Dr. Papalaskari,

Here is the completed practice final. If my writing is not clear enough, please let me know and I will try to write more clearly. Also, if you need me to scan it, I also can do that.

CSC 1051 Algorithms and Data Structures I

Thanks!

- Jay

Name: Jay Santoro

<table>
<thead>
<tr>
<th>Question</th>
<th>Value</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10</td>
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<td>4</td>
<td>10</td>
<td></td>
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<td>10</td>
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<td>10</td>
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<td>20</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

TOTAL 100

Please answer questions in the spaces provided. If you make a mistake or for some other reason need more space, please use the back of this page or the extra blank page at the end and clearly indicate where the answer can be found.

Good luck and best wishes for a great summer!

CSC1051 Data Structures and Algorithms I

Dr. Papalaskari
1. (_____/ 10) What gets printed? Please show output as it will appear, or indicate "NO OUTPUT," or show some of the output followed by "INFINITE LOOP."

```java
int a = 0;
while (a >= 0)
    {
        a = a + 3;
        System.out.println(a);
    }
```

```
Output:
3
6
9
... INFINITE LOOP
```

```java
int a = 5;
do
    {
        a--;
        System.out.println(a);
    }while (a > 5)
```

```
Output:
4
```

```java
for (int a = 0; a > 0; a++)
    System.out.println(a);
```

```
Output: NO OUTPUT
```

```java
int[] a = {10, 30, 45};
for (int num: a)
    System.out.println(num + 2);
```

```
Output:
12
32
47
```
2. (______/ 10) Rewrite the highlighted code fragments as directed:
   a) Use if/else instead of conditional operator:

```java
Scanner scan = new Scanner(System.in);
String a = scan.nextLine();

System.out.print("Result = " + (a.length() > 3) ? 1: -1);
if (a.length() > 3) {
    System.out.print("Result = "+1);
} else {
    System.out.print("Result = "+(-1));
}
```

b) Use if/else instead of switch statement:

```java
Scanner scan = new Scanner(System.in);
char ch = scan.nextLine().charAt(0);

switch(ch) {
    case 'y': case 'Y':
        System.out.println("Positive");
        break;
    case 'N': case 'n':
        System.out.println("Negative");
        break;
    default:
        System.out.println("Not sure");
}
```

c) Use while instead of for statement:

```java
double value = 235.67;
for (int i = 10; i >= 1; i--)
{
    System.out.println(value);
    value = value/2;
}
```

```java
int i = 10;
while (i >= 1)
{
    System.out.println(value);
    value = value/2;
    i--;  
}
```
3. (____/ 10) Show what gets printed with the file contents shown below.

```java
import java.util.Scanner;

public class SomethingToDoWithFiles {
    public static void main(String[] args) throws IOException {
        File myFile1 = new File("sample1.inp");
        Scanner fileScan1 = new Scanner (myFile1);

        int count = 0;
        while (fileScan1.hasNext()) {
            String line = fileScan1.nextLine();
            Scanner scanLine = new Scanner(line);
            String[] word = new String[3];
            word[0] = scanLine.next();
            word[1] = scanLine.next();
            word[2] = scanLine.next();
            System.out.println(count + "  " + word[0]);
            count++;
        }
        System.out.println("All done " + count);
    }
}
```

<table>
<thead>
<tr>
<th>sample1.inp</th>
</tr>
</thead>
<tbody>
<tr>
<td>it was the</td>
</tr>
<tr>
<td>best of times</td>
</tr>
<tr>
<td>it was the</td>
</tr>
<tr>
<td>worst of times</td>
</tr>
</tbody>
</table>

**OUTPUT:**

```
0  it
1  best
2  it
3  worst
   All done 4
```
4. (___/10) Write a Java method `incrementMatrix()` with one parameter that is a 2D array of `int`, that adds 1 to the value of every element of the array. The method should not print or return anything.

```
public void incrementMatrix(int[][] array)
{
    for (int a=0; a < array.length; a++)
        for (int b=0; b < array[a].length; b++)
            array[a][b] += 1;
}
```

