Exam Rules

- Show all your work. Your grade will be based on the work shown.
- The exam is closed book and closed notes.
- When taking the exam, you may have with you pens or pencils, and an 8 1/2” x 11” piece of paper filled with notes, programs, etc.
- You may not use a computer or calculator.
- All books and bags must be left at the front of the classroom during this exam.
- Do not open this exams until instructed to do so.

| Question 1 |   |
| Question 2 |   |
| Question 3 |   |
| Question 4 |   |
| Question 5 |   |
| Question 6 |   |
| Question 7 |   |
| Question 8 |   |
| Question 9 |   |
| Question 10|   |
| TOTAL      |   |
1. True or False:

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

(b) a variable score which is 8.25:

(c) a string variable me that holds your name:

(d) an object smiley of the class Circle:

(e) a list ShapesToDraw of 5 Shape objects:
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

(b) Events

When is clicked on left button.Button
Do:
    If left button.depressed
        left button.raiseButton
    Else
        left button.depressButton

While left button.depressed is true
   Begin: Nothing
   During: left button.playMusic
   End: Nothing
4. What is the output of the following code fragments:

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

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

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

(d) Output:
```java
text
```
```
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");

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

(c) int x = 3, y = 3, z = 4;
if ( x+y*z > 15 )
   System.out.println("Yes");
else
   System.out.println("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");

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

Output: 

(b) first.wonder();

Output: 

(c) second.print();

Output: 

(d) second.wonder();

Output: 

(e) third.print();

Output: 

6
7. (a) Write a for-loop that prints out the even numbers from 10 to 0:
   10 8 6 4 2 0

(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.
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:

```java
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() {
        // Code to print all the information about the train
    }

    /* Calculates and returns the number of passengers per car */
    public double carDensity() {
        // Code to calculate passengers per car
    }

    /* Calculates and returns the time of trip given the speed of train */
    public double tripTime(double speed) {
        // Code to calculate the trip time
    }
}
```
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.

```java
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);
    }
}
```
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.**