```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * AuthorPane.java
 */

package code;


public class AuthorPane extends LabelPane {

  public static final String AUTHOR_TEXT = "Program Author: Grant Broadwater
   (grbcp5)";

  public AuthorPane() {
    super(AuthorPane.AUTHOR_TEXT);
  }

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonMenu.java
 */

package code;

import javafx.scene.control.Button;
import javafx.scene.layout.HBox;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.layout.Priority;
import javafx.geometry.Insets;

public class ButtonMenu extends HBox {


  public static final double DEFAULT_SPACING = 20.0;


  public ButtonMenu() {
    this(ButtonMenu.DEFAULT_SPACING);
  }


  public ButtonMenu(double spacing) {
    this(null, new String[0]);
  }


  public ButtonMenu(EventHandler<ActionEvent> handler, String... buttonTitles)
   {
    this(ButtonMenu.DEFAULT_SPACING, handler, buttonTitles);
  }


  public ButtonMenu(double spacing, EventHandler<ActionEvent> handler,
   String... buttonTitles) {
    super(spacing);

    this.setPadding(new Insets(10, 10, 10, 10));

    this.setButtons(handler, buttonTitles);
  }
```

```
  public void setButtons(EventHandler<ActionEvent> handler, String...
   buttonTitles) {
    this.removeAllButtons();

    for(int i = 0; i < buttonTitles.length; i++) {
      this.addButton(handler, buttonTitles[i]);
    }
  }


  public void addButton(EventHandler<ActionEvent> handler, String buttonTitle)
   {
      Button b = new Button(buttonTitle);
      b.setOnAction(handler);
      b.setMaxWidth(Double.MAX_VALUE);
      HBox.setHgrow(b, Priority.ALWAYS);
      this.getChildren().add(b);
  }


  public void removeAllButtons() {
    this.getChildren().removeAll();
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentController.java
 */

package code;

import javafx.scene.layout.BorderPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.Button;


public class ButtonSegmentController extends BorderPane implements
 EventHandler<ActionEvent> {


  private ButtonMenu buttonMenu;
  private ButtonSegmentControllerDataSource dataSource;


  public ButtonSegmentController(ButtonSegmentControllerDataSource dataSource)
   {
    super();

    this.buttonMenu = new ButtonMenu();
    this.dataSource = dataSource;

    this.setTop(this.buttonMenu);

    this.reloadData();
  }


  public void reloadData() {

    this.buttonMenu.removeAllButtons();

    for(int i = 0; i < this.dataSource.getNumberOfSegments(); i++) {
      this.buttonMenu.addButton(
        this,
        this.dataSource.getTitleForSegment(i)
      );
    }

    if(this.dataSource.getNumberOfSegments() > 0) {
      this.setCenter(
```

```
        this.dataSource.getPaneForSegment(
          this.dataSource.getTitleForSegment(0)
        )
      );
    }
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    String senderTitle = ((Button)actionEvent.getSource()).getText();

    this.setCenter(this.dataSource.getPaneForSegment(senderTitle));
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentController.java
 */

package code;

import javafx.scene.layout.BorderPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.Button;


public class ButtonSegmentController extends BorderPane implements
 EventHandler<ActionEvent> {


  private ButtonMenu buttonMenu;
  private ButtonSegmentControllerDataSource dataSource;


  public ButtonSegmentController(ButtonSegmentControllerDataSource dataSource)
   {
    super();

    this.buttonMenu = new ButtonMenu();
    this.dataSource = dataSource;

    this.setTop(this.buttonMenu);

    this.reloadData();
  }


  public void reloadData() {

    this.buttonMenu.removeAllButtons();

    for(int i = 0; i < this.dataSource.getNumberOfSegments(); i++) {
      this.buttonMenu.addButton(
        this,
        this.dataSource.getTitleForSegment(i)
      );
    }

    if(this.dataSource.getNumberOfSegments() > 0) {
      this.setCenter(
```

```
        this.dataSource.getPaneForSegment(
          this.dataSource.getTitleForSegment(0)
        )
      );
    }
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    String senderTitle = ((Button)actionEvent.getSource()).getText();

    this.setCenter(this.dataSource.getPaneForSegment(senderTitle));
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentControllerDataSource.java
 */

package code;

import javafx.scene.layout.Pane;

interface ButtonSegmentControllerDataSource {

  public int getNumberOfSegments();
  public String getTitleForSegment(int segmentIndex);
  public Pane getPaneForSegment(String segmentTitle);

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataModel.java
 */

package code;

import java.util.Scanner;
import java.io.File;
import java.io.FileNotFoundException;
import java.util.LinkedList;

public class CircleDataModel {

  private DemoCircle circle1;
  private DemoCircle circle2;

  private DemoCircle[][] testCases;

  public CircleDataModel() {
    this.circle1 = new DemoCircle(50, 50, 10);
    this.circle2 = new DemoCircle(100, 50, 10);

    this.testCases = this.getTestCasesFromFile();
  }

  private DemoCircle[][] getTestCasesFromFile() {
    LinkedList<DemoCircle[]> result = new LinkedList<DemoCircle[]>();;
    Scanner fileScanner;
    Scanner strScanner;

    try {
      fileScanner = new Scanner(new File("data.txt"));
    } catch(FileNotFoundException e) {
      try {
        fileScanner = new Scanner(new File("data/data.txt"));
      } catch(FileNotFoundException f) {
        try {
          fileScanner = new Scanner(new File("data/inFile.txt"));
        } catch(FileNotFoundException g) {
          return new DemoCircle[0][0];
        }
      }
    }


    while(fileScanner.hasNextLine()) {
```

```
    DemoCircle[] newTestCase = new DemoCircle[2];
    strScanner = new Scanner(fileScanner.nextLine());
    newTestCase[0] = readCircleFromScanner(strScanner);
    newTestCase[1] = readCircleFromScanner(strScanner);
    result.addLast(newTestCase);
  }

  return result.toArray(new DemoCircle[result.size()][2]);
}


private DemoCircle readCircleFromScanner(Scanner circleScanner) {
  return new DemoCircle(
    Double.parseDouble(circleScanner.next().replace(",", "")),
    Double.parseDouble(circleScanner.next().replace(",", "")),
    Double.parseDouble(circleScanner.next().replace(",", ""))
  );
}


public void setCircleData(String circleData) {
  Scanner circleScanner = new Scanner(circleData);

  this.circle1 = readCircleFromScanner(circleScanner);
  this.circle2 = readCircleFromScanner(circleScanner);
}


public void setCircleData(DemoCircle[] circleData) {
  this.circle1 = circleData[0];
  this.circle2 = circleData[1];
}


public int getNumTestCases() {
  return this.testCases.length;
}


public DemoCircle[] getTestCase(int testCaseIdx) {
  if (0 <= testCaseIdx && testCaseIdx < this.getNumTestCases()) {
    return this.testCases[testCaseIdx];
  }
  return null;
}


public javafx.scene.shape.Circle getCircle1() {
  return this.circle1;
}
```

```
  public javafx.scene.shape.Circle getCircle2() {
    return this.circle2;
  }


  public String getCircleRelationship() {

    if (this.circle1.equals(circle2)) {
      return "Circles are identical.";
    } else if (this.circle1.isInside(this.circle2)) {
      if(this.circle1.isInternallyTouching(this.circle2)) {
        return "C1 is inside of and touching C2.";
      } else {
        return "C1 is inside of but not touching C2.";
      }
    } else if (this.circle2.isInside(this.circle1)) {
      if(this.circle2.isInternallyTouching(this.circle1)) {
        return "C2 is inside of and touching C1.";
      } else {
        return "C2 is inside of but not touching C1.";
      }
    } else if (this.circle1.isOutside(this.circle2)) {
      if(this.circle1.isExternallyTouching(this.circle2)) {
        return "C1 is outside of and touching C2.";
      } else {
        return "C1 is outside of but not touching C2.";
      }
    }else {
      return "Circles properly overlap.";
    }
  }


  public String toString() {
    return this.circle1.getCenterX()
            + " " + this.circle1.getCenterY()
            + " " + this.circle1.getRadius()
            + " " + this.circle2.getCenterX()
            + " " + this.circle2.getCenterY()
            + " " + this.circle2.getRadius();
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataPane.java
 */

package code;


import javafx.scene.layout.VBox;
import javafx.scene.control.Label;
import javafx.scene.control.TextField;
import javafx.scene.control.Button;
import javafx.scene.control.ToggleGroup;
import javafx.scene.control.RadioButton;
import javafx.geometry.Insets;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.paint.Color;
import javafx.beans.value.ChangeListener;
import javafx.beans.value.ObservableValue;
import javafx.scene.control.Toggle;


public class CircleDataPane extends VBox implements EventHandler<ActionEvent>,
 ChangeListener<Toggle> {

  public static final double DEFAULT_SPACING = 20;

  private CircleDataModel circleDataModel;

  private EventHandler<ActionEvent> parent;

  private Label lbl_circlesData;
  private TextField tf_circlesData;
  private Button btn_submitChanges;

  private ToggleGroup group;

  private Label lbl_circle1;
  private Label lbl_circle2;

  public CircleDataPane(EventHandler<ActionEvent> parent) {
    super(CircleDataPane.DEFAULT_SPACING);

    this.parent = parent;
    this.circleDataModel = new CircleDataModel();
```

```
  this.setPrefWidth(300);
  this.setPadding(new Insets(10, 30, 50, 20));

  this.lbl_circlesData = new Label("Circles Data:");
  this.tf_circlesData = new TextField();
  this.tf_circlesData.setOnAction(this);
  this.btn_submitChanges = new Button("Submit Changes");
  this.btn_submitChanges.setOnAction(this);
  this.getChildren().addAll(this.lbl_circlesData, this.tf_circlesData,
   this.btn_submitChanges);

  this.group = new ToggleGroup();
  for(int i = 0; i < this.circleDataModel.getNumTestCases(); i++) {
    RadioButton rb = new RadioButton("Test Case " + (i + 1));
    rb.setToggleGroup(group);
    rb.setUserData(i);
    this.getChildren().add(rb);
  }
  group.selectedTogglePropery().addListener(this);

  this.lbl_circle1 = new Label("Circle 1:\n");
  this.lbl_circle1.setTextFill(Color.RED);
  this.lbl_circle2 = new Label("Circle 2:\n");
  this.lbl_circle2.setTextFill(Color.BLUE);
  this.getChildren().addAll(this.lbl_circle1, this.lbl_circle2);

  this.updateUI();
}


@Override
public void handle(ActionEvent actionEvent) {
  circleDataModel.setCircleData(this.tf_circlesData.getText());
  this.updateUI();

  parent.handle(actionEvent);
}

@Override
public void changed(
    ObservableValue<? extends Toggle> ov,
    Toggle old_toggle,
    Toggle new_toggle
  ) {

  if (group.getSelectedToggle() != null) {
    int idx = (Integer)group.getSelectedToggle().getUserData();

     this.circleDataModel.setCircleData(this.circleDataModel.getTestCase(idx)
     );
    this.updateUI();
```

```
      parent.handle(null);
    }
  }


  public void updateUI() {

    this.tf_circlesData.setText(this.circleDataModel.toString());

    this.lbl_circle1.setText("Circle 1:\n" +
     this.circleDataModel.getCircle1().toString());
    this.lbl_circle2.setText("Circle 2:\n" +
     this.circleDataModel.getCircle2().toString());

    this.lbl_circlesData.setText(this.circleDataModel.getCircleRelationship());
  }


  public CircleDataModel getModel() {
    return this.circleDataModel;
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataScrollPane.java
 */

package code;

import javafx.scene.control.ScrollPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.ScrollPane.ScrollBarPolicy;


public class CircleDataScrollPane extends ScrollPane {

  private CircleDataPane pane;

  public CircleDataScrollPane(EventHandler<ActionEvent> parent) {
    this.pane = new CircleDataPane(parent);
    this.setContent(this.pane);
    this.setHbarPolicy(ScrollBarPolicy.NEVER);
  }


  public CircleDataPane getPane() {
    return this.pane;
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * Demo.java
 */

package code;


import javafx.application.Application;
import javafx.scene.Scene;
import javafx.scene.layout.Pane;
import javafx.stage.Stage;


public class Circles extends Application implements
 ButtonSegmentControllerDataSource {

  public static final String AUTHOR_MENU_OPTION = "Author";
  public static final String PROBLEM_MENU_OPTION = "Problem";
  public static final String REFERENCE_MENU_OPTION = "Reference";
  public static final String DEMOS_MENU_OPTION = "Demos";
  public static final String[] MENU_OPTION_TITLES = {
    Demo.AUTHOR_MENU_OPTION,
    Demo.PROBLEM_MENU_OPTION,
    Demo.REFERENCE_MENU_OPTION,
    Demo.DEMOS_MENU_OPTION,
  };

  private ButtonSegmentController segmentController;
  private AuthorPane authorPane;
  private ProblemPane problemPane;
  private ReferencePane referencePane;
  private DemosPane demosPane;


  public static void main(String[] args) {

    System.out.println("CS5405");
    System.out.println("Homework 05");
    System.out.println("Grant Broadwater");
    System.out.println("October 16, 2018");
    System.out.println();

    System.out.println("Starting application.");
    Demo.launch(args);
    System.out.println("Terminating application.");
```

```
  }


  public void start(Stage primaryStage) {

    this.authorPane = new AuthorPane();
    this.problemPane = new ProblemPane();
    this.referencePane = new ReferencePane();
    this.demosPane = new DemosPane();
    this.segmentController = new ButtonSegmentController(this);

    Scene scene = new Scene(this.segmentController, 750, 600);
    primaryStage.setTitle("Homework 05");
    primaryStage.setScene(scene);
    primaryStage.show();
  }


  public int getNumberOfSegments() {
    return Demo.MENU_OPTION_TITLES.length;
  }


  public String getTitleForSegment(int segmentIndex) {
    return Demo.MENU_OPTION_TITLES[segmentIndex];
  }


  public Pane getPaneForSegment(String segmentTitle) {
    if (segmentTitle.equals(Demo.AUTHOR_MENU_OPTION)) {
      return this.authorPane;
    } else if (segmentTitle.equals(Demo.PROBLEM_MENU_OPTION)) {
      return this.problemPane;
    } else if (segmentTitle.equals(Demo.REFERENCE_MENU_OPTION)) {
      return this.referencePane;
    } else if (segmentTitle.equals(Demo.DEMOS_MENU_OPTION)) {
      return this.demosPane;
    } else {
      return null;
    }
  }
}
```

