CS 121

Practice Final Exam (Spring 2015)

Time: 120 minutes *Name :*____________________________________

- *This exam has 9 questions, for a total of 200 points.*

Question	Points	Score
1	20	
2	40	
3	20	
4	20	
5	20	
6	30	
7	20	
8	20	
9	10	
Total:	200	

1. (20 points) **Multiple Choice Questions**. (circle the correct answer)

a. Suppose we want to create a variable to store the number of students in a class. The number of students can change while the program is running. Which of the following would be the *most appropriate* variable declaration for this?

(i) `double numStudents;`
(ii) `String studentcount;`
(iii) `int numStudents;`
(iv) `final int NUM_STUDENTS;`

b. What is the output of the following statement?

```
System.out.println("Next year, my dog will be " + 2 + 1 + " years old.");
```

(i) Next year, my dog will be 3 years old.
(ii) Next year, my dog will be 2 years old.
(iii) Next year, my dog will be 2 + 1 years old.
(iv) Next year, my dog will be 21 years old.

c. What output is produced by the following statements?

```
int num1 = 22;
int num2 = 10;
double result = (double) (num1 / num2);
System.out.println(result);
```

(i) 2.0
(ii) 2
(iii) 0
(iv) 0.0

d. Consider the following declaration:

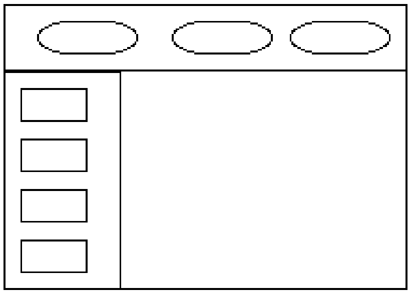
```
JPanel keypadPanel = new JPanel();
keypadPanel.setLayout(new GridLayout(4,4));

JButton [][] buttons = new JButton[4][4];
for (int i = 0; i < buttons.length; i++)
    for (int j = 0; j < buttons[i].length; j++) {
        buttons[i][j] = new JButton(i + "," + j);
        keypadPanel.add(buttons[i][j]);
    }
```

What is the label on the button on the bottom-left corner?

(i) 0,0
(ii) 0,3
(iii) 3,0
(iv) 3,3

2. (40 points) **Short Answer Questions**.

   a. What combination of `JPanels` and `LayoutManagers` would you use to create the GUI shown below?



   b. Declare and instantiate a one dimensional array, named `labels`, of `JLabel` objects. You do not need to show how to instantiate each individual JLabel.

   c. Given the array below, show how you would access the *last element in the first row.*

```
int n = 100;
int [][] table = new int[n][n];
```

d. Given the array below, write code to print out every element in the array (one per line).

```
String[] mySlangs = new String[10];
```

e. The ChangeListener interface is defined as follows:

```
 public interface ChangeListener {
    public void stateChanged(ChangeEvent e);
}
```

Write a skeleton definition for a class `MyListener` containing the minimum amount of code that is necessary to implement the `ChangeListener` interface.

3. (20 points) Write code that prints multiples of 3 from 100 **down** to 1 but only if the multiples are odd. However if the multiple of 3 is also a multple of 11, then instead of the number print ”Yay!” (*Note*: There are no command line arguments and there should be no user input in this method. The output is on one line as shown below.)

```
Yay! 93 87 81 75 69 63 57 51 45 39 Yay! 27 21 15 9 3
```

```
public class Test {
    public static void main (String[] args) {










    }
}
```

4. (20 points) Read the following code and explain what it does. Assume that `list1` is the list of friends for `user1` while `list2` is the list of friends for `user2`. Assume that the *User* class implements an `equals` method to compare if two users are the same.

```
public int whatAmI(User[] list1, User[] list2)
{
    int count = 0;
    for (User u1: list1) {
        for (User u2: list2) {
            if (u1.equals(u2))
                count++;
        }
    }
    return count;
}
```

5. (20 points) **Labels and loops**. What does the following method calculate and return?

```
public int[] loopy(JLabel[][] labels)
{
    final int MAX_LABEL_LENGTH = 100;
    int[] nums = new int[MAX_LABEL_LENGTH];

    for (int i = 0; i < labels.length; i++) {
        for (int j = 0; j < labels[i].length; j++) {
            nums[labels[i][j].getText().length()]++;
        }
    }
    return nums;
}
```

6. (30 points) **Writing Classes**. Write a class to represent a `Twitter` account. An account has a String *id*, an *email* address and a list of all *hashtags* (use an `ArrayList<String>`) used by this account.

   a. Write a class skeleton with appropriate variable declarations.

   b. Write a constructor that creates an account using the specified *id* and *email* address. The list of hashtags is initialized to be empty.

   c. Write a method named `checkHashtag(String tag)` that returns true if the given tag was ever used by the account, false otherwise. Use the `contains(Object o)` method from the `ArrayList` class to do the search.

7. (20 points) **GUI**. Read the GUI application code shown below (and continued on next page) and answer two things:

   - Draw the layout of the GUI that the application will display when it is run.
   - Explain what happens when `button1` is clicked by the user.

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

public class Stooges extends JFrame implements ActionListener
{
    private JPanel panel;
    private JPanel buttonPanel;
    private JTextArea messageDisplay;
    private JButton button1;
    private JButton button2;
    private JButton button3;
    private String message = "";

    public Stooges()
    {
        setTitle("Three Stooges!");
        setSize(400,200);
        panel = new JPanel();
        messageDisplay = new JTextArea();
        panel.setLayout(new BorderLayout());

        buttonPanel = new JPanel();
        button1 = new JButton ("Larry");
        button2 = new JButton ("Moe");
        button3 = new JButton ("Curly");

        buttonPanel.add(button1);
        buttonPanel.add(button2);
        buttonPanel.add(button3);

        button1.addActionListener(this);
        button2.addActionListener(this);
        button3.addActionListener(this);

        panel.add(buttonPanel, BorderLayout.NORTH);
        panel.add(messageDisplay, BorderLayout.CENTER);
        getContentPane().add(panel);
    }

    public void actionPerformed(ActionEvent e)
    {
        String temp = button2.getText();
        button2.setText(button1.getText());
        button1.setText(button3.getText());
        button3.setText(temp);

        if (e.getSource() == button1)
            message = "You hit me!";
        else if (e.getSource() == button2)
            message = "Don’t tickle me!";
        else if (e.getSource() == button3)
            message = "Was that you!";

        messageDisplay.setText(message);
        repaint();
    }

    public static void main(String[] args)
    {

        Stooges frame = new Stooges();
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        frame.setVisible(true);
    }
}
```

8. (20 points) **Processing Arrays**. Write a method called *amplitude* that takes an array of doubles as a parameter and returns the difference between the largest and smallest value in the array.

```
public double amplitude(double[] values)
{








}
```

9. (10 points) **Finally Done!!** Describe something you studied for the final that wasn't really covered. Finally, tell us about something you learned this semester in 121 that you thought was cool!