(Tela_principal.class.getResource("/imagens/Minerva_UFRJ_Oficial
.png")));
            Image img = icon.getImage();
            //ImageIcon scaledIcon = new ImageIcon(imgScale);
            ImageIcon icone = (new
ImageIcon(Tela_principal.class.getResource("/imagens/logo1.jpg")));
            Image imge = icone.getImage();
```

```
            //ImageIcon scaledIcone = new ImageIcon(imgScaled);

            JTextArea textopasso = new JTextArea();
            scrollPane.setViewportView(textopasso);
            textopasso.setBorder(null);
            textopasso.setWrapStyleWord(true);
            textopasso.setMinimumSize(new Dimension(5, 20));
            textopasso.setMaximumSize(new Dimension(5, 20));
            textopasso.setColumns(1);
            textopasso.setRows(1);

            textopasso.setDropMode(DropMode.INSERT);
            panel.setLayout(null);
            panel.add(separator);
            panel.add(lblOrdemDaMatriz);
            panel.add(scrollPane);
            panel.add(tolmax);
            panel.add(scrollPane_texttol);

            JLabel lblOrdemDaMatriz_1 = new JLabel("Par\u00E2metros
m,c,k, a1, a2, a3, w1, w2, w3");

      lblOrdemDaMatriz_1.setHorizontalTextPosition(SwingConstants.CENTER)
;

      lblOrdemDaMatriz_1.setHorizontalAlignment(SwingConstants.CENTER);
            lblOrdemDaMatriz_1.setFont(new Font("Segoe UI", Font.BOLD,
15));
            lblOrdemDaMatriz_1.setBounds(100, 11, 290, 45);
            panel.add(lblOrdemDaMatriz_1);

            JScrollPane scrollPane_1 = new JScrollPane();

      scrollPane_1.setVerticalScrollBarPolicy(ScrollPaneConstants.VERTICA
L_SCROLLBAR_NEVER);

      scrollPane_1.setHorizontalScrollBarPolicy(ScrollPaneConstants.HORIZ
ONTAL_SCROLLBAR_NEVER);
            scrollPane_1.setBorder(new
SoftBevelBorder(BevelBorder.LOWERED, null, null, null, null));
            scrollPane_1.setBounds(399, 23, 154, 24);
            panel.add(scrollPane_1);

            JTextArea textoparametros = new JTextArea();
            textoparametros.setWrapStyleWord(true);
            textoparametros.setRows(1);
            textoparametros.setMinimumSize(new Dimension(5, 20));
            textoparametros.setMaximumSize(new Dimension(5, 20));
            textoparametros.setDropMode(DropMode.INSERT);
            textoparametros.setColumns(1);
            textoparametros.setBorder(null);
            scrollPane_1.setViewportView(textoparametros);
```

```
            JLabel lblCaminhoParaSaida = new JLabel("Caminho para arquivo
de sa\u00EDda");

      lblCaminhoParaSaida.setHorizontalTextPosition(SwingConstants.CENTER
);

      lblCaminhoParaSaida.setHorizontalAlignment(SwingConstants.LEFT);
            lblCaminhoParaSaida.setFont(new Font("Segoe UI", Font.BOLD,
17));
            lblCaminhoParaSaida.setBounds(10, 123, 258, 41);
            panel.add(lblCaminhoParaSaida);

            JScrollPane scrollPane_2 = new JScrollPane();

      scrollPane_2.setVerticalScrollBarPolicy(ScrollPaneConstants.VERTICA
L_SCROLLBAR_NEVER);

      scrollPane_2.setHorizontalScrollBarPolicy(ScrollPaneConstants.HORIZ
ONTAL_SCROLLBAR_NEVER);
            scrollPane_2.setBorder(new
SoftBevelBorder(BevelBorder.LOWERED, null, null, null, null));
            scrollPane_2.setBounds(272, 133, 382, 23);
            panel.add(scrollPane_2);

            JTextArea textopathsaida = new JTextArea();
            textopathsaida.setWrapStyleWord(true);
            textopathsaida.setRows(1);
            textopathsaida.setMinimumSize(new Dimension(5, 20));
            textopathsaida.setMaximumSize(new Dimension(5, 20));
            textopathsaida.setDropMode(DropMode.INSERT);
            textopathsaida.setColumns(1);
            textopathsaida.setBorder(null);
            scrollPane_2.setViewportView(textopathsaida);

            JButton btnNewButton = new JButton("Pronto");
            btnNewButton.addActionListener(new ActionListener() {
                  public void actionPerformed(ActionEvent e) {
                        try {
                              calc(textopathsaida.getText(),
textoparametros.getText(),textotempo.getText(), textopasso.getText());
                        } catch (Exception e1) {
                              e1.printStackTrace();
                        }
                  }
            });
            btnNewButton.setFont(new Font("Tahoma", Font.PLAIN, 12));
            btnNewButton.setBounds(306, 173, 89, 23);
            panel.add(btnNewButton);

            //
```

```
            ActionListener determinanteActionListener = new
ActionListener() {
                  public void actionPerformed(ActionEvent actionEvent) {
                        AbstractButton butpot = (AbstractButton)
actionEvent.getSource();
                  }
            };

            ActionListener determinante_2ActionListener = new
ActionListener() {
                  public void actionPerformed(ActionEvent actionEvent) {
                        AbstractButton  butgauss= (AbstractButton)
actionEvent.getSource();
                        AbstractButton butjacobi = (AbstractButton)
actionEvent.getSource();
                  }
            };


            /*butPronto.addActionListener(new ActionListener() {
                  public void actionPerformed(ActionEvent e) {
                        if (butbis.isSelected()) {
                              try {
                                    calc(textpathentrada.getText(),
textpathsaida.getText(), textointervalo.getText(), "determinante",
texttolmax.getText(), "pot"  );
                              } catch (IOException e1) {
                                    e1.printStackTrace();}
                        }
                        if (butnewton.isSelected()) {
                              try {
                                    calc(textpathentrada.getText(),
textpathsaida.getText(), textointervalo.getText(),  "determinante",
texttolmax.getText(), "jacobi"  );
                              } catch (IOException e1) {
                                    e1.printStackTrace();}
                        }

                  }
            });*/

      }
}
```