Java Assignment 3

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Contains all the code of Non Graded Labs of CSD 206 (Monsoon 2015, Shiv Nadar University)

The code is also uploaded to https://github.com/rhnvrm/java_learn and the commit history is available at https://github.com/rhnvrm/java_learn/commits/master

Lab 0

WelcomeJava.java

```
1 public class WelcomeJava{
2     public static void main(String[] args){
3         System.out.println("Welcome");
4     }
5 }
```

WelcomeJava2.java

```
1  import javax.swing.JOptionPane;
2
3  public class WelcomeJava2{
4      public static void main(String[] args){
5          JOptionPane.showMessageDialog(null, "Welcome to Java");
6          JOptionPane.showMessageDialog(null, "Welcome to Java 3",
               "GUI Welcome", 3);
7          JOptionPane.showMessageDialog(null, "Welcome to Java 3",
               "GUI Welcome", 2);
8          JOptionPane.showMessageDialog(null, "Welcome to Java 3",
               "GUI Welcome", JOptionPane.QUESTION_MESSAGE);
9      }
10 }
```

ComputeArea.java

```
1 import javax.swing.JOptionPane;
2
3
4 public class ComputeArea{
5     public static void main(String[] args){
6         float radius = 0;
7         double area;
```

```
8
9           area = radius * radius * 3.14159;
10
11          for (String s: args) {
12              radius = Float.parseFloat(s);
13              area = radius * radius * 3.14159;
14              System.out.println("Area of circle of radius " +
                    radius + " = " + area);
15          }
16
17
18      }
19  }
```

ScannerExample.java

```
1  import javax.swing.JOptionPane;
2  import java.util.Scanner;
3
4  public class ScannerExample{
5      public static void main(String[] args){
6
7          Scanner input = new Scanner(System.in);
8
9          System.out.print("Enter an integer for seconds: ");
10         int seconds = input.nextInt();
11         int minutes = seconds/60;
12         int remainingSeconds = seconds % 60;
13
14         JOptionPane.showMessageDialog(null, seconds +  " seconds
               is " + minutes + " minutes and " + remainingSeconds
               + " seconds", "ScannerExample", -1);
15
16     }
17 }
```

Lab 1

Lottery.java

```
1  package lottery;
2
3  import java.util.Scanner;
4
5  /**
6   *
```

```
 * @author rv285
 */
public class Lottery {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {

        int randNum1, randNum2, userNumber;
        randNum1 = (int) (Math.random() * 10);
        randNum2 = (int) (Math.random() * 10);

        Scanner s = new Scanner(System.in);

        userNumber = s.nextInt();

        int matches = 0;
        while(userNumber != 0){

            int digit = userNumber % 10;

            if(digit == randNum1) matches+=1;
            if(digit == randNum2) matches+=1;

            userNumber /= 10;
        }

        if(matches == 2) System.out.println("You have won 3000 USD!");
        else if(matches == 1) System.out.println("You have won 1000 USD!");
        else System.out.println("Better Luck Next Time!");

    }
}
```

Lottery2.java

```
/*
 * To change this template, choose Tools | Templates
 * and open the template in the editor.
 */
package lottery;

import java.util.Scanner;
```

```java
import javax.swing.*;


/**
 *
 * @author rv285
 */
public class Lottery2 {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        // TODO code application logic here
        int randNum1, randNum2, userNumber;
        randNum1 = (int) (Math.random() * 10);
        randNum2 = (int) (Math.random() * 10);

        //Scanner s = new Scanner(System.in);
        //userNumber = s.nextInt();

        //debug
        //System.out.println(randNum1+(randNum2*10));

        userNumber =
            Integer.parseInt(JOptionPane.showInputDialog("Enter
            a two digit number"));

        boolean exactMatch = false;

        //check exact match
        if(randNum1+(randNum2*10) == userNumber) exactMatch =
            true;

        if(exactMatch){
            JOptionPane.showMessageDialog(null, "You have won
                10000 USD!");
        }
        //else
        else{
            int matches = 0;
            while(userNumber != 0){

                int digit = userNumber % 10;

                if(digit == randNum1) matches+=1;
```

```
50                  if(digit == randNum2) matches+=1;
51
52                  userNumber /= 10;
53              }
54
55              if(matches >= 2) JOptionPane.showMessageDialog(null,
                    "You have won 3000 USD!");
56              else if(matches == 1)
                    JOptionPane.showMessageDialog(null, "You have
                    won 1000 USD!");
57              else JOptionPane.showMessageDialog(null, "Better
                    Luck Next Time!");
58          }
59      }
60  }
```

insideCircle.java

```
1  /*
2   * To change this template, choose Tools | Templates
3   * and open the template in the editor.
4   */
5  package insidecircle;
6
7  import java.util.Scanner;
8
9  /**
10  *
11  * @author rv285
12  */
13 public class InsideCircle {
14
15     /**
16      * @param args the command line arguments
17      */
18     public static void main(String[] args) {
19         // TODO code application logic here
20
21         double x,y,r;
22         Scanner s = new Scanner(System.in);
23
24         x = s.nextDouble();
25         y = s.nextDouble();
26         r = s.nextDouble();
27
28         double LHS = Math.pow(x,2) + Math.pow(y,2);
```

```
        double RHS = Math.pow(r,2);

        if(LHS <= RHS){
            System.out.println("The point is inside or on the
                circle");
        }
        else{
            System.out.println("The point is outside the
                circle");
        }

    }
}
```

quadratic.java

```
/*
 * To change this template, choose Tools | Templates
 * and open the template in the editor.
 */
package quadratic;

import java.util.Scanner;

/**
 *
 * @author rv285
 */
public class Quadratic {

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        // TODO code application logic here
        double a,b,c,d,r;

        //a = 1;
        Scanner s = new Scanner(System.in);

        a = s.nextDouble();
        b = s.nextDouble();
        c = s.nextDouble();

        d = Math.pow(b,2) - 4*a*c;