(b) Assume `incrementMatrix()` is defined as a static method in some class, and that a 2D `int` array named `myNums` has already been initialized with some values. Write a code fragment that could be used in the `main()` method of that class to invoke `incrementMatrix()` so as to increment the values stored in the array.
(Note: your answer should be one line of code).

```
incrementMatrix(myNums);
```
5. (**/ 10) Review the program and answer the questions below:

```java
import java.awt.*;
import javax.swing.JApplet;

public class FinalApplet extends JApplet
{
    public void paint( Graphics page )
    {
        Color myColor = new Color(0, 150, 0); // what’s this color?
        page.setColor( myColor );
        page.fillRect( 0, 0, 400, 300 );
        page.setColor( Color.black );
        page.drawLine(150, 0, 150, 300);
        page.setColor( Color.red );
        page.fillOval(0, -100, 200, 200 );
    }
}
```

a) For each identifier listed in the table, specify what it refers to – choose one of the following:

- **Class** .... **Method** .... **Object** .... **Package**
- *(Note: some of these may occur more than once)*

<table>
<thead>
<tr>
<th>java.awt</th>
<th>JApplet</th>
<th>Graphics</th>
<th>page</th>
<th>Color</th>
<th>myColor</th>
<th>setColor</th>
<th>fillOval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Package</td>
<td>Class</td>
<td>Class</td>
<td>object</td>
<td>Class</td>
<td>object</td>
<td>method</td>
<td>method</td>
</tr>
</tbody>
</table>

b) What do you think the `myColor` looks like? **Green**

c) Draw a sketch of the image displayed by the applet – indicate the color of each figure or line. Be sure to label the coordinate system.

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CSC1051 Data Structures and Algorithms I

Dr. Papalaskari
6. (_____/ 10) Suppose you look up a class in the Java API and find something that looks like the following (NOTE: this is a made-up class):

```java
java.mystery

Class Awesome

java.lang.Object
  java.mystery.Awesome

public class Awesome
extends Object

This is a made-up class. It does not matter what it actually does, I am just trying to see if you know how to use it.

Constructor Summary

Awesome()
  Creates a new Awesome object.

Method Summary

<table>
<thead>
<tr>
<th>double</th>
<th>compute(char y, boolean x)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mystery method 1.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>void</th>
<th>updater(int x)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mystery method 2.</td>
</tr>
</tbody>
</table>

a) What import statement do you need to include in your program in order to use this class?

```java
import java.mystery.Awesome;
```  

b) Write some code to declare variables for two objects of this class, named thing1 and thing2 (use any values of the appropriate type in the constructor).

```java
Awesome thing1 = new Awesome();
Awesome thing2 = new Awesome();
```
(Question 6, continued)
c) For each of the methods listed in the method summary, state its name, return type and the number and types of parameters it requires.

<table>
<thead>
<tr>
<th>Method name</th>
<th>Method return type</th>
<th>Required parameters for the method: (how many? of what type(s)?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>compute</td>
<td>double</td>
<td>1 character (char y) and 1 boolean variable (boolean x)</td>
</tr>
<tr>
<td>updatator</td>
<td>void</td>
<td>1 integer (int x)</td>
</tr>
</tbody>
</table>

d) Suppose you are writing a driver class that uses Awesome and you have already declared and instantiated objects thing1 and thing2. For each of the following, check the appropriate box to indicate whether it represents a valid Java statement.

<table>
<thead>
<tr>
<th>Valid Java statement?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awesome.updatator (5);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing1.updatator (int x);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing1. computate (char y, boolean x);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing1. computate ('y', true);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing1. computate ('y', false);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing2.updatator();</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thing2.updatator(0);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>if (thing2.computate('y', true) &gt; thing1.computate('y', true)) System.out.println(&quot;ok&quot;);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>if (thing2.updatator(1) == 2) System.out.println(&quot;ok&quot;);</td>
<td></td>
<td></td>
</tr>
<tr>
<td>System.out.println(thing1.computate(false, 'y'));</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

Dr. Papalaskari

these are in the wrong order
7. (____/ 10) Suppose you have a Passenger class defined as follows to represent passengers in the Titanic:

```java
public class Passenger {
    // instance data
    private int status;
    private boolean child;
    private char sex;
    private boolean survivor;

    // constructor
    public Passenger(int status, boolean child, char sex, boolean survivor) {
        this.status = status;
        this.child = child;
        this.sex = sex;
        this.survivor = survivor;
    }