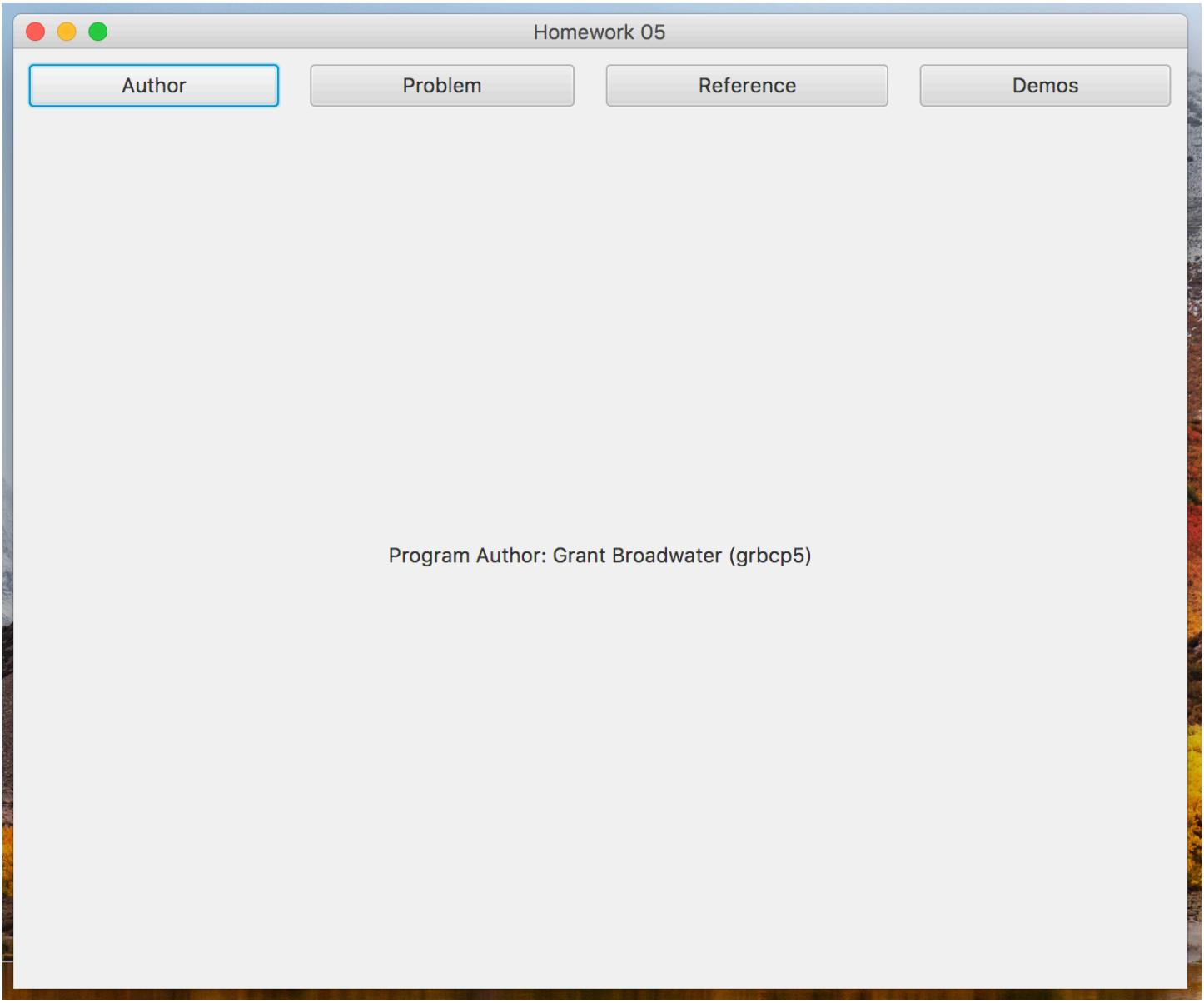
```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * DemosPane.java
 */

package code;


import javafx.scene.layout.BorderPane;
import javafx.scene.layout.Pane;
import javafx.scene.shape.Circle;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.paint.Color;


public class DemosPane extends BorderPane implements EventHandler<ActionEvent>
 {

  private CircleDataScrollPane circleDataPane;

  private Pane circlePane;
  private Circle c1;
  private Circle c2;

  public DemosPane() {
    super();

    this.circleDataPane = new CircleDataScrollPane(this);
    this.setLeft(this.circleDataPane);

    this.updateUI();
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    this.updateUI();
  }


  public void updateUI() {

    this.circlePane = new Pane();
    this.circlePane.setStyle("-fx-border-color: black");
    this.c1 = circleDataPane.getPane().getModel().getCircle1();
    this.c2 = circleDataPane.getPane().getModel().getCircle2();
```