```

```
31          if(d == 0){
32              System.out.println("Root:");
33              r = (-b)/(2*a);
34              System.out.println(r);
35          }
36          else if (d > 0){
37              System.out.println("Roots:");
38
39              r = ((-b) + d)/(2*a);
40              System.out.println(r);
41
42              r = ((-b) - d)/(2*a);
43              System.out.println(r);
44
45          }
46          else {
47              System.out.println("The equation has no real
                    roots.");
48          }
49
50
51      }
52  }
```

Lab 2

Create a package SNU.geometryUtil. Define Classes For various 2-d shapes like Circle, Triangle, Square, Rectangle. Create variables, required constructors, methods for calculating areas, perimeters, for each type of shape. Create Mainclass having " public static void main()" method in another package. Create menu driven program asking user to create a new object of any of the shape, show him the count of each object created, asking him to show any property of any of the object, calculate area or perimeter of any object.

Compiling

`javac *.java -d .` ###Testing `java Test.Mainclass`

TODO

Lab 3

Define two classes.

1. **Name**. Having at least three components the First name, Middle Name and the Last Name. Add appropriate constructors.

Add methods to check sameNames, e.g. name1= Saurabh Kulshreshtha, ame2=Saurabh Kulshreshtha/ saurabh kulshreshtha.... sameInitials, e.g. name1=Ram Vashishtha, name2=Ravi Verma similarNames (When some of the first, middle or last names have been exchanged.),e.g. (Ravi Verma and Verma Ravi) or (Venkat Sai Velluri and Velluri Sai Venkat and Sai Velluri Venkat) etc. maybeSameNames (when some names contains initials in place of First, Middle and/or Last names and they are same as initials of other complete names) e.g. L. R. Ramesh, Luxmi Rama Ramesh,

2. **Student**. Has three names studentName, FathersName, MothersName. Constructors, Accessors/Mutators.

3. **Main Program**. Array of Students. Answer.... How many have same names, same fathers name etc..

Lab 4

Lab 5

Lab 6

Question 1

Write a program that draws a fixed circle, rectangle and triangle. Whenever a mouse is moved, display the message indicating whether the mouse point is inside the figure, as shown in figures below.

A.java (Circle)

```
1  package q1;
2
3  import javax.swing.*;
4  import java.awt.*;
5  import java.awt.event.MouseAdapter;
6  import java.awt.event.MouseEvent;
7
8  @SuppressWarnings("serial")
9  public class A extends JFrame {
10
11     private static JLabel jlabel = new JLabel("Mouse is
           outside!");
```

