Пензенский государственный университет

Факультет вычислительной техники

Кафедра «Вычислительная техника»

Отчет о лабораторной работе № 1

по дисциплине «Программирование на языке JAVA»

Вариант № 7

Выполнили: ст-ты гр. 20ВВП2

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2022

**Цель работы:** научиться разрабатывать приложения, обладающие графическим интерфейсом пользователя, с использованием библиотеки Swing.

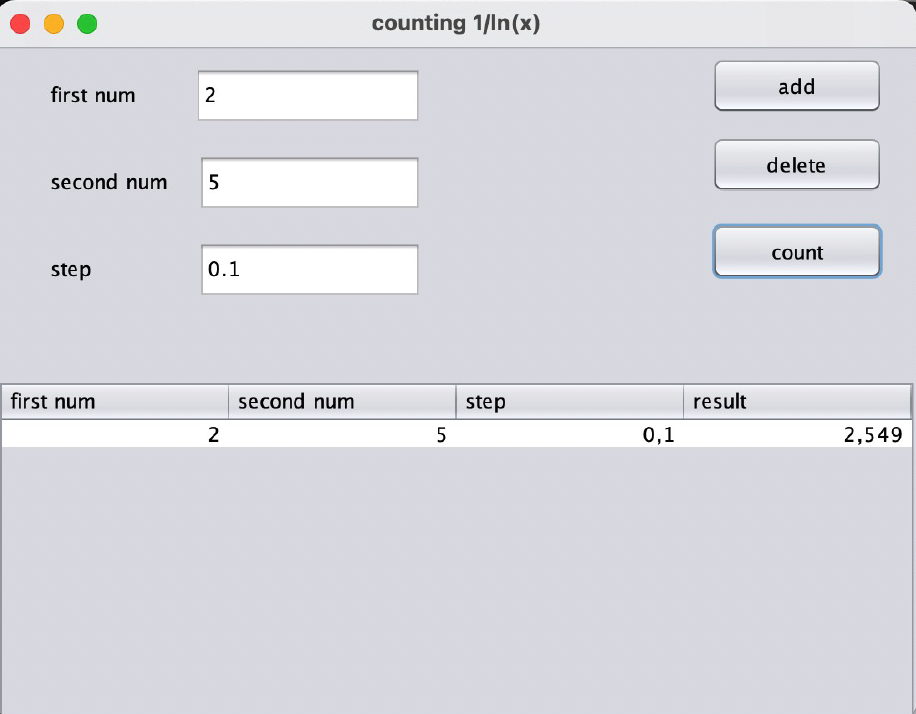
**Задание на лабораторную работу:** вычислить определенный интеграл функции в соответствии с вариантом задания (Приложение 1). Разработать приложение, обладающее графическим интерфейсом с использованием языка Java и библиотеки Swing. Приложение должно содержать 3 поля ввода (JTextField), доступных для редактирования, и соответственно таблицу (JTable) с четырьмя колонками: нижняя граница интегрирования, верхняя граница интегрирования, шаг интегрирования и результат вычисления.  Кроме того, должны присутствовать 3 кнопки (JButton): добавить, удалить, вычислить. Для добавления/удаления строки и вычисления значения определенного интеграла для функции в соответствии с вариантом задания (Приложение 1) и параметров выделенной строки таблицы. Результат должен выводиться в четвертой колонке, которая не доступна для редактирования. Оформление лабораторной работы должно быть выполнено в соответствии с требованиями, приведенными в Приложении 2.

Вариант:



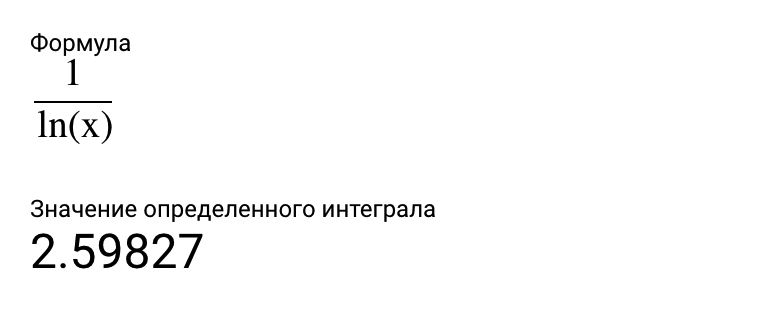
**Решение**

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Результат работы программы

Проверим данный результат при помощи сторонней программы:



**Листинг**

**Main.java**

import javax.swing.table.DefaultTableModel;  
import java.util.ArrayList;  
import java.util.Vector;  
  
import static javax.swing.JOptionPane.*showMessageDialog*;  
  