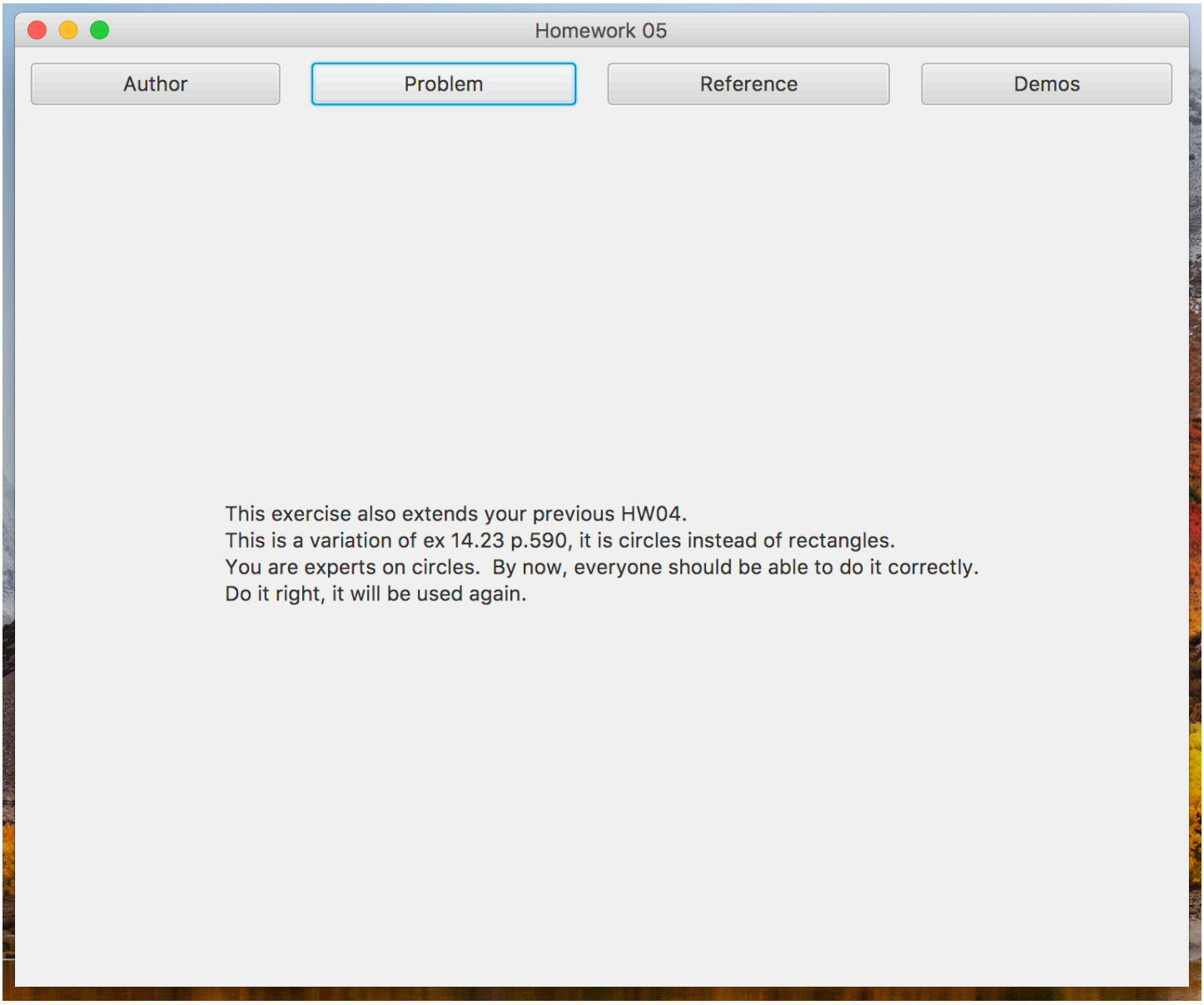
```
    this.c1.setFill(new Color(1.0, 0.0, 0.0, 0.5));
    this.c1.setStroke(Color.RED);
    this.c2.setFill(new Color(0.0, 0.0, 1.0, 0.5));
    this.c2.setStroke(Color.BLUE);

    this.circlePane.getChildren().add(this.c1);
    this.circlePane.getChildren().add(this.c2);

    this.setCenter(circlePane);
  }
}
```

