BIRZEIT UNIVERSITY

Faculty of Engineering & Technology
Computer Science Department
First Semester 2022-2023
Comp1331
Mid-Term Exam (17/01/2023)

Question	Grade
Q1	
Q2	
Q3	
Total	/106

Student Name: _____ **Student ID#:**_____

Circle your Instructor **Time :** 1.5 hours

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Question I (51%, 3 for each question)

Select the best answer for each of the following questions (1-15):

1. How many times will the following code print "Welcome to Java"?

```
int count = 0;
do {
   System.out.println("Welcome to Java");
} while (count++ < 10);
```

A) 10 (B) 8 (C) 0 (D) 11

2. What is the output of the following code?

```
public class Test {
  public static void main(String[] args) {
    int number = 0;
    int[] numbers = new int[1];
    m(number, numbers);
    System.out.println("number is " + number + " and numbers[0] is " + numbers[0]);
  }
  public static void m(int x, int[] y) {
    x = 3;
    y[0] = 3;
  }
}
```

A) number is 3 and numbers[0] is 3
B) number is 0 and numbers[0] is 3
C) number is 0 and numbers[0] is 0
D) number is 3 and numbers[0] is 0

3. Analyze the following code:

```
public class Test {
  public static void main(String[] args) {
    double[] x = {2.5, 3, 4};
    for (double value: x)
      System.out.print(value + " ");
  }
}
```

A) The program displays 2.5, 3, 4
B) The program displays 2.5 3 4
C) The program displays 2.5 3.0 4.0
D) The program has a syntax error because value is undefined.

4. Analyze the following code.

```
Class Test{
   public static void main(String[] args) {
     System.out.println(max(1, 2));
   }
   public static double max(int num1, double num2) {
     System.out.println("max(int, double) is invoked");
     if (num1 > num2)
       return num1;
     else
       return num2;
   }
   public static double max(double num1, int num2) {
     System.out.println("max(double, int) is invoked");
     if (num1 > num2)
       return num1;
     else
       return num2;
   }
}
```

A) The program runs and prints 2 followed by "max(double, int)" is invoked.
B) The program cannot compile because the compiler cannot determine which max method should be invoked.
C) The program runs and prints "max(int, double) is invoked" followed by 2.
D) The program runs and prints 2 followed by "max(int, double)" is invoked.
E) The program cannot compile because you cannot have the print statement in a non-void method.

5. In the following code, what is the output for list2:

```
public class Test {
  public static void main(String[] args) {
    int[] oldList = {1, 2, 3, 4, 5};
    reverse(oldList);
    for (int i = 0; i < oldList.length; i++)
      System.out.print(oldList[i] + " ");
  }
  public static void reverse(int[] list) {
    int[] newList = new int[list.length];
    for (int i = 0; i < list.length; i++){
      newList[i] = list[list.length - 1 - i];}
    list = newList;
  }}
```

A) The program displays 1 2 3 4 5.
B) The program displays 1 2 3 4 5 and then raises an ArrayIndexOutOfBoundsException.
C) The program displays 5 4 3 2 1.
D) The program displays 5 4 3 2 1 and then raises an ArrayIndexOutOfBoundsException.

6. Which of the following statements are correct?

A) A reference variable is an object.
B) A reference variable references to an object.
C) A data field in a class must be of a primitive type.
D) A data field in a class must be of an object type.

7. Analyze the following code:

```
public class Test {
    public static void main(String[] args) {
        int[] x = new int[5];
        int i;
        for (i = 0; i < x.length; i++)
            x[i] = i;
        System.out.println(x[i]);
    }
}
```

A) The program has a runtime error because the last statement in the main method causes ArrayIndexOutOfBoundsException.
B) The program displays 4.
C) The program has a compile error because i is not defined in the last statement in the main method.
D) The program displays 0 1 2 3 4.

8. Analyze the following code:

```
class TempClass {
	int i;
	public void TempClass(int j) {
		int i = j;
	}
}

public class C {
	public static void main(String[] args) {
		TempClass temp = new TempClass(2);
	}
}
```

A) The program has a compile error because TempClass does not have a default constructor.
B) The program has a compile error because TempClass does not have a constructor with an int argument.
C) The program compiles fine, but it does not run because class C is not public.
D) The program compiles and runs fine.

