NAME: _____ ID: _____

CONCORDIA UNIVERSITY
Summer 2005
Comp 248 /1 Section AA – Introduction to Programming
Final Examination/A

Instructor: N. Acemian
Monday June 27, 2005
Duration: 3 hours

INSTRUCTIONS:

- Answer all questions on these sheets in the space provided.
- No hand calculators, books, notes or extra paper.
- No cell phones, pagettes or any other electronic devices.
- This exam is 13 pages long, including the cover page. Check that your copy is complete.
- This exam is out of 100 points.

GRADING (For Professor's use only)				
Q1 - Q10/ 25	**Q11/ 7**	**Q12/10**	**Q13/ 10**	**Q14/ 10**
Q15/ 18	**Q16/ 10**	**Q17/ 10**		**Total /100**

Multiple Choice Questions (circle only one answer) - 2.5 points/ question

Question 1. Which of the following would be a legal Java identifier?

a) i
b) class
c) ilikeclass!
d) idon'tlikeclass
e) i-like-class

Question 2. What value will z have if we execute the following assignment statement?
float z = 5 / 10;

a) z will equal 0.0
b) z will equal 0.5
c) z will equal 5.0
d) z will equal 0.05
e) none of the above, a run-time error arises because z is a float and 5 / 10 is an int

Question 3. Assume that x, y and z are all ints equal to 50, 20 and 6 respectively. What is the result of x / y / z?

a) 0
b) 12
c) 16
d) A syntax error as this is syntactically invalid
e) A run-time error because this is a division by 0

Question 4. If you want to store into the String name the value "George Clooney", you would do which statement?

a) String name = "George Clooney ";
b) String name = new String("George Clooney ");
c) String name = "George" + " " + " Clooney ";
d) String name = new String("George" + "   " + " Clooney ");
e) Any of the above would work

Question 5. Which of the following would return the last character of the String x?

a) x.charAt(0);
b) x.charAt(last);
c) x.charAt(length(x));
d) x.charAt(x.length( )-1);
e) x.charAt(x.length( ));

Question 6. Given the nested if-else structure below,

```
if (a > 0)
if (b < 0)
x = x + 5;
else
if (a > 5)
x = x + 4;
else
x = x + 3;
else
x = x + 2;
```

if x is currently 0, a = 5 and b = 5, what will x become after the above statement is executed?

a) 0
b) 2
c) 3
d) 4
e) 5

Question 7. Given the following switch statement where x is an int,

```
switch (x)
{
    case 3 : x += 1;
    case 4 : x += 2;
    case 5 : x += 3;
    case 6 : x++;
    case 7 : x += 2;
    case 8 : x--;
    case 9 : x++
 }
```

if x is currently equal to 5, what will the value of x be after the switch statement executes?

a) 5
b) 6
c) 7
d) 8
e) 10

Question 8. The relationship between a class and an object is best described as

a) classes are instances of objects
b) objects are instances of classes
c) objects and classes are the same thing
d) classes are programs while objects are variables
e) objects are the instance data of classes

Question 9. Which of the following loops would adequately add 1 to each element stored in an array *values*?

a. for(j=1;j<values.length;j++) values[j]++;
b. for(j=0;j<values.length;j++) values[j]++;
c. for(j=0;j<=values.length;j++) values[j]++;
d. for(j=0;j<values.length–1;j++) values[j]++;
e. for(j=1;j<values.length–1;j++) values[j]++;

Question 10. Assume that we have the class Airplane. A 3-by-4 two-dimensional array of objects of the class Airplane is actually:

a. A 1 dimensional array of 3 elements where each element is a reference to an array of 4 references to Airplane objects
b. A 1 dimensional array of 3 objects where each object contains a data member that is a 1 dimensional array of 4 Airplane objects
c. A 1 dimensional array of 12 elements where each element is an Airplane object
d. We cannot use 2-dimentional arrays in Java

Short Answer Questions

Question #11 (7 points) – NESTED SELECTION

Given the following code segment.

```
If (b1 == b2)
   System.out.println( “b2 and b1 have the same value”);
else if (a1 == a2)
   System.out.println(“a1 and a2 have the same value”);
else
   System.out.println(“All variables are different”);
```

a) (2 points) What will be printed if all four variables have the same value?

b) (5 points) Rewrite the above code so that when all four variables have the same values it prints out the message “All variables have the same value” as well.