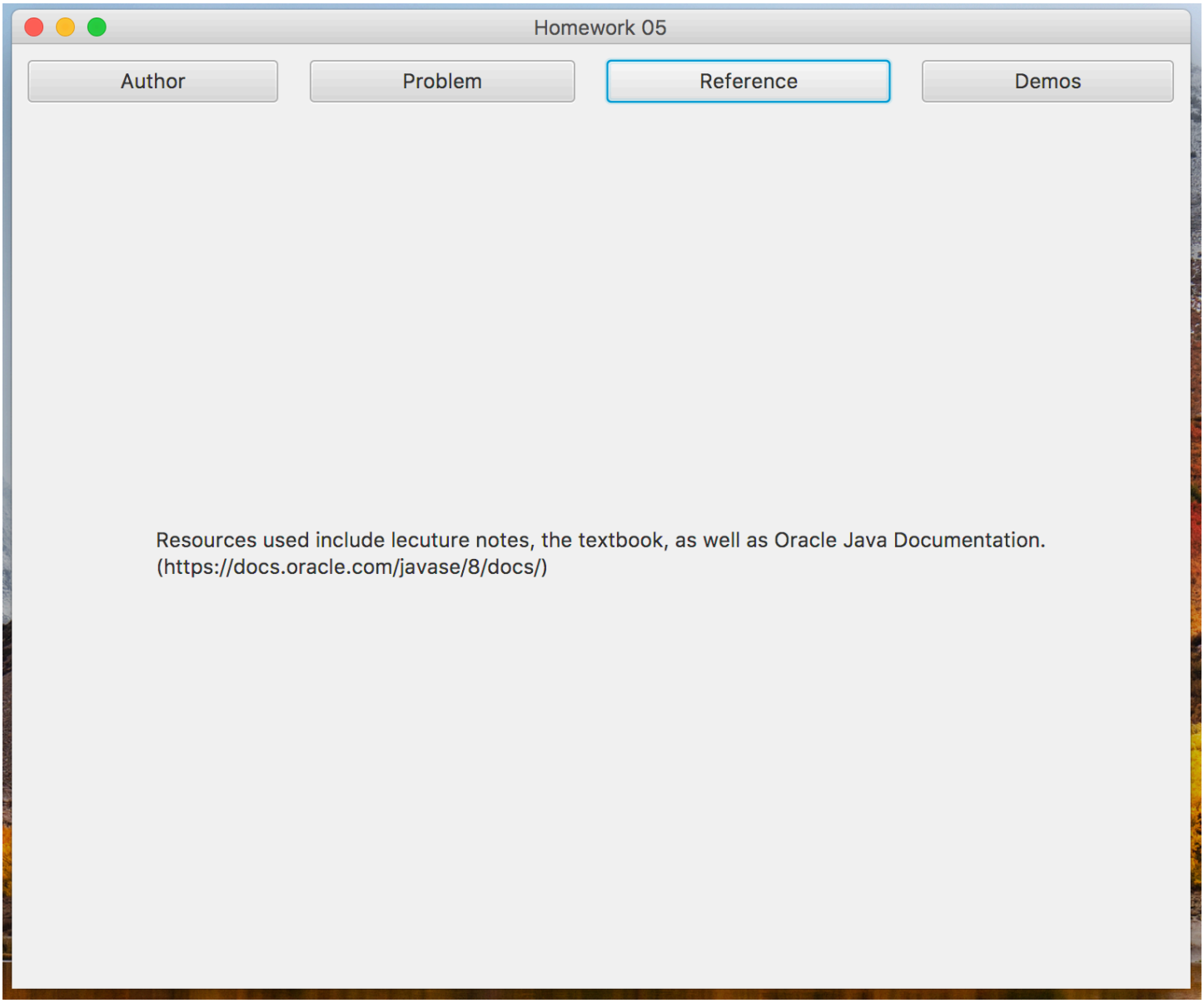
```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * LabelPane.java
 */

package code;

import javafx.scene.layout.StackPane;
import javafx.scene.control.Label;


public class LabelPane extends StackPane {

  private Label primaryLabel;

  public LabelPane(String labelText) {
    super();

    this.primaryLabel = new Label(labelText);
    this.getChildren().add(this.primaryLabel);
  }

}
```

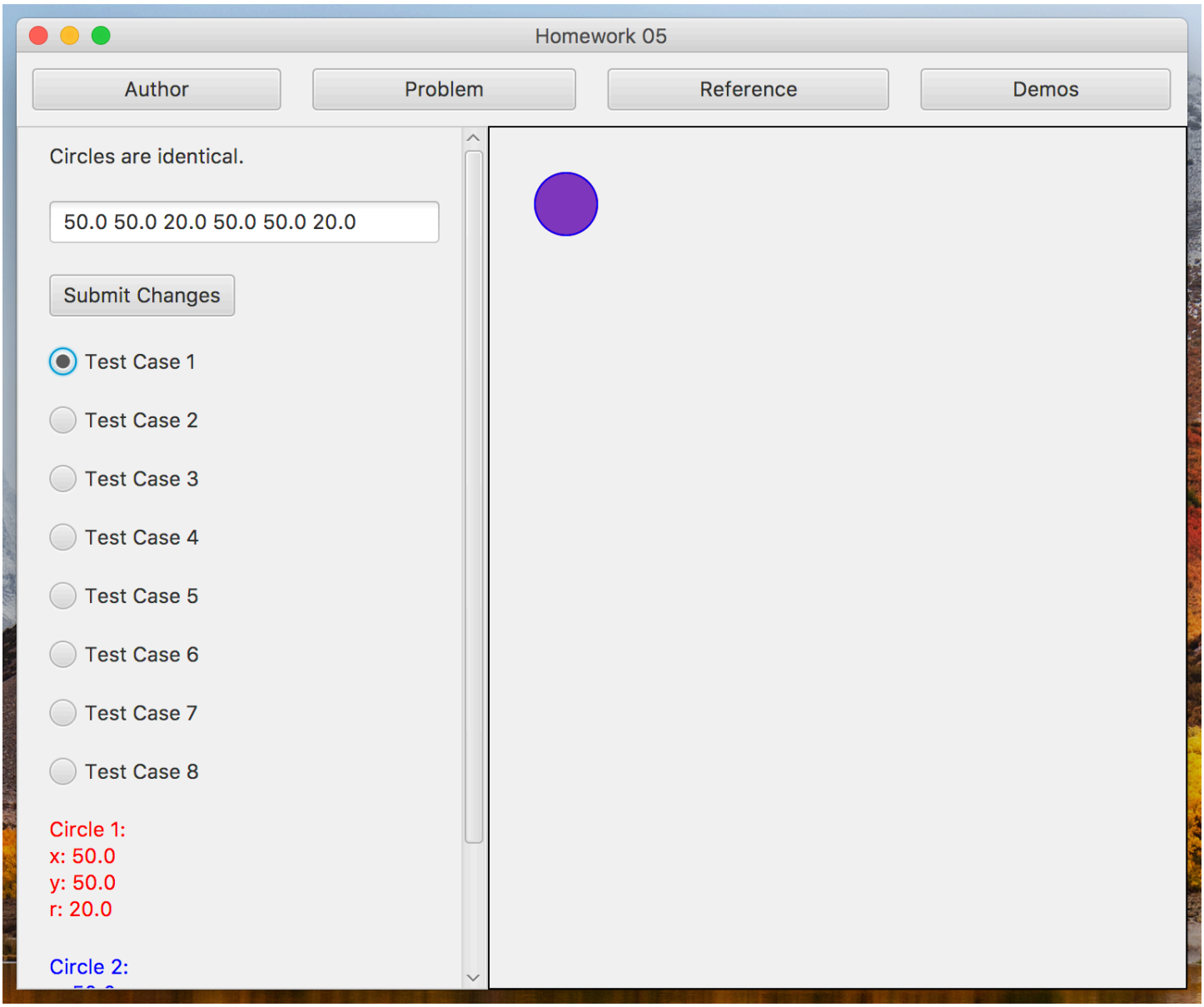
```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ProblemPane.java
 */

package code;


public class ProblemPane extends LabelPane {

  public static final String PROBLEM_TEXT = "This exercise also extends your
   previous HW04."
    + "\nThis is a variation of ex 14.23 p.590, it is circles instead of
     rectangles."
    + "\nYou are experts on circles.  By now, everyone should be able to do it
     correctly."
    + "\nDo it right, it will be used again.";

  public ProblemPane() {
    super(ProblemPane.PROBLEM_TEXT);
  }

}
```