9. What is the output of the second println statement in the main method?

```
public class Foo {
	int i;
	static int s;

	public static void main(String[] args) {
		Foo f1 = new Foo();
		System.out.println("f1.i is " + f1.i + " f1.s is " + f1.s);
		Foo f2 = new Foo();
		System.out.println("f2.i is " + f2.i + " f2.s is " + f2.s);
		Foo f3 = new Foo();
		System.out.println("f3.i is " + f3.i + " f3.s is " + f3.s);
	}

	public Foo() {
		i++;
		s++;
	}
}
```

A) f2.i is 1 f2.s is 1
B) f2.i is 1 f2.s is 2
C) f2.i is 2 f2.s is 2
D) f2.i is 2 f2.s is 1

10. Encapsulation means _____.

A) that data fields should be declared private
B) that a class can extend another class
C) that a variable of supertype can refer to a subtype object
D) that a class can contain another class

11. What is the value of myCount.count displayed?

```
public class Test {
      public static void main(String[] args) {
            Count myCount = new Count();
            int times = 0;
            for (int i = 0; i < 100; i++)
                  increment(myCount, times);

            System.out.println("myCount.count =   " + myCount.count);
            System.out.println("times = " + times);
      }

      public static void increment(Count c, int times) {
            c.count++;
            times++;
      }
}
class Count {
      int count;
      Count(int c) {
            count = c;
      }
      Count() {
            count = 1;
      }
}
```

A) 101 B) 100 C) 99 D) 98

12. When invoking a method with an object argument, _____ is passed.

A) the contents of the object
B) a copy of the object
C) the reference of the object
D) the object is copied, then the reference of the copied object

13. Which of the following statements is not true about an immutable object?

A) The contents of an immutable object cannot be modified.
B) All properties of an immutable object must be private.
C) All properties of an immutable object must be of primitive types.
D) An immutable object contains no mutator methods.

14. Analyze the following code:

```
public class Test {
	public static void main(String[] args) {
		int[] x = {1, 2, 3, 4, 5};
		myTest (x, 5);
	}

	public static void myTest(int[] x, int length) {
		System.out.print(" " + x[length - 1]);
		myTest (x, length - 1);
	}
}
```

A) The program displays 1 2 3 4 6.
B) The program displays 1 2 3 4 5 and then raises an ArrayIndexOutOfBoundsException.
C) The program displays 5 4 3 2 1.
D) The program displays 5 4 3 2 1 and then raises an ArrayIndexOutOfBoundsException.

15. Given the declaration Circle[] x = new Circle[10], which of the following statement is most accurate?
A) x contains an array of ten int values.
B) x contains a reference to an array and each element in the array can hold a reference to a Circle object.
C) x contains an array of ten objects of the Circle type.
D) x contains a reference to an array and each element in the array can hold a Circle object.

16. What is the exact output of the following code?

```
double area = 3.5;
System.out.print("area");
System.out.print(area);
```

A) 3.53.5 B) 3.5 3.5 C) area 3 D) area3.5

17. Analyze the following recursive method

```
public static int h(int n) {
	if(n == 0) {
		return 1;
	}
	return 3*h(n-1);
}
```

A) Invoking h(0) returns 0.
B) Invoking h(1) leads method to run infinitely and causes a StackOverflowError..
C) Invoking h(2) returns 6.
D) Invoking h(3) returns 27.

Answers: Fill Answers in the following table (*USING CAPTIAL LETTERS ONLY*):

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Answer	D	B	C	B	A	B	A	B	B	A	A	C	C	D	B	D	D

Question II (20%)

Write the following method that returns true if the list is already sorted in increasing order.

Write a test program that prompts the user to enter a list and displays whether the list is sorted or not. Here is a sample run. Note that the first input from the user should be the number of the elements in the list.

<Output> Enter list size:8 Enter list: 10 1 5 16 61 9 11 1 The list is not sorted ***<End Output>***	***<Output>*** Enter list size:10 Enter list: 1 1 3 4 4 5 7 9 11 21 The list is already sorted ***<End Output>***

```
public class Test {
  public static void main(String[] args) {
     // Fill in the code here

     Scanner sc = new Scanner(System.in);
     System.out.print("Enter the number of elements in the array: ");
     int n = sc.nextInt();
     int[] arr = new int[n];

     System.out.print("Enter the elements of the array: ");
     for (int i = 0; i < n; i++) {
        arr[i] = sc.nextInt();
     }

     if (isSorted(arr)) {
         System.out.println("The array is sorted in increasing order.");
     } else {
         System.out.println("The array is not sorted in increasing order.");
     }

  }

  public static boolean isSorted(int[] list) {
     // Fill in the code here


     for (int i = 0; i < arr.length - 1; i++) {
          if (arr[i] > arr[i + 1]) {
               return false;
          }
     }
     return true;


  }
}
```

Question III (35%)

Design a class named ShawirmaRestaurant that contains the following:

- A private static String datatype called name
- A private String datatype called location
- A private int datatype called chickenShawirma
- A private int datatype called beefSawirma
- A private int datatype called lambSawirma
- A private double array of itemPrices
  - Assume the indices of the prices in the array as follows:
  - chickenShawirma: index 0
  - beefSawirma: index 1
  - lambSawirma: index 2
- A no-argument constructor that creates a default shawarma object using default values.
- An arguments constructor that takes name, location, itemPrices and creates a shawarma object using the input arguments.
- A private method called calculateCost that returns the total cost.
- A public method called getTotalPrice that returns the total price as follows:
  - If the total price is larger than 50, then make a 5% discount and returns the total cost
  - Else returns the total cost.
- A public 3 void methods that increment the order as follows:
  - addChickenShawirma
  - addBeefSawirma
  - addLambSawirma
- A public getter method for the name
- A public void method called printOrderInfo that print the order information as follows:

```
you have ordered the following:
chicken Shawarma: 1
beef Shawarma: 2
lamb Shawarma: 1
your total cost is: 114.0
```

(Only prints the items that have order > 0)

a. Implement the class

```
class ShawarmaRestaurant {

	private static String name;
	private String location;
	private int chickenShawarma;
	private int beefShawarma;
	private int lambShawarma;
	private double[] itemPrices;

	public ShawarmaRestaurant(String name, String location, double[]
itemPrices) {
		ShawarmaRestaurant.name = name;
		this.location = location;
		this.itemPrices = itemPrices;
	}

	public ShawarmaRestaurant() {
		this("Alreef", "Birzeit", new double[] {20, 30, 40})
	}
```

```
	public void addChickenShawarma() {
		this.chickenShawarma ++;
	}
	public void addBeefShawarma() {
		this.beefShawarma ++;
	}
	public void addLambShawarma() {
		this.lambShawarma ++;
	}
	public  static String getName() {

		return ShawarmaRestaurant.name;
	}

	private double calculateCost() {
		double cost = chickenShawarma*itemPrices[0] +
		beefShawarma*itemPrices[1] + lambShawarma*itemPrices[2];
		return cost;
	}
	public double getTotalPrice() {
		double totalPrice = calculateCost();
		if(totalPrice >= 50) {
			totalPrice = totalPrice * 0.95;
		}

		return totalPrice;
	}

	public void printOrderInfo() {
		System.out.println("you have ordered the following: ");
		if(this.chickenShawarma > 0) {
			System.out.println("chicken Shawarma: " + chickenShawarma);
		}
		if(this.beefShawarma > 0) {
			System.out.println("beef Shawarma: " + beefShawarma);
		}
		if(this.lambShawarma > 0) {
			System.out.println("lamb Shawarma: " + lambShawarma);
		}
		System.out.println("your total cost is: " + getTotalPrice());
	}
}
```

b. Write a test class using the following arguments:

Name: ALreef
Location: birzeit
Prices:
chicken Shawarma: 20
beef Shawarma: 30
lamb Shawarma: 40

```
public class Driver {
      public static void main(String[] args) {

            ShawarmaRestaurant sr = new ShawarmaRestaurant
            ("ssad", "nablus", new double[] {20, 30, 40});
            sr.addBeefShawarma();
            sr.addBeefShawarma();
            sr.addLambShawarma();
            sr.addChickenShawarma();
            sr.printOrderInfo();

}
```

System.out.println(“Best of luck ☺☺”);