Concordia University
COMP-248 : Object-Oriented Programming I **Fall 2011**

COMP 248 EE – Test 4

Instructions:

Date: Novembre 18th, 2011
Time: 17:45 – 19:00 (1:15h)

Only ENCS-approved calculators (with the ENCS sticker) are allowed.
No other electronic devices (including cell phones) are allowed.
No books, papers or extra notes are allowed.
Answer directly on this questionnaire.

Identification:

Last Name: _____

First Name : _____

Student ID : _____

Signature: _____

Marking scheme (for the instructor's use only):

QUESTION 1	QUESTION 2	QUESTION 3	QUESTION 4	**TOTAL**
/ 16	/ 36	/ 15	/ 33	**/ 100**

Question 1 (16pts) Multiple Choice – Circle only 1 answer.

A. (4pts) What is the output of the following :

```
int [] a = new int[10];
for (int i = 0; i <= 10; i++)
   System.out.println(a[i]);
```

a) a syntax error
b) a run-time error of the type **`ArrayIndexOutOfBoundsException`**
c) a run time error because the array has not been initialized
d) 10 zeros one under the other
e) 9 zeros one under the other

B. (4pts) What is the output of the following :

```
int [] a = new int[10];
for (int i = 0; i < 10; i++)
   a[i] = 9 - i;
for (int i = 0; i < 10; i++)
   a[i] = a[a[i]];
for (int i = 0; i < 10; i++)
   System.out.print(a[i] + " ");
```

a) 0 1 2 3 4 4 3 2 1 0
b) 0 1 2 3 4 5 6 7 8 9
c) 9 8 7 6 5 4 3 2 1 0
d) 0 1 2 3 4 4 4 4 4 4
e) 1 2 3 4 5 6 7 8 9 0

C- (4pts) Which of the following may be part of a class definition?

a) instance variables
b) methods
c) constructors
d) all of the above
e) none of the above

D- (4pts) You read the following statement in a Java program that compiles and executes.

```
Submarine nautilus = new submarine();
nautilus.dive(depth);
```

What can you say for sure?

a) **`depth`** must be an **`int`**
b) **`dive`** must be a method
c) **`dive`** must be the name of an instance variable
d) **`nautilus`** must be the name of a class
e) **`Submarine`** must be a method

Question 2 (36pts) Assume the following class that represents a bicycle:

```
public class Bicycle {
   private int cadence;
   private int speed;
   private int gear;

   public void changeCadence(int newValue) {
      cadence = newValue;
   }

   public void changeGear(int newValue) {
       gear = newValue;
   }

   public void speedUp(int increment) {
      speed = speed + increment;
   }

   public void applyBrakes(int decrement) {
      speed = speed - decrement;
   }

   public void printStates() {
      System.out.println(cadence + " " + speed + " " + gear);
   }
}
```

And assume the following driver:

```
public class BicycleDriver
{
   public static void main(String[] args)
   {
      Bicycle bike1 = new Bicycle();
      Bicycle bike2 = new Bicycle();

      bike1.printStates();
      bike1.changeCadence(50);
      bike1.printStates();
      bike1.speedUp(10);
      bike1.changeGear(2);
      bike1.printStates();


      bike2.printStates();
      bike2.speedUp(10);
      bike2.speedUp(30);
      bike2.printStates();
   }
}
```

A- (10pts) What is the output of the `BicycleDriver` program?

Answer:

B-(6pts) Write a method called `stop` that could be placed in the `Bicycle` class and whose purpose is to stop the bicycle (to set its speed to 0).

Answer:

C- (10pts) Write a method called `isGoingFasterThan` that could be placed in the `Bicycle` class and that determines and returns if a bicycle is going faster then a specific speed.

Answer:

D- (10pts) Write the necessary statements that could be placed inside the driver to display the message "slow down" if `bike1` is going faster than 35. You must call the method that you defined in part C above.

Answer:

Question 3 (15pts) Assume the following fragment of code:

```
char[] setA = {'a', 'b', 'd', 'e', 'f'};
char[] setB = {'d', 'a', 'c'};
boolean mystery = false;

for (int i = 0; i < setA.length; i++)
{
   mystery = false;
   for (int j = 0; (j < setB.length && !mystery); j++)
      if (setA[i] == setB[j])
         mystery = true;
   if (!mystery)
      System.out.print(setA[i] + " ");
}
```

A- (10pts) What will be the output of the code above?

Answer:

B- (5pts) Explain in plain English what the code does. Be specific. A vague answer will receive no points.

Answer:

Given 2 arrays of characters, the code displays...

Question 4 (33pts) An NxN matrix is said to be quasi-magic if:

1. it contains all integers from 1 to N^2 only once, and
2. the sum of its rows are all equal.

For example:

the 3 x 3 matrix:

4	9	2
3	5	7
8	1	6

is quasi-magic, because all digits 1 to 9 appear only once; and all rows add up to 15.

but :

4	8	2
3	5	7
9	1	6

is not quasi-magic, because the first row adds up to 14, the second row adds up to 15, and the third adds up to 16.

also:

4	3	2
3	5	7
8	1	6

is not quasi-magic, because the digit 3 appears twice.

Complete the following program to determine if a 2-D array represents a quasi-magic matrix.

```
import java.util.Scanner;

public class QuasiMagic
{
   public static void main (String[] args)
   {
       Scanner myKeyboard = new Scanner(System.in);
       System.out.println("Enter the dimension of the matrix (N)");
       int N = myKeyboard.nextInt();

// A- (3pts) Create a 2-D array to represent the NxN matrix.
            // You can assume that N will be >= 1
            // You must create space for all NxN elements, not just for the name of the array




// assume that here, we somehow fill the matrix with some values
// (the code is not shown, but assume that it is there)

// B- (15pts) Check that the matrix contains all integers from 1 to N^2 only once,
             // and display a message accordingly.
             // To verify this, I suggest that you use an array of N*N booleans and
             // you think about assignment 4
```

```
// C- (15pts) Now check that all rows of the matrix have the same sum
                // and display a message accordingly.









    }
}
```

End of the Exam