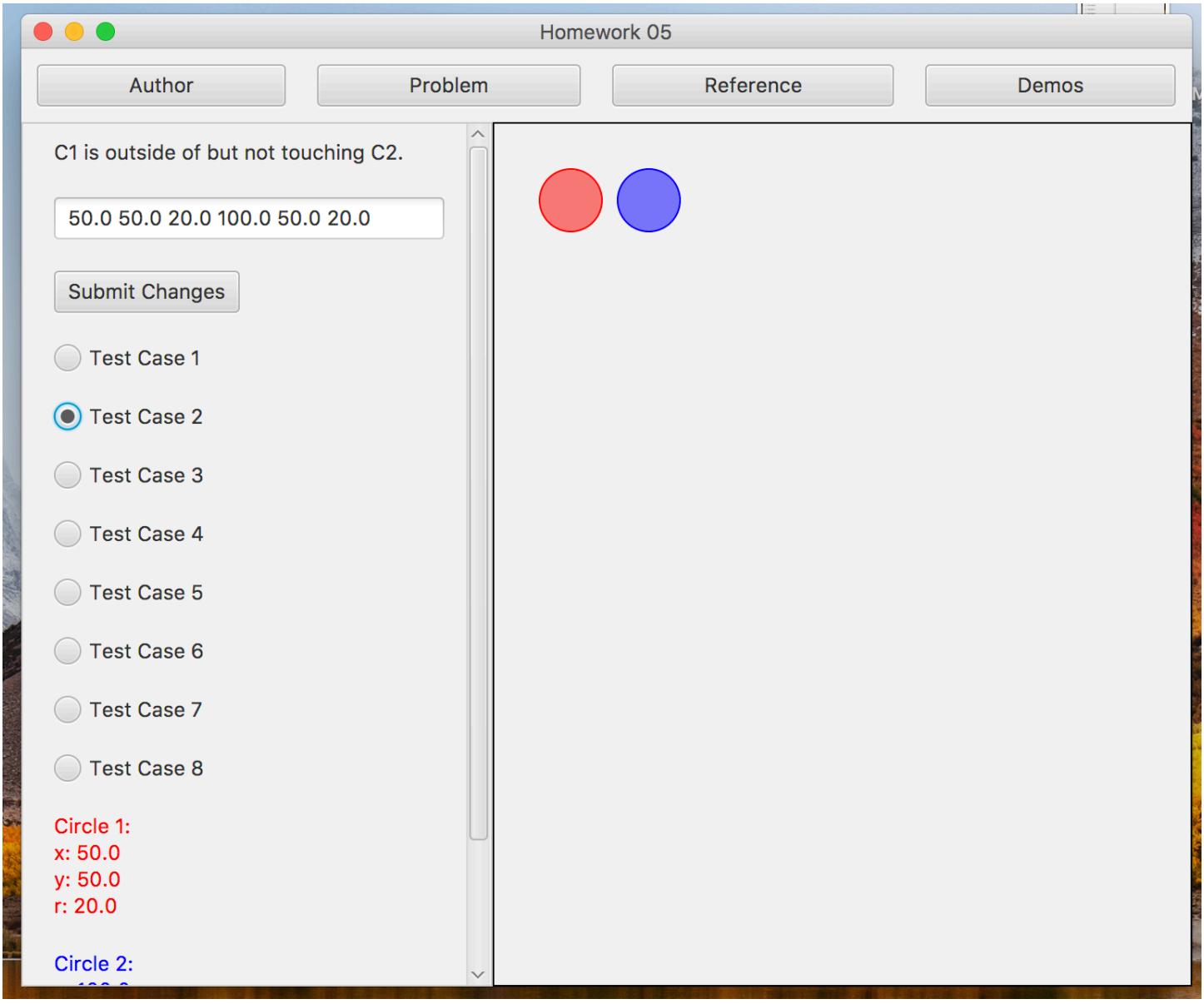
```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ReferencePane.java
 */

package code;


public class ReferencePane extends LabelPane {

  public static final String REFERENCE_TEXT
    = "Resources used include lecuture notes, the textbook, as well as Oracle
     Java Documentation.\n(https://docs.oracle.com/javase/8/docs/)";

  public ReferencePane() {
    super(ReferencePane.REFERENCE_TEXT);
  }

}
```