/\*  
 \* To change this license header, choose License Headers in Project Properties.  
 \* To change this template file, choose Tools | Templates  
 \* and open the template in the editor.  
 \*/  
  
*/\*\*  
 \** ***@author*** *student  
 \*/*class Main extends javax.swing.JFrame {  
  
 */\*\*  
 \* Creates new form NewJFrame  
 \*/* //CollectionList OurCollection = new CollectionList();  
 ArrayList<RecIntegral> OurArray = new ArrayList();  
 // Variables declaration - do not modify  
 private javax.swing.JButton AddButton;  
 private javax.swing.JButton CalculateButton;  
 private javax.swing.JButton ClearButton;  
 private javax.swing.JButton DeleteButton;  
 private javax.swing.JTextField LowerThreshold;  
 private javax.swing.JTable MainTable;  
 private javax.swing.JButton ReadButton;  
 private javax.swing.JTextField Step;  
 private javax.swing.JTextField UpperThreshold;  
 private javax.swing.JScrollPane jScrollPane1;  
 private javax.swing.JScrollPane jScrollPane2;  
 private javax.swing.JScrollPane jScrollPane3;  
 private javax.swing.JTable jTable1;  
 private javax.swing.JTable jTable2;  
  
 public Main() {  
  
 initComponents();  
 }  
  
 */\*\*  
 \** ***@param*** *args the command line arguments  
 \*/* public static void main(String[] args) {  
 /\* Set the Nimbus look and feel \*/  
 //<editor-fold defaultstate="collapsed" desc=" Look and feel setting code (optional) ">  
 /\* If Nimbus (introduced in Java SE 6) is not available, stay with the default look and feel.  
 \* For details see http://download.oracle.com/javase/tutorial/uiswing/lookandfeel/plaf.html  
 \*/  
 try {  
 for (javax.swing.UIManager.LookAndFeelInfo info : javax.swing.UIManager.*getInstalledLookAndFeels*()) {  
 if ("Nimbus".equals(info.getName())) {  
 javax.swing.UIManager.*setLookAndFeel*(info.getClassName());  
 break;  
 }  
 }  
 } catch (ClassNotFoundException ex) {  
 java.util.logging.Logger.*getLogger*(Main.class.getName()).log(java.util.logging.Level.*SEVERE*, null, ex);  
 } catch (InstantiationException ex) {  
 java.util.logging.Logger.*getLogger*(Main.class.getName()).log(java.util.logging.Level.*SEVERE*, null, ex);  
 } catch (IllegalAccessException ex) {  
 java.util.logging.Logger.*getLogger*(Main.class.getName()).log(java.util.logging.Level.*SEVERE*, null, ex);  
 } catch (javax.swing.UnsupportedLookAndFeelException ex) {  
 java.util.logging.Logger.*getLogger*(Main.class.getName()).log(java.util.logging.Level.*SEVERE*, null, ex);  
 }  
 //</editor-fold>  
  
 /\* Create and display the form \*/  
 java.awt.EventQueue.*invokeLater*(new Runnable() {  
 public void run() {  
 new Main().setVisible(true);  
 }  
 });  
 }  
  
 */\*\*  
 \* This method is called from within the constructor to initialize the form.  
 \* WARNING: Do NOT modify this code. The content of this method is always  
 \* regenerated by the Form Editor.  
 \*/* @SuppressWarnings("unchecked")  
 // <editor-fold defaultstate="collapsed" desc="Generated Code">  
 private void initComponents() {  
  
 jScrollPane1 = new javax.swing.JScrollPane();  
 jTable1 = new javax.swing.JTable();  
 jScrollPane2 = new javax.swing.JScrollPane();  
 jTable2 = new javax.swing.JTable();  
 javax.swing.JPanel jPanel1 = new javax.swing.JPanel();  
 AddButton = new javax.swing.JButton();  
 DeleteButton = new javax.swing.JButton();  
 CalculateButton = new javax.swing.JButton();  
 ReadButton = new javax.swing.JButton();  
 ClearButton = new javax.swing.JButton();  
 javax.swing.JPanel jPanel2 = new javax.swing.JPanel();  
 UpperThreshold = new javax.swing.JTextField();  
 javax.swing.JLabel jLabel3 = new javax.swing.JLabel();  
 javax.swing.JLabel jLabel1 = new javax.swing.JLabel();  
 LowerThreshold = new javax.swing.JTextField();  
 javax.swing.JLabel jLabel2 = new javax.swing.JLabel();  
 Step = new javax.swing.JTextField();  
 javax.swing.JPanel jPanel3 = new javax.swing.JPanel();  
 jScrollPane3 = new javax.swing.JScrollPane();  
 MainTable = new javax.swing.JTable();  
  