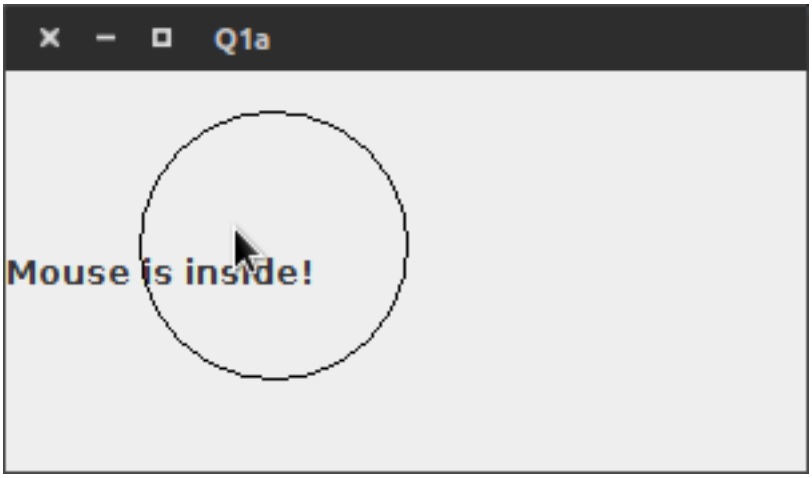

Figure 1: Mouse Pointer is inside the Circle

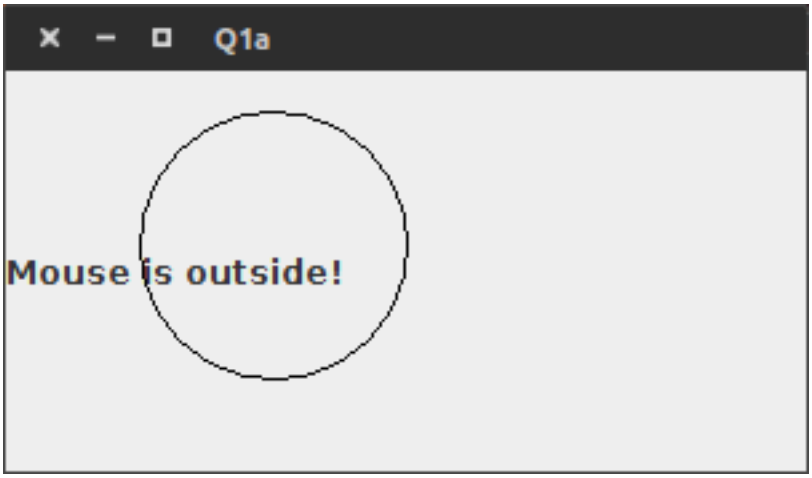

Figure 2: Mouse Pointer is outside the Circle

```
12
13      private static int circleX=50, circleY=15, circleWidth=100,
            centerX=circleX + circleWidth/2, centerY=circleY  +
            circleWidth/2;
14
15      public static double distance(
16              double x1, double y1, double x2, double y2) {
17          return Math.sqrt((x2 - x1) * (x2 - x1) + (y2 - y1) * (y2
                - y1));
18      }
19
20
21      public boolean isInsideCircle(int px, int py) {
22          return distance(px, py, centerX, centerY) <
                circleWidth/2;
23      }
24
25      public A()
26      {
27
28       //Set JFrame title
29       super("Q1a");
30
31       //Set default close operation for JFrame
32       setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
33
34       //Set JFrame size
35       setSize(300,150);
36
37       //Make JFrame visible
38       setVisible(true);
39
40       this.addMouseMotionListener(new MouseAdapter() {
41
42          @Override
43          public void mouseMoved(MouseEvent e) {
44
45              super.mouseMoved(e);
46
47              //jlabel.setText(""+isInsideCircle(e.getX(),e.getY())+"
                    "+e.getX()+" "+e.getY());
48
49              if(isInsideCircle(e.getX(),e.getY())){
50                  jlabel.setText("Mouse is inside!");
51              }
52              else{
```

```
                jlabel.setText("Mouse is outside!");
            }

            repaint();
        }



    });
    }



    public void paint(Graphics g)
    {
     super.paint(g);

        g.drawOval(circleX, circleY, circleWidth, circleWidth);


    }

    public static void main(String[] args) {

        A frame = new A();



        frame.add(jlabel);

    }

}
```

B.java (Rectange)

```
package q1;

import javax.swing.*;
import java.awt.*;
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;

@SuppressWarnings("serial")
public class B extends JFrame {