Question #12. (10 points) – STRING CLASS

Write the necessary statements part of a main method to:

- prompt the user for his/her full name (given name followed by their family name separated by a space) which you read into one String variable
- print the first letter of the given name, a period, a space and the family name.

Your code should work for any name entered. Assume the user enters their name in the correct format.

Here is a sample output:

```
Please enter your name: Nancy Acemian
Your abbreviated name is: N. Acemian
```

Question #13. (10 points) – ARRAY, LOOPS
Write a static Java method *alternatingSum* that computes the alternating sum of all elements in an array.

For example if *alternatingSum* is called with an array containing 1 4 9 16 9 7 4 9 11 then it will return the sum of 1 – 4 + 9 – 16 + 9 – 7 + 4 – 9 + 11.

Question 14. (10 points) INTEGER OPERATORS
Write a static Java method called reverseSame to compare two integers to see if the first integer contains the same digits as the second integer but in reverse order.

For example,
- if num1 = 1234 and num2 = 4321 then reverseSame(num1, num2) returns true
- if num1 = 1234 and num2 = 4561 then reverseSame(num1, num2) returns false

Note: you are only allowed to use additional variables of **primitive** types. In particular, you are not allowed to use any String variables.

Question 15. (18 points) WRITE A CLASS – ARRAYS OF OBJECTS

The class Product encapsulates the concept of a product stocked in a supermarket, e.g. a jar of peanut butter. It should contain the following information:

- the UPC code of the product (all digits),
- the name of the product,
- the price of the product,
- the quantity of the product currently in stock, and
- an array of 52 boolean indicating if the product was or will be on special during each week of the current year.

Include the following constructor and methods in the class.

- A constructor which creates a new product with a given code, a given name and a given array indicating which week the product will be or was on special.. Initially, the price and the quantity should be set to zero.
- A method getName that will return the name of the product.
- A method addStock that will add a specific value to the quantity of the product in stock.
- A method outOfStock that will return true if there is none of this product in stock. Otherwise it will return false.
- A method equals to determine if 2 products are equal (have the same values for each attribute)

a) (3 points) Represent the class with a UML diagram.

b) (6 points) Write the class definition for the class Product..

c) (3 points) Create a store containing 50 Products. The name of each product will simply be the strings "product1", "product2", "product3", … "product50", the UPC code will all be zero, and the price will all be 50 cents more then the previous product (the first product will cost 50cents).

d) (3 points) Write a series of instructions to display the name of all the products in the store.

e) (3 points) Write an instruction to add 50 units to the last Product in the store.

Question 16. (10 points) What is the output of the following code?

Output

```
class Pair {
  int first, second;
  public Pair(){
        first = second = 0;
  }
  public Pair(int f, int s){
        first = f; second = s;}
  int getFirst() {
        return first;
  }
  int getSecond() {
        return second;
  }
  void setFirst(int f) {
        first = f;
  }
  void setSecond(int s) {
        second = s;
  }
  void printPair() {
     System.out.println("Pair: " + first + ", " + second);
  }
}

public class PairTest{
  public static void main(String[] args)
  {
     int i = 5;

     Pair c1 = new Pair();
     Pair c2 = new Pair(2, 3);
     c1.printPair();
     c1.setSecond(i);
     c1.printPair();
     c2.printPair();

     c2.setFirst(i * 3);
     c2.printPair();
     System.out.println(c1.getFirst());

     Pair c3 = c2;
     c3.setFirst(i * 4);
     c2.printPair();
     c3.printPair();
     if (c2 == c3)
        System.out.print(“here 1 ”);
     c3 = new Pair(4, 3);
     if (c2 == c3)
        System.out.print(“here 2 ”);
  }
}
```

Question #17. (10 points) Write the necessary statements (not a complete program) to prompt the user for a number and then print the "hour glass figure" as illustrated in the two sample outputs below. Your code should work for odd and even numbers. Assume the user enters a number > 2.

Following are two sample outputs to illustrate the cases when a user enters an even and an odd number. There is a space between each star.

Sample Output1:
Odd number entered

```
Enter a number? 5
* * * * *
  * * *
    *
  * * *
* * * * *
```

Sample Output2:
Even number entered

```
Enter a number? 6
* * * * * *
  * * * *
    * *
  * * * *
* * * * * *
```

End OF Exam