```java
//Written By: Evan Williams
//For CSE-271 Lab 8
//Due 3/27/22
import java.awt.BorderLayout;
import java.awt.ComponentOrientation;
import java.awt.Container;
import java.awt.FlowLayout;
import java.awt.GridLayout;
import java.awt.event.ActionEvent;
import java.awt.event.ActionListener;
import java.io.File;
import java.io.FileNotFoundException;
import java.io.FileWriter;
import java.io.IOException;
import java.io.PrintWriter;
import java.util.ArrayList;
import java.util.Scanner;
import javax.swing.JButton;
import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JMenu;
import javax.swing.JMenuBar;
import javax.swing.JMenuItem;
import javax.swing.JPanel;
import javax.swing.JScrollPane;
import javax.swing.JTextArea;
import javax.swing.JTextField;
import javax.swing.border.TitledBorder;

public class AddressBook extends JFrame {

      private final int FRAME_WIDTH = 630;
      private final int FRAME_HEIGHT = 520;
      private JPanel panel;
      private JPanel textPanel;
      private JPanel output;
      private JButton addContact;
      private JButton saveToFile;
      private JTextField name;
      private JTextField address;
      private JTextField phone;
      private JTextField email;
      private JTextArea area;
      private JLabel nameLabel;
      private JLabel addressLabel;
      private JLabel phoneLabel;
      private JLabel emailLabel;

      private ArrayList<String> contacts = new ArrayList<String>();

      /**
       * Constructor for the AddressBook class
       */
      public AddressBook() {
            constructDisplay();
      }

      /**
```

```
       * This methods purpose is to write to the file we read from to append the
list
       * of contacts with any new ones that were added with the program/GUI
       */
      public void writeContactsToFile() {
            FileWriter fw = null;
            PrintWriter pw = null;
            try {
                  fw = new FileWriter("contacts.txt");
                  pw = new PrintWriter(fw, true);

                  for (String s : contacts) {
                        pw.println(s);
                  }
            } catch (IOException e1) {
                  e1.printStackTrace();
            } finally {
                  try {
                        fw.close();
                        pw.close();
                  } catch (Exception e) {
                        e.printStackTrace();
                  }
            }
      }

      /**
       * This methods purpose is to read from the text file contacts.txt it then
takes
       * the contents of the file and puts them into an arraylist of
       * addresses/contacts then also appends the JTextField to display its
contents
       * on the GUI
       */
      public void readContactsFromFile() {
            Scanner in = null;
            try {
                  in = new Scanner(new File("contacts.txt"));
                  while (in.hasNextLine()) {
                        String input = in.nextLine();
                        area.append(input + "\n");
                        contacts.add(input);
                  }
            } catch (IOException e) {
                  e.printStackTrace();
            } finally {
                  try {
                        in.close();
                  } catch (Exception e) {
                        e.printStackTrace();
                  }
            }
      }

      /**
       * This methods purpose is to create the display that is being put into the
GUI
       * takes no inputs and when it is finished executing it should have a
       * constructed GUI in a window with functioning features that includes
       * textFields, functioning buttons, and a textArea that displays text
       */
      public void constructDisplay() {
            Container container = getContentPane();
            textPanel = new JPanel();
            textPanel.setLayout(new FlowLayout(6, 10, 10));
            nameLabel = new JLabel("     Name:  ");
            name = new JTextField(55);
            addressLabel = new JLabel("Address:   ");
            address = new JTextField(55);
            phoneLabel = new JLabel("    Phone:  ");
            phone = new JTextField(55);
            emailLabel = new JLabel("     Email:  ");
            email = new JTextField(55);
            area = new JTextArea(20, 50);
            JScrollPane pane = new JScrollPane(area);
            area.setEditable(false);

            addContact = new JButton("Add Contact");
            addContact.addActionListener(new ActionListener() {
                  /**
                   * recognized that the button is clicked and then takes the text
from text
                   * fields and constructs a String that is then appended into the
JTextArea
                   *
                   * @param e
                   */
                  @Override
                  public void actionPerformed(ActionEvent e) {
                        String out = (name.getText() + ", " + address.getText() +
", " + phone.getText() + ", "
                                    + email.getText());
                        contacts.add(out);
                        area.append(out + "\n");
                  }
            });
            saveToFile = new JButton("Saves to File");
            saveToFile.addActionListener(new ActionListener() {
                  /**
                   * recognized that the button is clicked and then writes what is
in the
                   * JTextArea into the contacts.txt file
                   *
                   * @param e
                   */
                  @Override
                  public void actionPerformed(ActionEvent e) {
                        writeContactsToFile();
                  }
            });

            textPanel.add(nameLabel, 0);
            textPanel.add(name, 1);
            textPanel.add(addressLabel, 2);
            textPanel.add(address, 3);
            textPanel.add(phoneLabel, 4);
            textPanel.add(phone, 5);
            textPanel.add(emailLabel, 6);
            textPanel.add(email, 7);

            output = new JPanel();
            readContactsFromFile();
            output.add(addContact);
            output.add(saveToFile);
            output.add(pane);
            container.setLayout(new BorderLayout(10, 10));
            container.add(textPanel, BorderLayout.CENTER);
            container.add(output, BorderLayout.SOUTH);
            setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
            setTitle("Address Book");
            setSize(FRAME_WIDTH, FRAME_HEIGHT);
      }
}
```