```

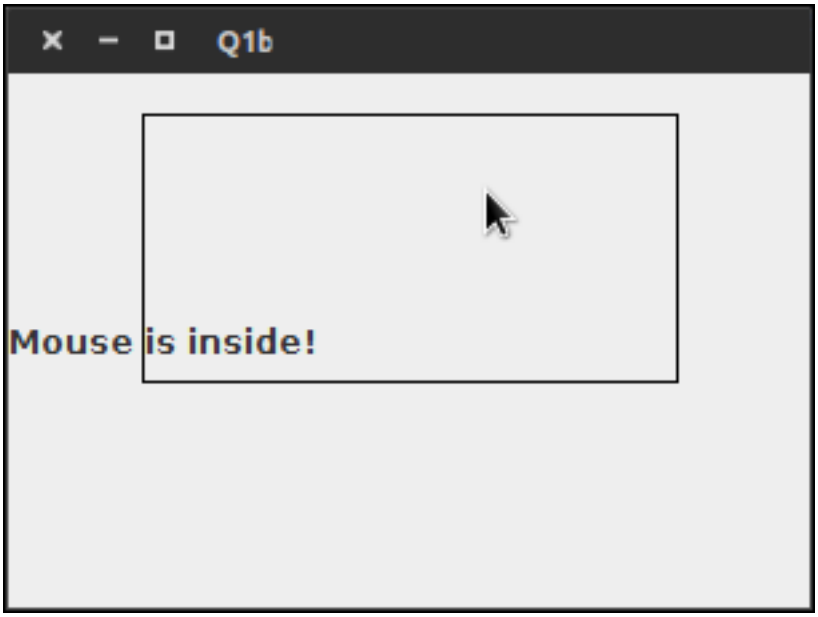

Figure 3: Mouse Pointer is inside the Rectangle

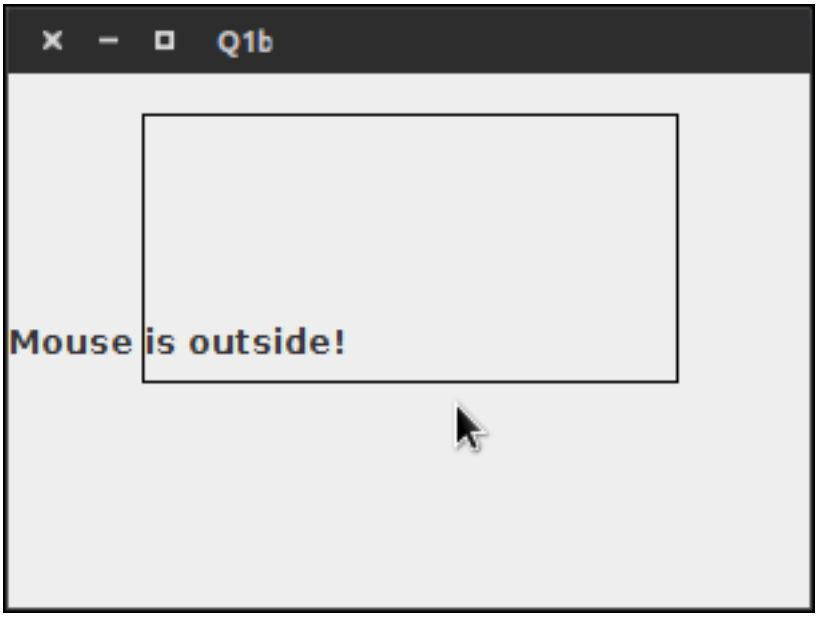

Figure 4: Mouse Pointer is outside the Rectangle

```
11      private static JLabel jlabel = new JLabel("Mouse is
            outside!");
12
13      private static int rectX=50, rectY=15, rectWidth=200,
            rectHeight=100;
14
15      public static double distance(
16              double x1, double y1, double x2, double y2) {
17          return Math.sqrt((x2 - x1) * (x2 - x1) + (y2 - y1) * (y2
                - y1));
18      }
19
20
21      public boolean isInsideRect(int px, int py) {
22          return px < rectX+rectWidth && py < rectY+rectHeight &&
                px > rectX && py > rectY;
23      }
24
25      public B()
26      {
27
28       //Set JFrame title
29       super("Q1b");
30
31       //Set default close operation for JFrame
32       setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
33
34       //Set JFrame size
35       setSize(300,200);
36
37       //Make JFrame visible
38       setVisible(true);
39
40       this.addMouseMotionListener(new MouseAdapter() {
41
42          @Override
43          public void mouseMoved(MouseEvent e) {
44
45              super.mouseMoved(e);
46
47              //jlabel.setText(""+isInsideRect(e.getX(),e.getY())+"
                    "+e.getX()+" "+e.getY());
48
49              if(isInsideRect(e.getX(),e.getY())){
50                  jlabel.setText("Mouse is inside!");
51              }
```

```
52              else{
53                  jlabel.setText("Mouse is outside!");
54              }
55
56              repaint();
57          }
58
59
60
61      });
62      }
63
64
65
66      public void paint(Graphics g)
67      {
68       super.paint(g);
69
70          g.drawRect(rectX, rectY, rectWidth, rectHeight);
71
72
73      }
74
75      public static void main(String[] args) {
76
77          B frame = new B();
78
79
80
81          frame.add(jlabel);
82
83      }
84
85  }
```

C.java (Triangle)

```
1  package q1;
2
3  import javax.swing.*;
4  import java.awt.*;
5  import java.awt.event.MouseAdapter;
6  import java.awt.event.MouseEvent;
7
8  import SNU.gr3.Point;
9
```

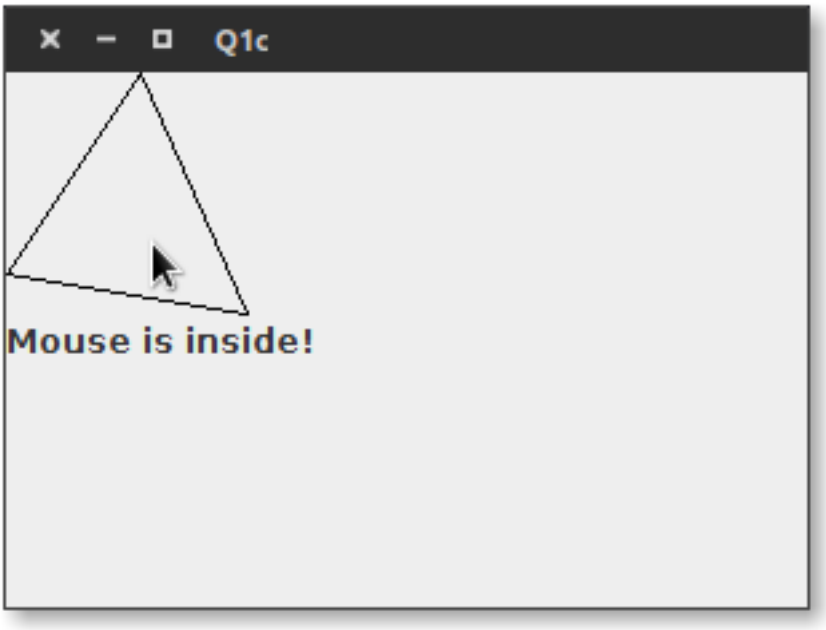

Figure 5: Mouse Pointer is inside the Tri

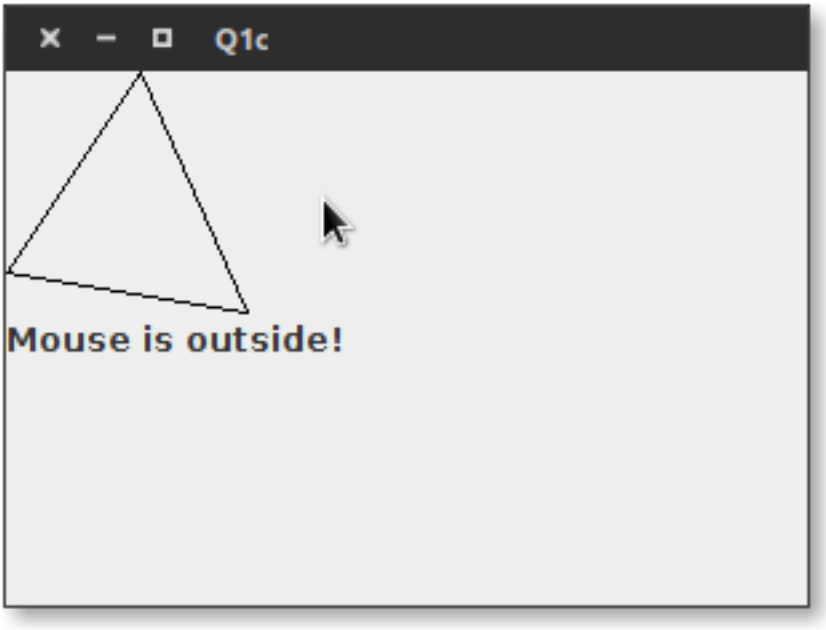

Figure 6: Mouse Pointer is outside the Tri

```
10 @SuppressWarnings("serial")
11 public class C extends JFrame {
12
13     private static JLabel jlabel = new JLabel("Mouse is
           outside!");
14
15     private  Point a = new Point(),b= new Point(),c=new Point();
16
17     private static double distance(
18             double x1, double y1, double x2, double y2) {
19         return Math.sqrt((x2 - x1) * (x2 - x1) + (y2 - y1) * (y2
               - y1));
20     }
21
22     private int sign(int n){
23         return Math.abs(n)/n;
24     }
25
26     private int dotProduct(Point A, Point B, Point P){
27         return
               (A.getX()-P.getX())*(B.getY()-P.getY())-(B.getX()-P.getX())*(A.getY()-P.getY());
28     }
29
30     public boolean isInside(int x, int y) {
31
32         Point p = new Point(x,y);
33
34         int ab = dotProduct(a,b,p);
35         int bc = dotProduct(b,c,p);
36         int ca = dotProduct(c,a,p);
37         return sign(ab)==sign(bc) && sign(bc)==sign(ca);
38
39
40     }
41
42     public C()
43     {
44
45         super("Q1c");
46
47         a.setX(0);
48         a.setY(75);
49         b.setX(90);
50         b.setY(90);
51         c.setX(50);
52         c.setY(0);
```

```
53
54      //Set JFrame title
55
56
57      //Set default close operation for JFrame
58      setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
59
60      //Set JFrame size
61      setSize(300,200);
62
63      //Make JFrame visible
64      setVisible(true);
65
66      this.addMouseMotionListener(new MouseAdapter() {
67
68         @Override
69         public void mouseMoved(MouseEvent e) {
70
71             super.mouseMoved(e);
72
73             //jlabel.setText(""+isInside(e.getX(),e.getY())+"
                   "+e.getX()+" "+e.getY());
74
75             //repaint();
76
77             if(isInside(e.getX(),e.getY())){
78                 jlabel.setText("Mouse is inside!");
79             }
80             else{
81                 jlabel.setText("Mouse is outside!");
82             }
83
84             repaint();
85         }
86
87
88
89     });
90     }
91
92
93
94     public void paint(Graphics g)
95     {
96      super.paint(g);
97
```

```
98          g.drawLine(a.getX(),a.getY(),b.getX(),b.getY());
99          g.drawLine(b.getX(),b.getY(),c.getX(),c.getY());
100         g.drawLine(c.getX(),c.getY(),a.getX(),a.getY());
101
102     }
103
104     public static void main(String[] args) {
105
106         C frame = new C();
107
108         frame.add(jlabel);
109         frame.repaint();
110
111     }
112
113 }
```

Question 2

Write a program that displays a circle. You can point the mouse inside the circle and drag (i.e.,move with mouse pressed) the circle wherever the mouse goes, as shown in Figure below.

DraggableCircle.java

```
1  package q2;
2
3  import java.awt.*;
4  import java.awt.event.*;
5
6  import javax.swing.*;
7
8  @SuppressWarnings("serial")
9  public class DraggableCircle extends JFrame{
10
11     CirclePanel canvas = new CirclePanel();
12
13     public DraggableCircle() {
14         // TODO Auto-generated constructor stub
15
16         this.add(canvas);
17
18
19     }
20
```

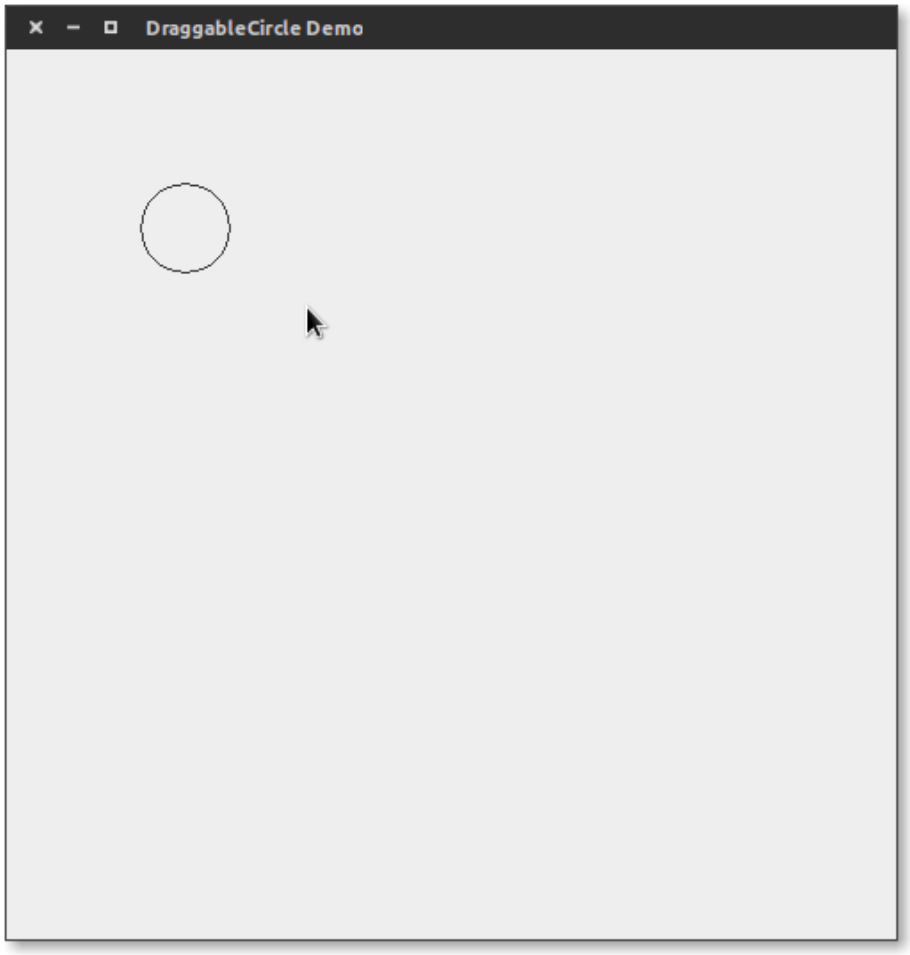

Figure 7: Initial State

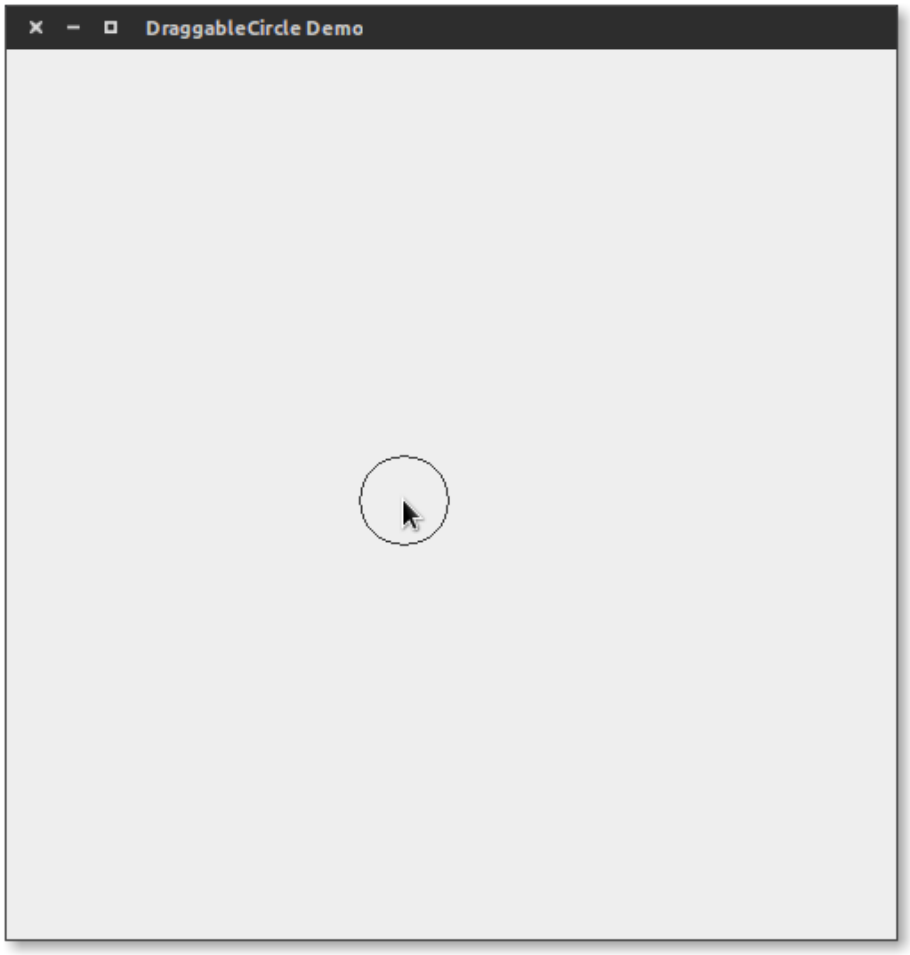

Figure 8: Dragging The Circle

```
21      class CirclePanel extends JPanel{
22          int x= 100, y = 100, diameter = 50;
23
24          public boolean isInsideCircle(int px, int py) {
25              return distance(px, py, x-diameter/2, y-diameter/2)
                    < diameter;
26          }
27
28          public double distance(
29                  double x1, double y1, double x2, double y2) {
30              return Math.sqrt((x2 - x1) * (x2 - x1) + (y2 - y1) *
                    (y2 - y1));
31          }
32
33          public CirclePanel() {
34              // TODO Auto-generated constructor stub
35              this.addMouseMotionListener(new MouseAdapter() {
36
37                  /*@Override
38                  public void mouseReleased(MouseEvent e) {
39                      // TODO Auto-generated method stub
40                      x = e.getX();
41                      y = e.getY();
42                      repaint();
43                  }*/
44                  /*
45                  @Override
46                  public void mousePressed(MouseEvent e) {
47                      // TODO Auto-generated method stub
48
49
50                  }*/
51                  @Override
52                  public void mouseClicked(MouseEvent e) {
53                      // TODO Auto-generated method stub
54                      super.mouseClicked(e);
55                      System.out.println("
                            "+isInsideCircle(e.getX(),e.getY()));
56                  }
57                  @Override
58                  public void mouseDragged(MouseEvent e) {
59                      // TODO Auto-generated method stub
60                      super.mouseDragged(e);
61
62                      if(isInsideCircle(e.getX(),e.getY()))
63                      {
```

```
64                          x = e.getX();
65                          y = e.getY();
66                          repaint();
67                      }
68                  }
69
70              });
71          }
72
73          @Override
74          protected void paintComponent(Graphics g) {
75              // TODO Auto-generated method stub
76              super.paintComponent(g);
77
78              g.drawOval(x-diameter/2, y-diameter/2, diameter,
                    diameter);
79          }
80      }
81
82      public static void main(String[] args) {
83          // TODO Auto-generated method stub
84          DraggableCircle frame = new DraggableCircle();
85          frame.setTitle("DraggableCircle Demo");
86          frame.setSize(500, 500);
87          frame.setVisible(true);
88
89      }
90
91  }
```