 jTable1.setModel(new javax.swing.table.DefaultTableModel(  
 new Object[][]{  
 {null, null, null, null},  
 {null, null, null, null},  
 {null, null, null, null},  
 {null, null, null, null}  
 },  
 new String[]{  
 "Title 1", "Title 2", "Title 3", "Title 4"  
 }  
 ));  
 jScrollPane1.setViewportView(jTable1);  
  
 jTable2.setModel(new javax.swing.table.DefaultTableModel(  
 new Object[][]{  
 {null, null, null, null},  
 {null, null, null, null},  
 {null, null, null, null},  
 {null, null, null, null}  
 },  
 new String[]{  
 "Title 1", "Title 2", "Title 3", "Title 4"  
 }  
 ));  
 jScrollPane2.setViewportView(jTable2);  
  
 setDefaultCloseOperation(javax.swing.WindowConstants.*EXIT\_ON\_CLOSE*);  
 setTitle("counting 1/ln(x)");  
 setPreferredSize(new java.awt.Dimension(550, 430));  
  
 AddButton.setText("add");  
 AddButton.addMouseListener(new java.awt.event.MouseAdapter() {  
 public void mouseClicked(java.awt.event.MouseEvent evt) {  
 AddButtonMouseClicked(evt);  
 }  
 });  
 AddButton.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 AddButtonActionPerformed(evt);  
 }  
 });  
  
 DeleteButton.setText("delete");  
 DeleteButton.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 DeleteButtonActionPerformed(evt);  
 }  
 });  
  
 CalculateButton.setText("count");  
 CalculateButton.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 CalculateButtonActionPerformed(evt);  
 }  
 });  
  
 ReadButton.setText("memory");  
 ReadButton.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 ReadButtonActionPerformed(evt);  
 }  
 });  
  
 ClearButton.setText("clear");  
 ClearButton.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 ClearButtonActionPerformed(evt);  
 }  
 });  
  
 javax.swing.GroupLayout jPanel1Layout = new javax.swing.GroupLayout(jPanel1);  
 jPanel1.setLayout(jPanel1Layout);  
 jPanel1Layout.setHorizontalGroup(  
 jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(javax.swing.GroupLayout.Alignment.*TRAILING*, jPanel1Layout.createSequentialGroup()  
 .addContainerGap(73, Short.*MAX\_VALUE*)  
 .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*TRAILING*, false)  
 .addGroup(jPanel1Layout.createSequentialGroup()  
 .addComponent(ClearButton, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*)  
 .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.*UNRELATED*)  
 .addComponent(CalculateButton, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 103, javax.swing.GroupLayout.*PREFERRED\_SIZE*))  
 .addGroup(jPanel1Layout.createSequentialGroup()  
 .addComponent(ReadButton, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 72, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.*UNRELATED*)  
 .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addComponent(AddButton, javax.swing.GroupLayout.Alignment.*TRAILING*, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 103, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addComponent(DeleteButton, javax.swing.GroupLayout.Alignment.*TRAILING*, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 103, javax.swing.GroupLayout.*PREFERRED\_SIZE*))))  
 .addGap(20, 20, 20))  
 );  
 jPanel1Layout.setVerticalGroup(  
 jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(jPanel1Layout.createSequentialGroup()  
 .addGroup(jPanel1Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(jPanel1Layout.createSequentialGroup()  
 .addContainerGap()  
 .addComponent(AddButton, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addGap(13, 13, 13)  
 .addComponent(DeleteButton, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addGap(18, 18, 18)  
 .addComponent(CalculateButton, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*))  
 .addGroup(jPanel1Layout.createSequentialGroup()  
 .addGap(41, 41, 41)  
 .addComponent(ReadButton)  
 .addGap(27, 27, 27)  
 .addComponent(ClearButton)))  
 .addContainerGap(javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*))  
 );  
  
 UpperThreshold.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 UpperThresholdActionPerformed(evt);  
 }  
 });  
  
 jLabel3.setText("step");  
  
 jLabel1.setText("first num");  
  
 LowerThreshold.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 LowerThresholdActionPerformed(evt);  
 }  
 });  
  
 jLabel2.setText("second num");  
  
