



LEBANESE AMERICAN UNIVERSITY
Department of Computer Science

CSC243
Introduction to Object Oriented Programming
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Exam I-W

94
100

Name: _____

ID: _____

Please Read Carefully:

This is a **Closed book, closed neighbor** exam. Any attempt to cheat will be severely punished. Write your name and id on the top of this page before you begin the exam.

Read each problem carefully before you begin **no questions** will be allowed **after the first 5 minutes**. If something appears unclear, please write your own assumptions.

The exam has 5 questions for a total of 125 points. Do all of them and show your work, as partial credit will be given.

Good Luck.

(-1)

2-{16 points}

For the following exercises, write **portions of code** segments that will perform the specified action. Assume that all variables have already been declared and given values.

Write a portion of a program that interchanges the value stored in variable **V1** with that stored in variable **V2**. Assume that V1 and V2 are of type int. (4 pts).

```
int temp = V1;
V1 = V2;
V2 = temp;
```

Print "Equal" if two floating point values stored in val1 and val2 are exactly equal, "Essentially Equal" if they are within 0.0001 of each other, or "Not Equal" otherwise. (6 pts).

```
if (val1 == val2) {
    System.out.println("equal");
}
else if (Math.abs(val1 - val2) <= 0.0001) {
    System.out.println("essentially equal");
}
else {
    System.out.println("not Equal");
}
```

Print "Uppercase", "Lowercase", or "Not a letter" depending on whether the character stored in ch is an uppercase alphabetic character, a lowercase alphabetic character, or not an alphabetic character at all.

```
if ((int)ch >= 65 && (int)ch <= 90) {
    System.out.println("uppercase");
}
else if ((int)ch >= 97 && (int)ch <= 122) {
    System.out.println("lower case");
}
else {
    System.out.println("not a character");
}
```

12

1-{20 points

List three good Programming Habits: (6 pts)

→ using Comments

→ using indentation or white spaces

→ Convintion of declbring variables, constants, classes, identefiers

For the following questions consider the declarations below, and then indicate the value that is assigned in each assignment statement. (14 pts)

int iResult, num1 = 19, num2 = 10, num3 = 5;
float fResult, val1 = 30.0; boolean flag;
String sResult, title = "Welcome to Programming";

▪ fResult = num1 / num3

19 / 5 = 3.0

▪ fResult = (float) num1 / num3++;

19.0 / 5 = 3.8

▪ iResult = (val1 / num3);

30.0 / 5 = 6

▪ fResult = num1 / num2 + num3 % num1;

(19 / 10) + (5 % 19)
1 + 5 = 6.0

▪ iResult = title.indexOf('t');

8

▪ sResult = title.length() + num2 + title.substring(5, 10);

27 + 10 + "me to" = "37me to"

▪ flag = (15 / 4 != 15 % 4) || ('A' == 'a')

false

false

False

Error

-2

Write a method called `randomInRange` that accepts two integer parameters representing a range. You may assume that the first parameter is less than or equal to the second, and that both are positive. The method should return a random integer in the specified range. (6 pts)

6

```
static int randomInRange (int a, int b) {  
    Random Gen = new Random();  
int x = Gen.nextInt(b-a)+a;  
    int x = Gen.nextInt(b-a+1)+a;  
    return x;  
}
```

Write a method called `Largest` that accepts three integers as parameters, and returns the largest. (Use logical operators) (6 pts)

6

```
static int Largest (int a, int b, int c) {  
    if [(a > b) && (a > c)]  
        return a;  
    else if (b > c)  
        return b;  
    else  
        return c;  
}
```

3) Public boolean equals (Complex c) {

~~// Let the current object be a1~~

~~a1~~
if [(~~a1~~Re == c.getRe) && (~~a1~~Im == c.getIm)] {

Return True;

else

Return False;

}

4) Public Static String toString () {

~~String s =~~ (Re + " + i" + Im);

Return s;

}

1) Public static void ~~set~~ ~~Re~~ (float x) {

~~Im = x;~~

Re = x; ✓

}

Public static void ~~set~~ ~~Im~~ (float y) {

Im = y; ✓

}

Public static float ~~get~~ ~~Re~~ () {

float x = Re;

Return x; ✓

}

Public static float ~~get~~ ~~Im~~ () {

float y = Im;

Return y; ✓

}

2)

Public static ~~float~~ ^{Complex} Add (Complex c) {

~~float a.getIm +~~ // ~~let the current object be a;~~

float x = ~~Re~~ + c.getRe();

float y = ~~Im~~ + c.getIm();

return new Complex (x, y); ✓

}

↖

What is the primary purpose of a constructor?

- a) To allow multiple classes to be used in a single program.
- a) To copy an actual argument to a method's parameter.
- b) To initialize each object as it is declared.
- c) To maintain a count of how many objects of a class have been created.

A variable whose scope is restricted to the method where it was declared is a(n):

- 1.5
- a. parameter
 - b. global variable
 - c. local variable
 - d. public instance data
 - e. private instance data

Garbage collection is a process that

- a) reclaims all objects
- b) reclaims objects which have been listed in a finalize statement
- c) reclaims all variables of primitive types
- d) reclaims all objects which are no longer being referenced
- e) reclaims all variables currently set to the value null

The behavior of an object is defined by the object's

- a. instance data
- b. constructor
- c. visibility modifiers
- d. methods
- e. all of the above

What is the common pattern of class definitions that in order to ensure encapsulation?

- a) A. Methods and instance variables are both private.
- b) B. Methods are private, and instance variables are public.
- c) C. Methods are public, and instance variables are private.
- d) D. Methods and instance variables are both public.

-3

Exercise 5

(15 points)

Choose the correct answer:

A unique aspect of Java that allows code compiled on one machine to be executed on a machine of a different hardware platform is Java's

- a) bytecodes
- b) syntax
- c) use of objects
- d) use of exception handling
- e) all of the above

Which of the following is true regarding Java syntax and semantics?

- a) a Java compiler can determine if you have followed proper syntax but not proper semantics
- b) a Java compiler can determine if you have followed proper semantics but not proper syntax
- c) a Java compiler can determine if you have followed both proper syntax and semantics
- d) a Java compiler cannot determine if you have followed either proper syntax or semantics
- e) a Java compiler can determine if you have followed proper syntax and can determine if you have followed proper semantics if you follow the Java naming convention rules

It is important to dissect a problem into manageable pieces before trying to solve the problem because

- a) most problems are too complex to be solved as a single, large activity
- b) most problems are solved by multiple people and it is easy to assign each piece to a separate person
- c) it is easier to integrate small pieces of a program into one program than it is to integrate one big chunk of code into one program
- d) our first solution may not solve the problem correctly
- e) all of the above

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());`

Which expression computes a pseudorandom integer between -10 and 10

- A. `(int) (Math.random() * 20) - 10`
- B. `(int) (Math.random() * 21) - 10`
- C. `(int) (Math.random() * 22) - 10`
- D. `(int) (Math.random() * 20) - 11`
- E. `(int) (Math.random() * 21) - 11`

Exercise3: (24 points)

Write a method called **average** that accepts three integer parameters and returns their average as a floating point value. (6 pts)

6

```
static float average (int a, int b, int c) {  
    float S = (float) (a+b+c)/3 ;  
    return S;  
}
```

Write a method called **mixColors** that accepts two Color objects as parameters and return a color object formed by mixing the two colors. That is the object that the method returns is composed 50% of the first color and 50% of the second color. (6 pts)

6

```
static Color mixColors (Color a, Color b) {  
    or int aRed = Color a.getRed();  
    int aGreen = Color a.getGreen();  
    int aBlue = Color a.getBlue();  
    int bRed = Color b.getRed();  
    int bGreen = Color b.getGreen();  
    int bBlue = Color b.getBlue();  
    or return new Color ( $\frac{aRed + bRed}{2}$ ,  $\frac{aGreen + bGreen}{2}$ ,  $\frac{aBlue + bBlue}{2}$ );  
}
```

Exercice4: (25 points)

A complex number is represented as follows:

$$C = \text{Re} + i \text{Im}$$

The number consists of two parts of type float.

Re, which is the real part.

Im, which is the imaginary part.

Given the following two complex numbers: $c_1 = a_1 + i b_1$ and $c_2 = a_2 + i b_2$

Addition works as follows: $c_1 + c_2 = (a_1 + a_2) + i (b_1 + b_2)$

Implement a Complex class to represent complex number in Java; it should have the following constructs:

Data members:

(Private) Re: float

// real part of the number

(Private) Im: float

// imaginary part of the number

Constructors:

Complex (float ReInitial, float ImInitial)

Construct complex number with specified values

Methods:

1) Two get methods and Two set methods for Re and Im.

2) Public Complex **Add** (Complex C)
adds C to the current complex object

3) Public boolean **equals**(Complex C)
// returns true if C and the current Object have the same values

4) Public static String **toString** ()
returns a string representation such as "A + i B"

public class Complex

{

private float Re;

private float Im;

public Complex (float ReInitial, float ImInitial) {

Re = ReInitial;

Im = ImInitial;

}