1. True or False:

(a) F In Alice, the body of the loop can contain another loop, but only of the while type.
(b) F In Alice, an event may occur only as a result of user action.
(c) F In Alice, an index in the array always starts with 1.
(d) T Some methods in Alice and Java are called automatically.
(e) T In Java, to generate a keyboard event, a component must have the keyboard focus.
(f) T In Java, Boolean isEmpty( ) returns true if this list contains no elements.
(g) F In Java, a variable can be used before it is declared.
(h) F In Java, class hierarchies can contain no more than three levels.
(i) F In Java, the content of the input file can only be read as text.
(j) T In Java, all exceptions are considered checked exceptions, except objects of type RuntimeException.

2. Write the Java code that declares

(a) a variable count that holds the number 0:
   int count = 0;
(b) a variable score which is 8.25:
   double score = 8.25;
(c) a string variable me that holds your name:
   String me = "Katherine";
(d) an object smiley of the class Circle:
   Circle smiley;
(e) a list ShapesToDraw of 5 Shape objects:
   ArrayList<Shape> ShapesToDraw; or Shapes[] ShapesToDraw = new Shapes[5]

3. What happens when the code is run?

(a) world.my first method ()
   Ballerinas =
   For all Ballerinas, every item_from_Ballerinas together
   item_from_Ballerinas turn left 3 revolutions
   item_from_Ballerinas move up 0.5 meters
   item_from_Ballerinas move down 0.5 meters
The ballerinas, in unison, make 3 complete turns and then jump up and down once.

**Events**

<table>
<thead>
<tr>
<th>When is clicked on left button.Button</th>
</tr>
</thead>
<tbody>
<tr>
<td>If left button.depressed</td>
</tr>
<tr>
<td>left button.raiseButton</td>
</tr>
<tr>
<td>Else</td>
</tr>
<tr>
<td>left button.depressButton</td>
</tr>
</tbody>
</table>

If the mouse clicks on the button, the button moves down and the music starts. If the button is pressed again, the button moves up and the music stops. This repeats every time the user clicks the button.

4. What is the output of the following code fragments:

(a)  
```java
int numtimes = 0;
while ( numtimes <= 1 )
{
    System.out.print("Hi!");
    numtimes++;
}
System.out.print("Bye!");
```

(b)  
```java
boolean done = false;
int total = 0;
while ( !done )
{
    if ( total > 3 )
    {
        done = true;
    }
    total = total + (total+1);
}
System.out.println(total);
```

(c)  
```java
int i, j;
for ( i = 0 ; i < 3 ; i++)
```
{  
   for ( j = 0 ; j < 5 ; j++)  
   {  
      System.out.print("+");  
   }  
   System.out.println();  
}

(d)
int i, j;
for ( i = 0 ; i < 3 ; i++)
{
   for ( j = 0 ; j < 5 ; j++)
   {
      if ( (i+j)%2 == 0 )
      {
         System.out.print("+");
      }
      else
      {
         System.out.print("-");
      }
   }
   System.out.println();
}

5. What is the output?

(a) if ( ( 1 <= 10) && ( 20 > 10 ) )
    System.out.println("Yes");
else
    System.out.println("No");

Output: Yes

(b) boolean tobe = true;
    if ( tobe || !tobe )
        System.out.println("Yes");
    else
        System.out.println("No");

Output: Yes

(c) int x = 3, y = 3, z = 4;
    if ( x+y*z > 15 )
        System.out.println("Yes");
    else
        System.out.println("No");

Output: No
(d) int number = 7;
    boolean ispositive = ( number > 0 );
    boolean iseven = ( number % 2 == 0 );
    if ( ispositive || iseven )
        System.out.println("Yes");
    else
        System.out.println("No");

Output: Yes

(e) int year = 2004;
    if (( year%4 == 0 && year%100 != 0 ) || ( year%400 == 0 ))
        System.out.println("Yes");
    else
        System.out.println("No");

Output: Yes

6. Assume the following class definition:

```java
public class SampleClass {
    public int number;
    public String message;
    public SampleClass()
    { number = 0; message = "I love Java"; }
    public void print()
    { System.out.println(message); }
    public void wonder()
    { int i;
        for ( i = 0 ; i < number ; i++ )
            System.out.print(message);
    }
}
```

and the following code has been executed:

```java
SampleClass first = new SampleClass();
SampleClass second, third;
first.number = 2;
first.message = "Hi";
second = new SampleClass();
second.number = 2*first.number;
third = first;
```

What is the output from the following statements?

(a) first.print();
Hi
(b) first.wonder();
Hi
Hi
(c) second.print();
I love Java
(d) second.wonder();
I love JavaI love JavaI love JavaI love java
(e) third.print();
Hi
7. (a) Write a for-loop that prints out the even numbers from 10 to 0:
10 8 6 4 2 0
for (int i = 10; i >= 0; i = i-2)
    System.out.print(i + " ");
(b) Write a while-loop that reads characters from the Scanner object line while there are still characters on the line and prints out any digits from the line.
while ( line.hasNext() )
{
    char ch = line.nextChar();
    if ( (ch >= '0') && (ch <= '9')
        System.out.print(ch);
}
CHECK THAT nextChar() IS THE CORRECT NAME
8. You have just been accepted a job with the Metropolitan Transit Authority (MTA). Your first assignment is to keep track of train departures. Your predecessor, before quitting, began writing a Train class. Each of the methods of the class is proceeded by a comment that explains what the method should do. Fill in each method with the appropriate code:

public class Train
{
    public String start; //The starting location of the train
    public String end; //The ending location of the train
    public int distance; //Distance travelled
    public int numCars; //Number of cars on the train
    public int people; //Number of people on the train
public Train() {
    start = end = "Grand Central Station;
    distance = numCars = people = 0;
}

/* Prints all the information about the train: */
public void print()
{
    system.out.println("Start: " + start);
    system.out.println("End: " + end);
    system.out.println("Distance: " + distance);
    system.out.println("Number of cars: " + numCars);
    system.out.println("Number of people: " + people);
}

/* Calculates and returns the number of passengers per car */
public double carDensity()
{
    return(people/numCars);
}

/* Calculates and returns the time of trip given the speed of train*/
public double tripTime( double speed )
{
    return(distance/speed);
}
}

9. Create a new class called Rectangle that extends the abstract class BoundedShape below. Your Rectangle class should have a constructor that takes two points as input (and uses the determineUpperLeft()) to store the upper left hand corner as well as the height and width. You should also write a method draw() that draws a rectangle to the screen with upper left point, upperLeft, and the given height and width.

import java.awt.*;
public abstract class BoundedShape extends Shape
{
    protected Point upperLeft;
    protected int width, height;
    protected boolean filled;
// Creates and returns a point representing the upper left corner of a
// bounding rectangle based on two points.
protected Point determineUpperLeft(Point p1, Point p2)
{
    int x = (int) Math.min(p1.getX(), p2.getX());
    int y = (int) Math.min(p1.getY(), p2.getY());
    return new Point(x, y);
}

//****************************************************************************
// Rectangle.java Programming with Alice and Java
//
// Represents a rectangle that can be drawn in a particular graphics context.
//****************************************************************************
import java.awt.*;

public class Rectangle extends BoundedShape
{
    // Sets the characteristics of the rectangle based on two points.
    public Rectangle(Point p1, Point p2, Color shade, boolean isFilled)
    {
        upperLeft = determineUpperLeft(p1, p2);
        width = (int) Math.abs(p1.getX()-p2.getX());
        height = (int) Math.abs(p1.getY()-p2.getY());
        filled = isFilled;
        color = shade;
    }

    // Draws the rectangle in the specified graphics context.
    public void draw(Graphics gc)
    {
        gc.setColor(color);
        int x = (int) upperLeft.getX();
        int y = (int) upperLeft.getY();
        if (filled)
            gc.fillRect(x, y, width, height);
    }
}
else
gc.drawRect(x, y, width, height);
}
}

10. Write a **complete** Java program that asks the user for their full name, and then prints out their initials.
For example, if the user enters: **Herbert H Lehman**
Your program should print out: **The initials are HHL**.

```java
public class Initials {
    public static void main(String[] args) {
        Scanner line = new Scanner(System.in);

        System.out.println("Please enter your full name:");

        System.out.print("The initials are ");
        while ( line.hasNext() ) {
            char ch = line.next().charAt(0);
            System.out.print(ch);
        }
        System.out.println();
    }
}
```