Question 3

Write a program that displays head (H) or tail (T) for each of nine coins, as shown in Figure below. When a cell is clicked, the coin is flipped. A cell is a JLable . Write a custom cell class that extends JLable with the mouse listener for handling the clicks. When the program starts, all cells initially display H .

HeadsTails.java

```
1  package q3;
2
3  import java.awt.BorderLayout;
4  import java.awt.Color;
5  import java.awt.Font;
6  import java.awt.GridLayout;
```

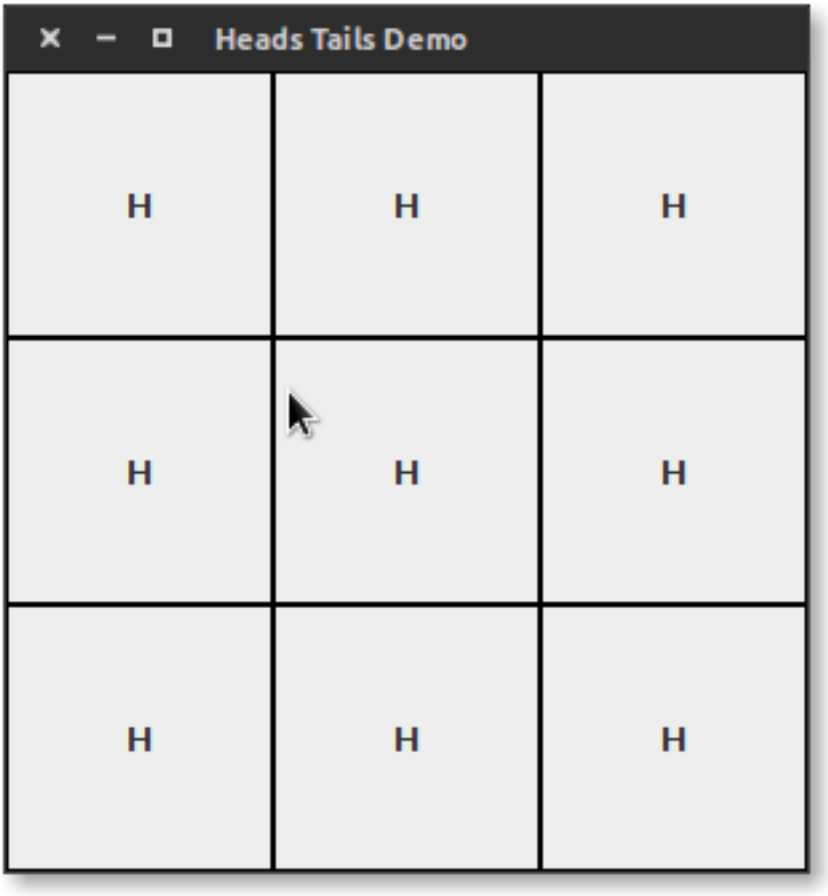

Figure 9: Initial Configuration

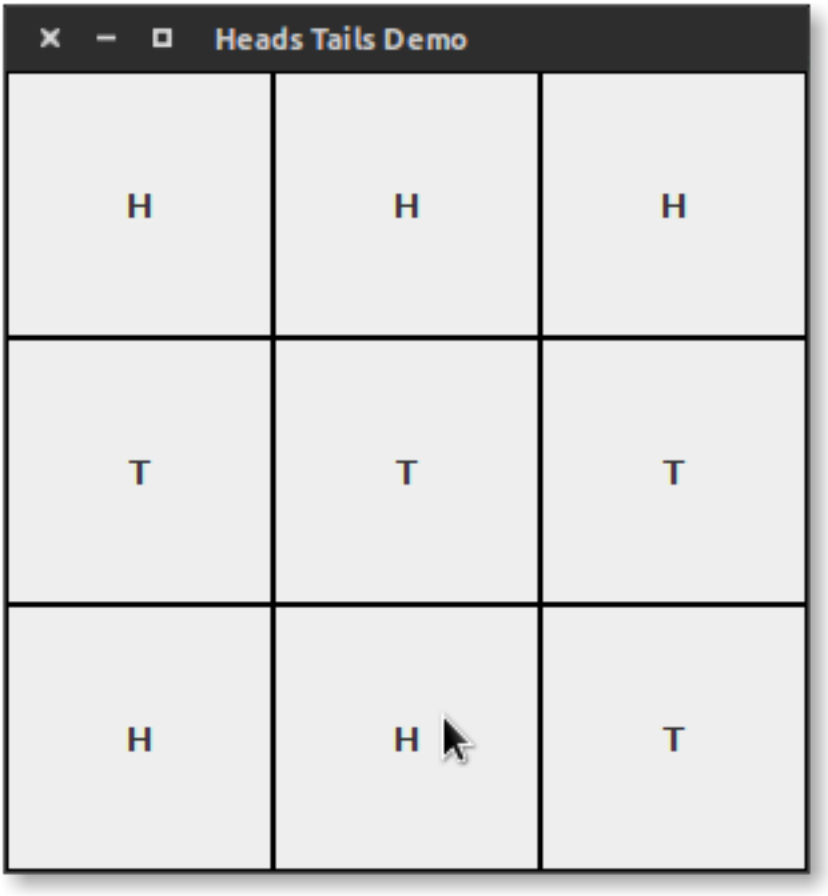

Figure 10: After Flipping

```java
import java.awt.event.MouseAdapter;
import java.awt.event.MouseEvent;

import javax.swing.JFrame;
import javax.swing.JLabel;
import javax.swing.JPanel;
import javax.swing.SwingConstants;
import javax.swing.border.LineBorder;

@SuppressWarnings("serial")
public class HeadsTails extends JFrame{


    public HeadsTails() {
        // TODO Auto-generated constructor stub
        setLayout(new GridLayout(3, 3));

        for (int i = 0; i < 9; i++)
            add(new ClickableCell("H"));
    }

    class ClickableCell extends JLabel {
        public ClickableCell(String s) {
            // TODO Auto-generated constructor stub
            setBorder(new LineBorder(Color.black, 1));
            setHorizontalAlignment(JLabel.CENTER);
            setText(s);

            addMouseListener(new MouseAdapter() {
                public void mouseClicked(MouseEvent e) {
                  if (getText().equals("H")) {
                    setText("T"); // Flip from H to T
                  }
                  else {
                    setText("H"); // Flip from T to H
                  }
                }
              });
        }
    }


    public static void main(String[] args) {
        HeadsTails frame = new HeadsTails();

        frame.setSize(300, 300);
```

```
53          frame.setTitle("Heads Tails Demo");
54          frame.setLocationRelativeTo(null);
55          frame.setVisible(true);
56
57
58      }
59  }
```

Lab 7

Question 1

Write a program to input a paragraph. Then can feed it in the program. Then perform the following using JCF: 1. find frequency of each vowel 2. Find and replace all occurrence of “the” with “THE”.

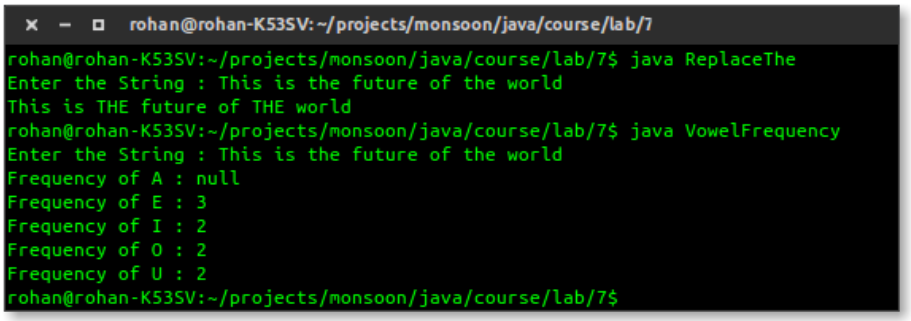

Figure 11: Output of Question 1