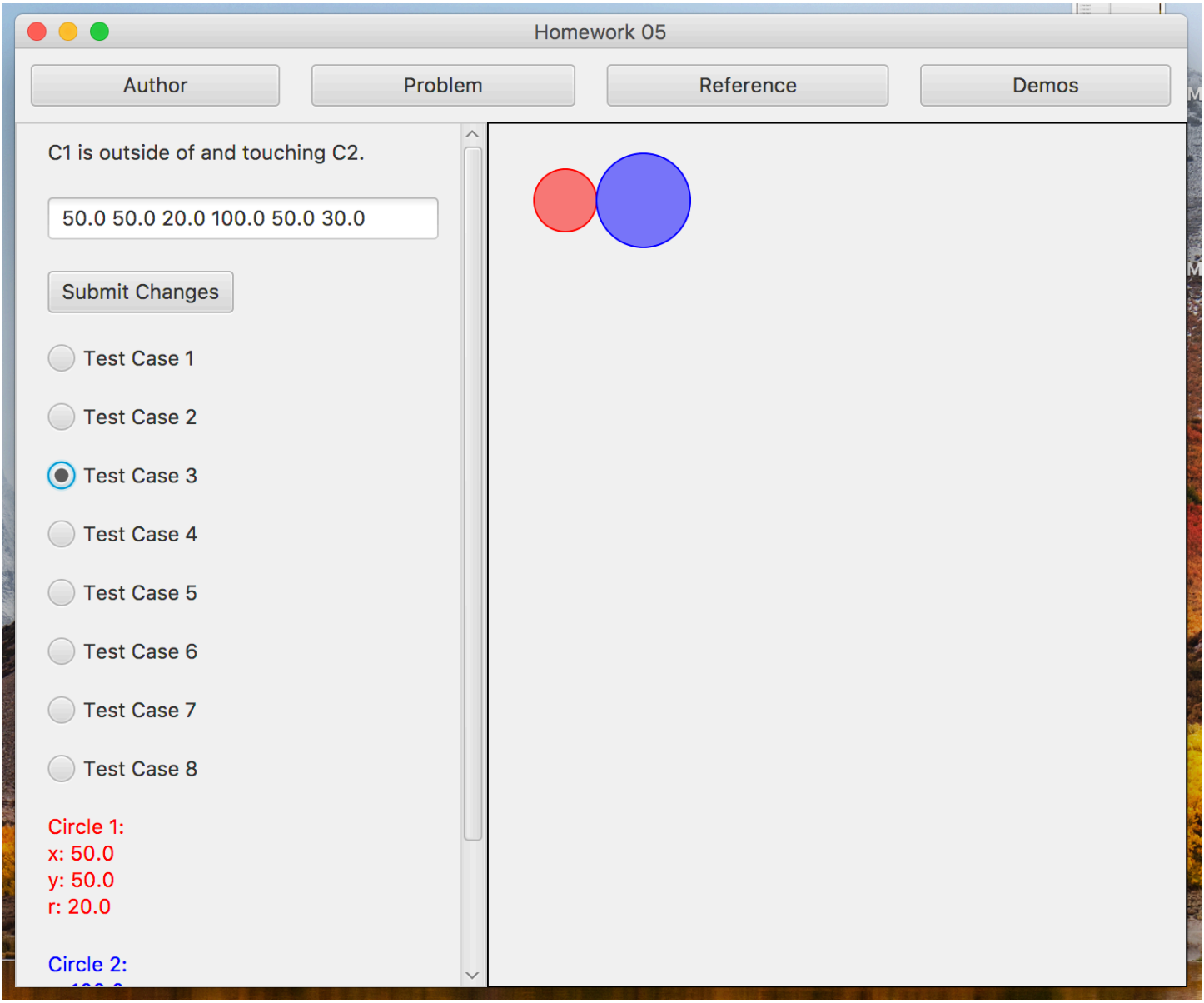

Homework 05
Author
Problem
Reference
Demos
Program Author: Grant Broadwater (grbcp5)

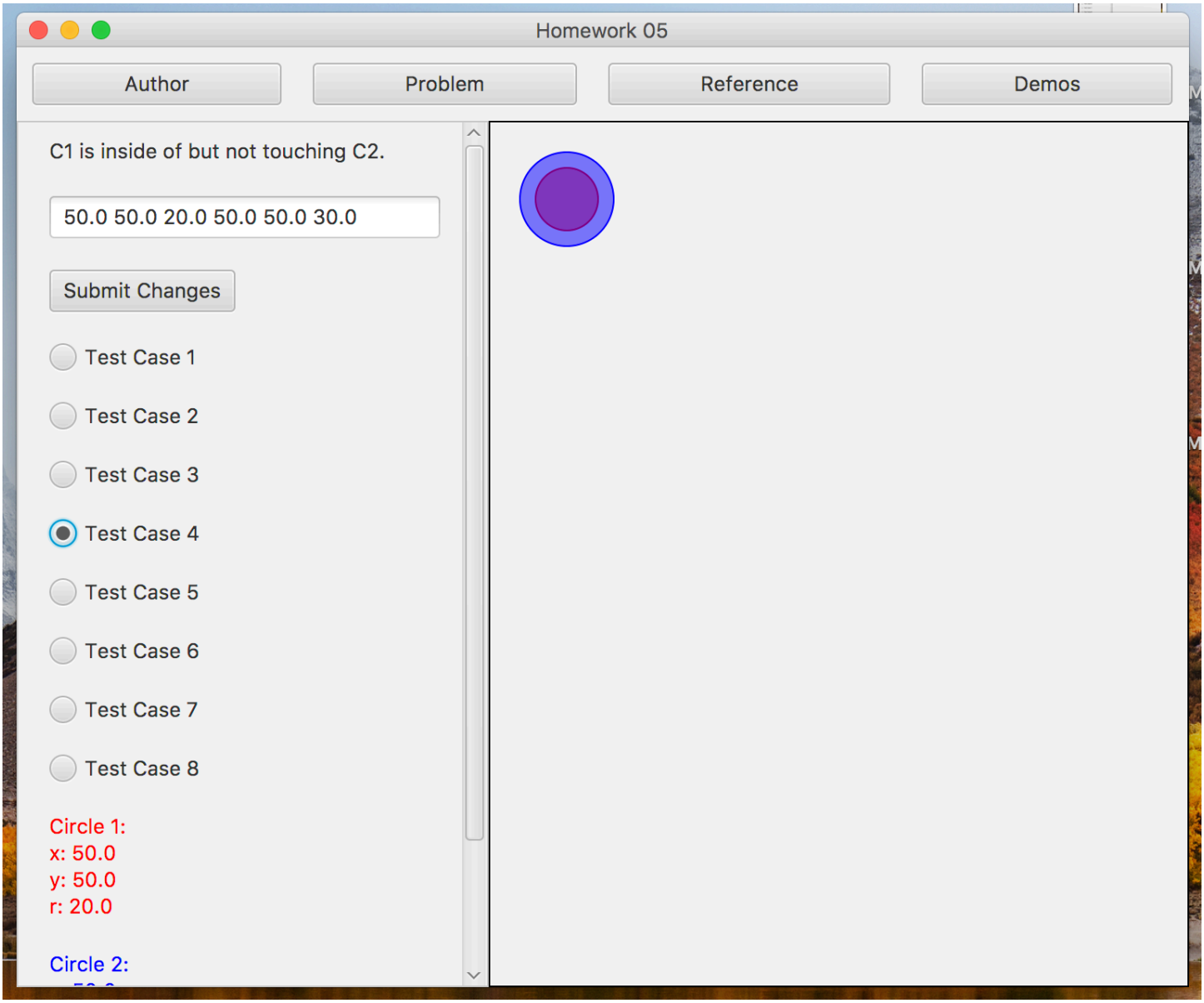

Homework 05
Author
Problem
Reference
Demos
This exercise also extends your previous HW04.
This is a variation of ex 14.23 p.590, it is circles instead of rectangles.
You are experts on circles. By now, everyone should be able to do it correctly.
Do it right, it will be used again.