    // toString() - returns String description of Passenger
    public String toString() {
        String pass = "";
        switch (status) {
            case 1: pass += "1st class\t"; break;
            case 2: pass += "2nd class\t"; break;
            case 3: pass += "3rd class\t"; break;
            case 4: pass += "crew\t"; break;
        }
        pass += (child? "child": "adult") + "\t";
        pass += ((sex == 'm') ? "male": "female") + "\t";
        pass += (survivor? "survived": "perished");

        return pass;
    }
}
```

On the next page, write the code for a PassengerData class to represent the list of passengers of the Titanic and to keep track of total number of passengers and survivors, using an array of Passenger objects. Some bits of the code and comments are already written. Use these comments as guidelines for your code, in the spaces provided on the next page. Note that you only need to implement the constructor and addPassenger() methods, which should initialize and update, respectively, the array and the two counts (i.e., count and numSurvivors).
public class PassengerData {
    private Passenger[] collection;
    private int count;
    private int numSurvivors;

    // Constructor: Creates an initially empty collection
    // with space for up to 5000 passengers.
    public PassengerData()
    {
        collection = new Passenger[5000];
        count = 0;
        numSurvivors = 0;
    }

    // Method addPassenger(): Adds a Passenger to the
    // collection.
    public void addPassenger(int status, boolean child,
                              char sex, boolean survivor)
    {
        collection[count] = new Passenger(status, child, sex, survivor);
        if (survivor == true)
            numSurvivors++;
        count++;
    }
}
8. Write a complete Java program consisting of a class AmazonItem and a driver class named Wishlist. The AmazonItem class should contain instance variables representing information such as the following:

Example:

- Shipping Weight: 1 pounds
- ASIN: B000IMZX2U
- Average Customer Review: 3.3
- Price: $31.95

- The AmazonItem class should have a constructor, accessor and mutator methods for the average customer review score, and a toString() method. Do not write code for any additional methods (no need to write accessors and mutators for all the other instance variables).

- The driver class Wishlist should implement the following algorithm:
  
- Instantiate three variables of the AmazonItem class named item1, item2, item3 (make up values for the data)
- Print the info of item1, item2, item3
- Change the average customer review score for item2 (make up a new value)
- Print the info of item1, item2, item3

Write the complete code for the two classes in the next two pages.
It is NOT necessary to include comments with your code, but be sure to use good indentation.

Notes:

- It is NOT necessary to include comments with your code, but be sure to use good indentation.

- Reminder: Formatting a number as a currency:
  Example: (assumes import java.text.NumberFormat;)

```java
NumberFormat fmt = NumberFormat.getCurrencyInstance();
System.out.println(fmt.format(3.4));
```

⇒ Prints: $3.40

Write the complete code for the two classes in the next two pages. ➔

CSC1051 Data Structures and Algorithms I

Dr. Papalaskari
```java
import java.text.NumberFormat;

public class AmazonItem {

    String ASIN;
    int shippingWeight;
    double avgReview, price;

    public AmazonItem (int x, String y, double z, double a) {
        shippingWeight = x;
        ASIN = y;
        avgReview = z;
        price = a;
    }

    public double getAvgReview () {
        return avgReview;
    }

    public void setAvgReview (int x) {
        avgReview = x;
    }

    public String toString () {
        NumberFormat Fmt = NumberFormat.getInstance();
        return "Shipping Weight: " + shippingWeight + " pounds" + "\nASIN: " + ASIN + "\nAverage Customer Review: " + avgReview + "\nPrice: " + Fmt.format(price) ;
    }
}
```
public class Wishlist
{
    public static void main(String[] args)
    {
        AmazonItem item1, item2, item3;
        item1 = new AmazonItem(2, "A2ZKZVX3V", 4.0, 49.99);
        item2 = new AmazonItem(1, "AZ1AB4X", 2.1, 19.27);
        item3 = new AmazonItem(3, "DYHDKADSP", 3.2, 29.75);
        System.out.println(item1);
        System.out.println(item2);
        System.out.println(item3);
        item2.setAvgReview(3.7);
        System.out.println(item1);
        System.out.println(item2);
        System.out.println(item3);
    }
}
9. (___/ 10) Draw the UML class diagram for the previous problem (AmazonItem + Wishlist).

```
Wish list

login(String): void

AmazonItem

ASIN : String
ShippingWeight : int
AveragePrice : double

getAvgPrice() : double
getAvgReview() : void
```