VowelFrequency.java

```
1  import java.util.*;
2  class VowelFrequency
3  {
4      public static void main(String[] args)
5      {
6          Scanner in = new Scanner(System.in);
7          System.out.print("Enter the String : ");
8          String st = in.nextLine();
9          Map<String, Integer> map = new HashMap<String,
               Integer>();
10
11         st=st.toLowerCase();
12
```

```
        for(int i = 0;i<st.length();i++)
        {
            char c = st.charAt(i);

            String ch = String.valueOf(c);

            Integer frequency = map.get(ch);

            Integer value;

            if (frequency == null)
                value = new Integer(1);
            else{
                value = new Integer(frequency.intValue()+1);
            }
            map.put(ch, value);



        }
        //System.out.println();
        System.out.println("Frequency of A :
            "+map.get(String.valueOf('a')));
        System.out.println("Frequency of E :
            "+map.get(String.valueOf('e')));
        System.out.println("Frequency of I :
            "+map.get(String.valueOf('i')));
        System.out.println("Frequency of O :
            "+map.get(String.valueOf('o')));
        System.out.println("Frequency of U :
            "+map.get(String.valueOf('u')));
    }
}
```

ReplaceThe.java

```
import java.util.*;
class ReplaceThe
{
    public static void main(String[] args)
    {
        Scanner in = new Scanner(System.in);
        System.out.print("Enter the String : ");
        String input = in.nextLine();

        String[] st = input.split(" ");
```

```
11
12          List<String> list = new ArrayList<String>();
13
14          for(int i = 0; i < st.length;i++){
15              if(st[i].compareTo("the") == 0){
16                  list.add(st[i].toUpperCase());
17              }
18              else{
19                  list.add(st[i]);
20              }
21          }
22
23          String listString = "";
24
25          for (String s : list)
26          {
27              listString += s + " ";
28          }
29
30          System.out.println(listString);
31      }
32  }
```

Question 2

Write a program to evaluate an infix expression (input and output using JOptionpane) using JCF. Use only JCF interfaces and methods for all stack operations needed to solve the problem.

Todo