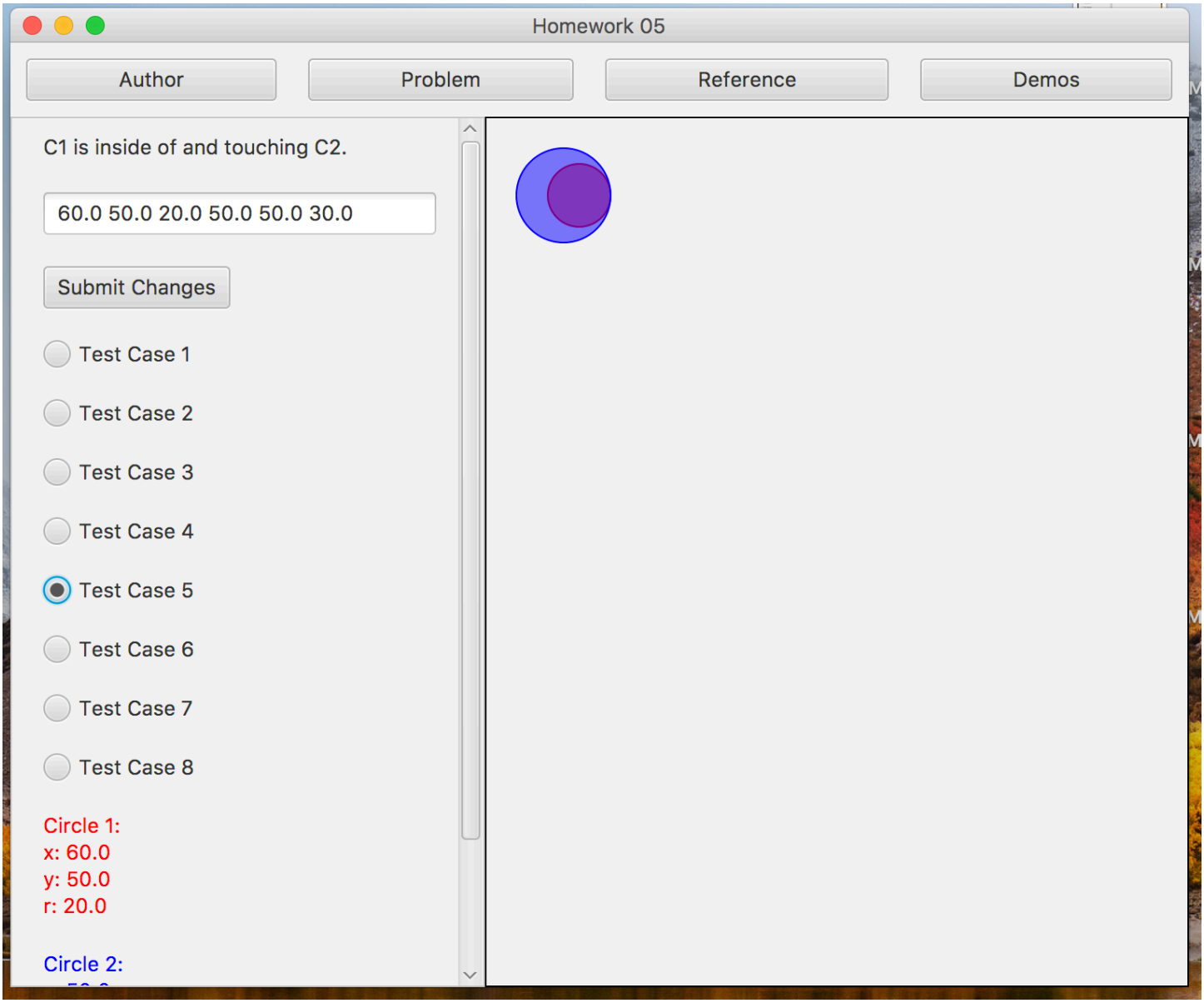

Homework 05
Author
Problem
Reference
Demos
Resources used include lecuture notes, the textbook, as well as Oracle Java Documentation.
(https://docs.oracle.com/javase/8/docs/)

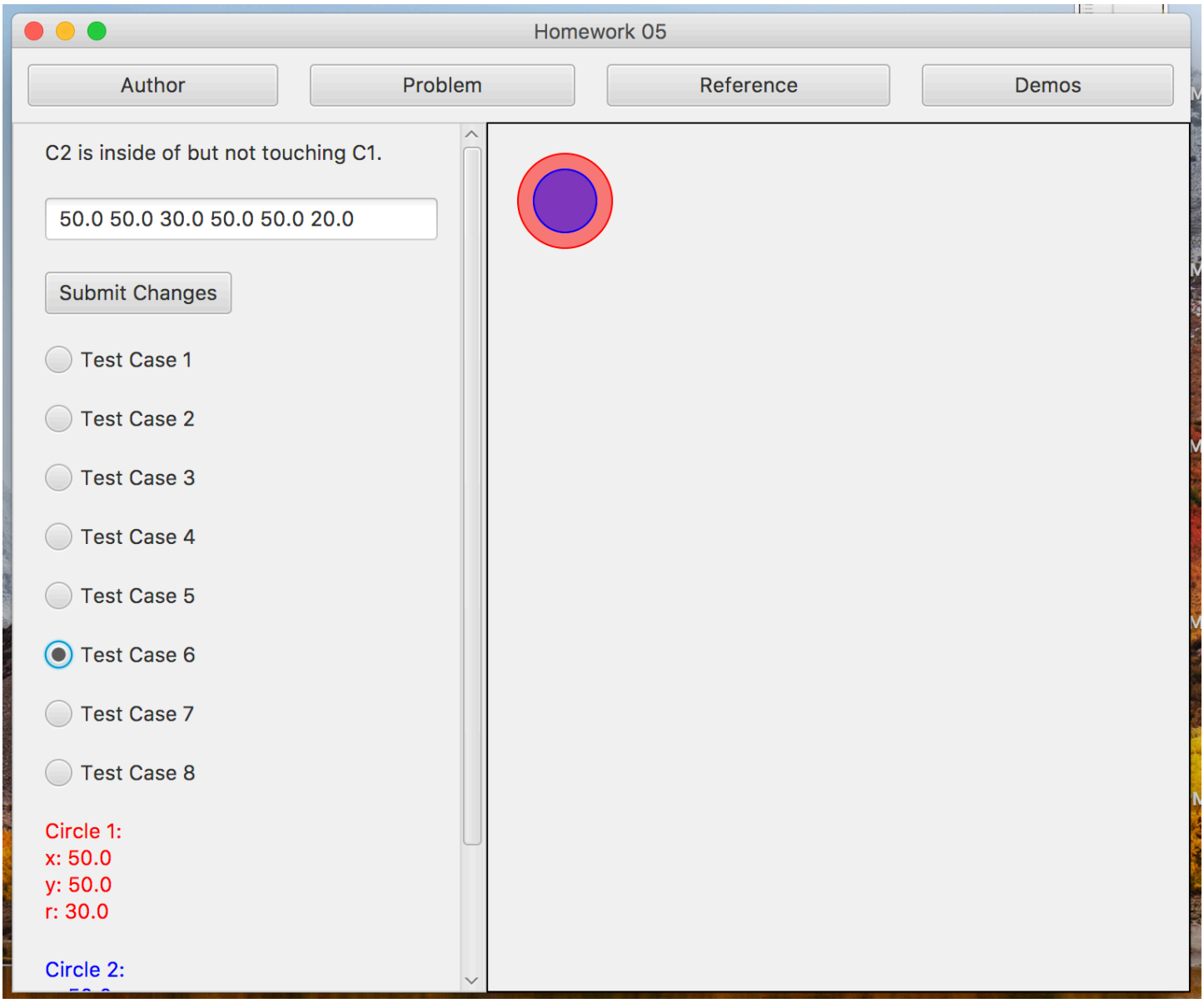

Homework 05
Author
Problem
Reference
Demos
Circles are identical.
50.0 50.0 20.0 50.0 50.0 20.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 20.0
Circle 2:

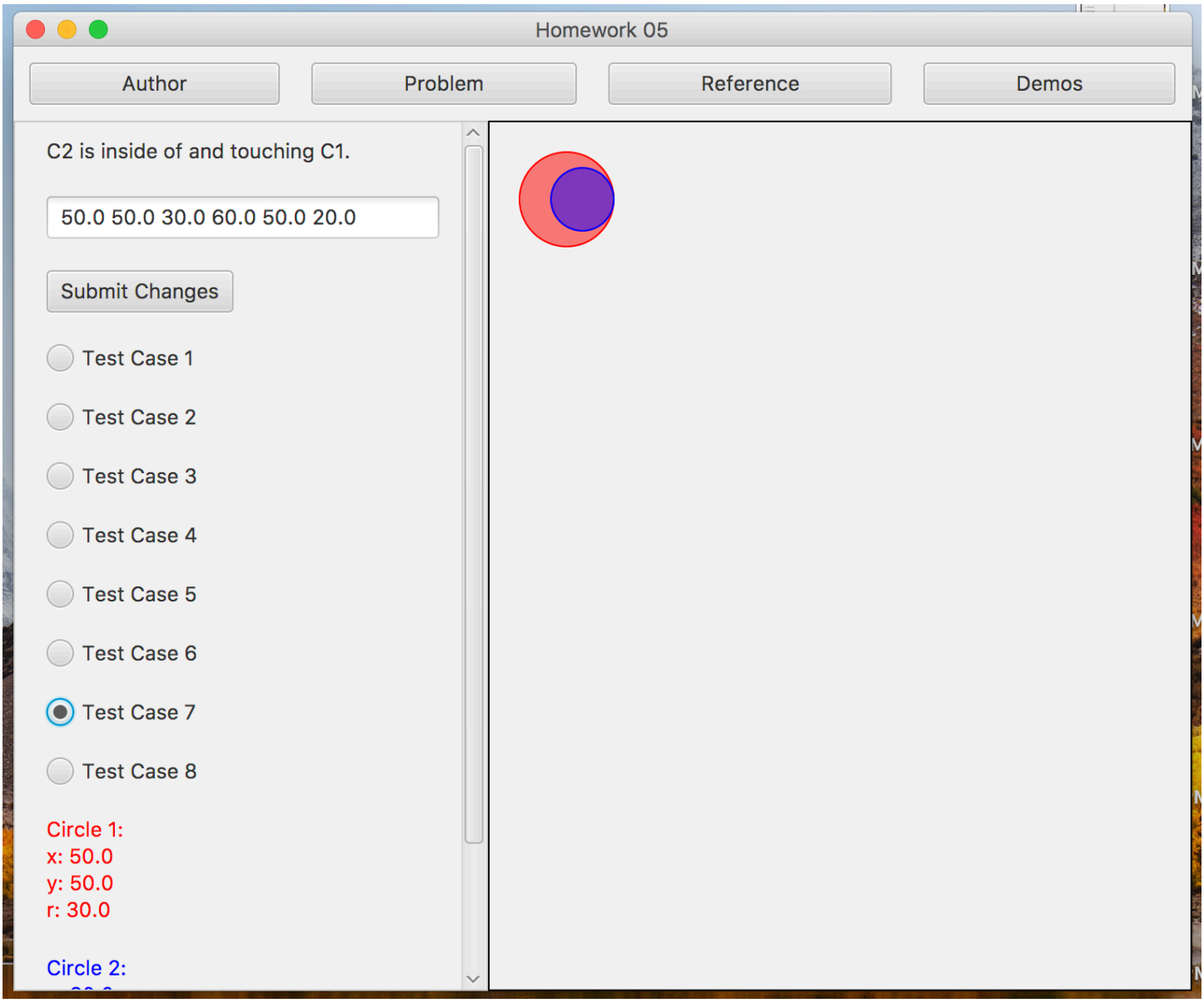

Homework 05
Author
Problem
Reference
Demos
C1 is outside of but not touching C2.
50.0 50.0 20.0 100.0 50.0 20.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 20.0
Circle 2:

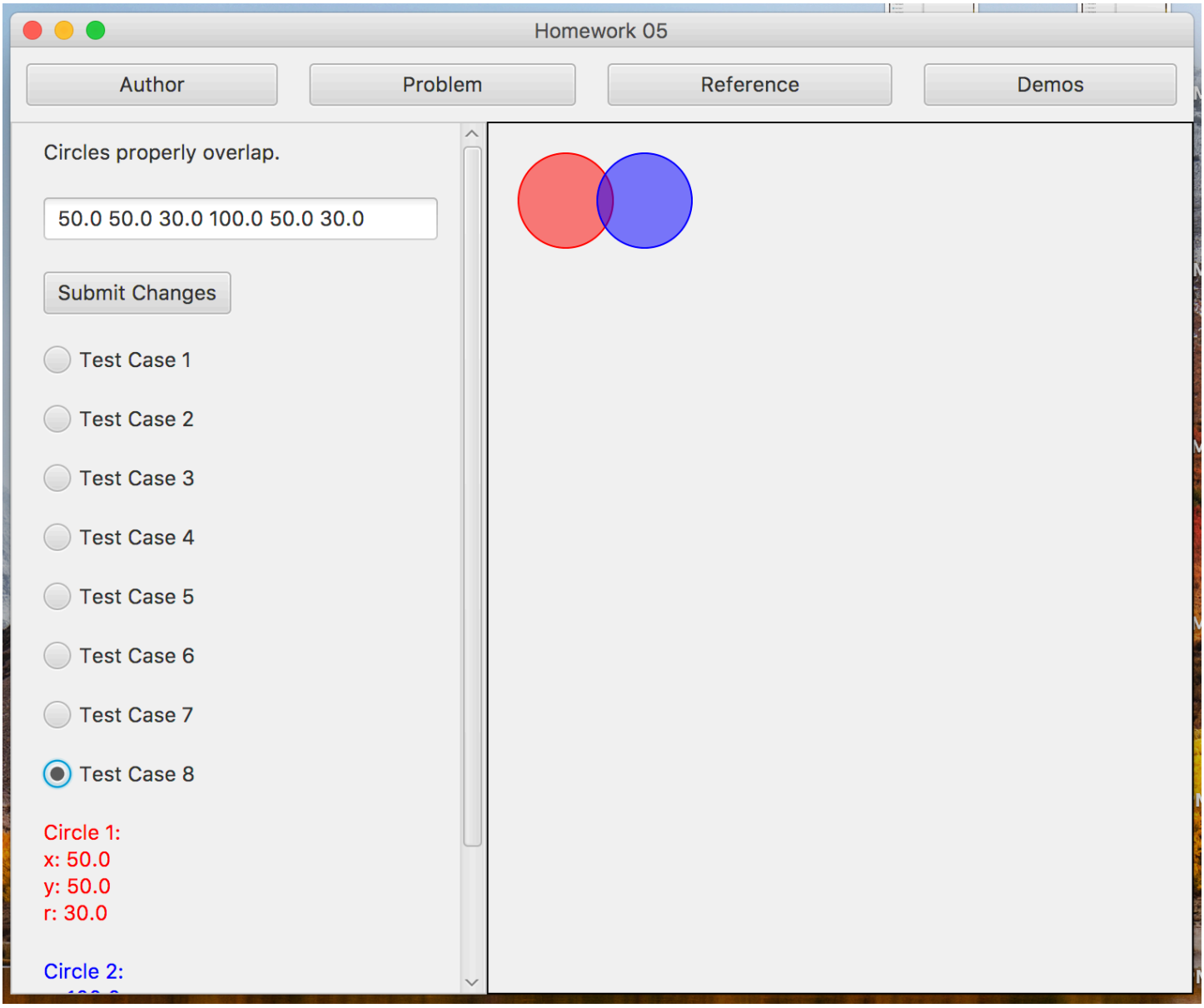

Homework 05
Author
Problem
Reference
Demos
C1 is outside of and touching C2.
50.0 50.0 20.0 100.0 50.0 30.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 20.0
Circle 2:


Homework 05
Author
Problem
Reference
Demos
C1 is inside of but not touching C2.
50.0 50.0 20.0 50.0 50.0 30.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 20.0
Circle 2:


Homework 05
Author
Problem
Reference
Demos
C1 is inside of and touching C2.
60.0 50.0 20.0 50.0 50.0 30.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 60.0
y: 50.0
r: 20.0
Circle 2:


Homework 05
Author
Problem
Reference
Demos
C2 is inside of but not touching C1.
50.0 50.0 30.0 50.0 50.0 20.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 30.0
Circle 2:


Homework 05
Author
Problem
Reference
Demos
C2 is inside of and touching C1.
50.0 50.0 30.0 60.0 50.0 20.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 30.0
Circle 2:


Homework 05
Author
Problem
Reference
Demos
Circles properly overlap.
50.0 50.0 30.0 100.0 50.0 30.0
Submit Changes
Test Case 1
Test Case 2
Test Case 3
Test Case 4
Test Case 5
Test Case 6
Test Case 7
Test Case 8
Circle 1:
x: 50.0
y: 50.0
r: 30.0
Circle 2: