Final Exam
Computer Programming 230
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City University of New York
Thursday, 17 December 2009

NAME (Printed) _____
NAME (Signed) _____
E-mail _____

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
```

Events

(b)

```
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:**

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

(b) **Output:**

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

(c) **Output:**

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

(d) **Output:**

```
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:

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

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

(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:

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

6. Assume the following class definition:

```
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:

```
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:

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:

```
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()
    {









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



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

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`.