 Step.addActionListener(new java.awt.event.ActionListener() {  
 public void actionPerformed(java.awt.event.ActionEvent evt) {  
 StepActionPerformed(evt);  
 }  
 });  
  
 javax.swing.GroupLayout jPanel2Layout = new javax.swing.GroupLayout(jPanel2);  
 jPanel2.setLayout(jPanel2Layout);  
 jPanel2Layout.setHorizontalGroup(  
 jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(javax.swing.GroupLayout.Alignment.*TRAILING*, jPanel2Layout.createSequentialGroup()  
 .addGap(32, 32, 32)  
 .addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addComponent(jLabel2)  
 .addComponent(jLabel3)  
 .addComponent(jLabel1))  
 .addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(jPanel2Layout.createSequentialGroup()  
 .addGap(18, 18, 18)  
 .addComponent(LowerThreshold, javax.swing.GroupLayout.*DEFAULT\_SIZE*, 134, Short.*MAX\_VALUE*))  
 .addGroup(jPanel2Layout.createSequentialGroup()  
 .addGap(16, 16, 16)  
 .addComponent(UpperThreshold))  
 .addGroup(jPanel2Layout.createSequentialGroup()  
 .addGap(18, 18, 18)  
 .addComponent(Step)))  
 .addGap(48, 48, 48))  
 );  
 jPanel2Layout.setVerticalGroup(  
 jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(jPanel2Layout.createSequentialGroup()  
 .addGap(12, 12, 12)  
 .addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*BASELINE*)  
 .addComponent(UpperThreshold, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addComponent(jLabel1))  
 .addGap(18, 18, 18)  
 .addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*BASELINE*)  
 .addComponent(jLabel2)  
 .addComponent(LowerThreshold, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*))  
 .addGap(18, 18, 18)  
 .addGroup(jPanel2Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*BASELINE*)  
 .addComponent(Step, javax.swing.GroupLayout.*PREFERRED\_SIZE*, 34, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addComponent(jLabel3))  
 .addContainerGap(43, Short.*MAX\_VALUE*))  
 );  
  
 MainTable.setModel(new javax.swing.table.DefaultTableModel(  
 new Object[][]{  
  
 },  
 new String[]{  
 "first num", "second num", "step", "result"  
 }  
 ) {  
 final Class[] types = new Class[]{  
 java.lang.Integer.class, java.lang.Integer.class, java.lang.Float.class, java.lang.Double.class  
 };  
 final boolean[] canEdit = new boolean[]{  
 true, true, true, false  
 };  
  
 public Class getColumnClass(int columnIndex) {  
 return types[columnIndex];  
 }  
  
 public boolean isCellEditable(int rowIndex, int columnIndex) {  
 return canEdit[columnIndex];  
 }  
 });  
 MainTable.getTableHeader().setReorderingAllowed(false);  
 jScrollPane3.setViewportView(MainTable);  
 if (MainTable.getColumnModel().getColumnCount() > 0) {  
 MainTable.getColumnModel().getColumn(0).setResizable(false);  
 MainTable.getColumnModel().getColumn(1).setResizable(false);  
 MainTable.getColumnModel().getColumn(2).setResizable(false);  
 MainTable.getColumnModel().getColumn(3).setResizable(false);  
 }  
  
 javax.swing.GroupLayout jPanel3Layout = new javax.swing.GroupLayout(jPanel3);  
 jPanel3.setLayout(jPanel3Layout);  
 jPanel3Layout.setHorizontalGroup(  
 jPanel3Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addComponent(jScrollPane3)  
 );  
 jPanel3Layout.setVerticalGroup(  
 jPanel3Layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addComponent(jScrollPane3, javax.swing.GroupLayout.*DEFAULT\_SIZE*, 233, Short.*MAX\_VALUE*)  
 );  
  
 javax.swing.GroupLayout layout = new javax.swing.GroupLayout(getContentPane());  
 getContentPane().setLayout(layout);  
 layout.setHorizontalGroup(  
 layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(layout.createSequentialGroup()  
 .addComponent(jPanel2, javax.swing.GroupLayout.*PREFERRED\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*PREFERRED\_SIZE*)  
 .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.*RELATED*)  
 .addComponent(jPanel1, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*))  
 .addComponent(jPanel3, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*)  
 );  
 layout.setVerticalGroup(  
 layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*)  
 .addGroup(layout.createSequentialGroup()  
 .addGroup(layout.createParallelGroup(javax.swing.GroupLayout.Alignment.*LEADING*, false)  
 .addComponent(jPanel1, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*)  
 .addComponent(jPanel2, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*))  
 .addPreferredGap(javax.swing.LayoutStyle.ComponentPlacement.*RELATED*)  
 .addComponent(jPanel3, javax.swing.GroupLayout.*DEFAULT\_SIZE*, javax.swing.GroupLayout.*DEFAULT\_SIZE*, Short.*MAX\_VALUE*))  
 );  
  
 pack();  
 }// </editor-fold>  
  
 private void StepActionPerformed(java.awt.event.ActionEvent evt) {  
 // *TODO add your handling code here:* }  
  
 private void LowerThresholdActionPerformed(java.awt.event.ActionEvent evt) {  
 // *TODO add your handling code here:* }  
  
 private void UpperThresholdActionPerformed(java.awt.event.ActionEvent evt) {  
 // *TODO add your handling code here:* }  
  
 private void CalculateButtonActionPerformed(java.awt.event.ActionEvent evt) {  
 // *TODO add your handling code here:* DefaultTableModel module = (DefaultTableModel) MainTable.getModel();  
 FunctionIntegral funk = new FunctionIntegral();  
 Vector data = module.getDataVector();  
 for (int i = 0; i < data.size(); i++) {  
 Vector CurrentData = (Vector) data.get(i);  
 int j;  
 double result = 0;  
 int n = (int) (((int) CurrentData.get(1) - (int) CurrentData.get(0)) / (float) CurrentData.get(2));  
 for (j = 1; j <= n; j++)  
 result += funk.f((int) CurrentData.get(0) + j \* (float) CurrentData.get(2)) \* (float) CurrentData.get(2);  
  
 if (n \* (float) CurrentData.get(2) < (int) CurrentData.get(1) - (int) CurrentData.get(0)) {  
 float newstep = ((int) CurrentData.get(1) - (int) CurrentData.get(0)) - n \* (float) CurrentData.get(2);  
 result += funk.f((int) CurrentData.get(1) + newstep);  
 }  
 module.setValueAt(result, i, 3);  
  
 }  
 }  
  
 private void DeleteButtonActionPerformed(java.awt.event.ActionEvent evt) {  
 DefaultTableModel module = (DefaultTableModel) MainTable.getModel();  
 int SelectedRow = MainTable.getSelectedRow();  
 if (MainTable.getRowCount() != 0) {  
 if (SelectedRow == -1)  
 module.removeRow(MainTable.getRowCount() - 1);  
 else  
 module.removeRow(MainTable.getSelectedRow());  
 }  
 }  
  
 private void AddButtonActionPerformed(java.awt.event.ActionEvent evt) {  
 // *TODO add your handling code here:* DefaultTableModel module = (DefaultTableModel) MainTable.getModel();  
 String a = UpperThreshold.getText();  
 String b = LowerThreshold.getText();  
 String c = Step.getText();  
 if ("".equals(a) || "".equals(b) || "".equals(c))  
 *showMessageDialog*(null, "empty field");  
 else {  
 if ("0".equals(c)) {  
 *showMessageDialog*(null, "error");  
 return;  
 }  
 RecIntegral Node = new RecIntegral();  
 Node.addNode(Integer.*parseInt*(a), Integer.*parseInt*(b), Float.*parseFloat*(c));  
 module.addRow(new Object[]{Integer.*parseInt*(a), Integer.*parseInt*(b), Float.*parseFloat*(c), null});  
 OurArray.add(Node);  
  
 }  
 }  
  
 private void AddButtonMouseClicked(java.awt.event.MouseEvent evt) {  
  
 }  
  
 private void ClearButtonActionPerformed(java.awt.event.ActionEvent evt) {  
 DefaultTableModel module = (DefaultTableModel) MainTable.getModel();  
 while (MainTable.getRowCount() != 0)  
 module.removeRow(MainTable.getRowCount() - 1);  
 }  
  
 private void ReadButtonActionPerformed(java.awt.event.ActionEvent evt) {  
 DefaultTableModel module = (DefaultTableModel) MainTable.getModel();  
 for (int i = 0; i < OurArray.size(); i++) {  
 RecIntegral Node = OurArray.get(i);  
 module.addRow(new Object[]{Node.Top, Node.Lower, Node.Step, null});  
 }  
  
 }  
  
 class FunctionIntegral {  
 // {Функция, площадь которой нужно вычислить}  
 public double f(double x) {  
 double F = 1 / Math.*log*(x);  
 return F;  
  
 }  
 }  
  
 class RecIntegral {  
 public int Lower, Top;  
 public float Step;  
  
 public void addNode(int top, int lower, float c) {  
 Step = c;  
 Lower = lower;  
 Top = top;  
 }  
 }  
  
 class CollectionList {  
 public ArrayList collectionarray;  
  
 public void addNewNode(Object element) {  
 collectionarray.add(element);  
 }  
 }  
 // End of variables declaration  
}

**Вывод:** научились разрабатывать приложения, обладающие графическим интерфейсом пользователя, с использованием библиотеки Swing. Выявили, что размер шага влияет на точность результата, а именно: чем меньше шаг, тем точнее результат