Final Exam - Spring 2023 - CSCI-UA.0101-005

NAME :

DATE :

True / False (1 point each) :

1	A static method in a class can access the instance variables in the same class	
2	In a class at least one constructor must always be defined explicitly	

3	boolean[][]x=new boolean [3][];
	x[0] = new boolean[1]; x[1] = new boolean [2];
	x[2] = new boolean [3];
	
	System.out.println("x[2][2] is " + x[2][2]);	

4	A subclass cannot extend more than one class, but may implement any number of interfaces	
5	All methods in an abstract class are abstract	
6	An abstract method can also be final	
7	You cannot create an instance of an abstract class using the new operator	
8	A recursive method can also be converted to a non-recursive method using iterations	
9	Interfaces can extend one or more classes	
10	Classes can only extend one class and one interface	
11	Overridden methods bind at runtime	
12	It is possible to override methods in the same class	
13	Overridden methods have the same signature in the superclass and in the subclass	
14	Overloading means to define multiple methods with the same name and signature	
15	Overloaded methods bind at runtime	
16	Abstract classes have constructors	
17	Double.parseDouble() is an instance method of wrapper class Double	
18	Boxing (or auto-boxing) converts automatically a primitive type to an	

	object of the corresponding wrapper class	
19	The this keyword can be used to reference instance members of a class	
20	Java requires that the this(arg-list) statement appears first, before any other executable statements in the constructor	

Code reading (5 question, 8 points each)

1) .

```
public class Test {
 public static void main(String[] args) {
 String s1 = "Welcome to Java!";
 String s2 = "Welcome to Java!";
 if (s1==s2){
 System.out.println("s1 and s2 reference to the same String object");
 }
 else
 {
 System.out.println("s1 and s2 reference to different String object");
 }
 }
```

2) .

```
class A{
 public A(){
 System.out.println("Default constructor of A");
 }
}
class B extends A{
 public B(){
 System.out.println("Default constructor of B");
 }
}
public class C {
 public static void main(String[] args) {
 B b = new B();
 }
}
```

3) .

```
import java.util.ArrayList;
public class ArrayListQuestion {
 public static void main(String[] args) {
 ArrayList<String> list = new ArrayList<>();
 list.add("New York");
 ArrayList<String> list1 = list;
 list.add("Atlanta");
 list1.add("Dallas");
 System.out.println(list1);
 }
}
```

4) .

```
public class Test2Exception {
 public static void main(String[] args) {
 try{
 method();
 System.out.println("After the method call");
 }
 catch (NumberFormatException ex){
 System.out.prinln(“NumberFormatException”);
 }
 catch (RuntimeException ex){
 System.out.println("RuntimeException");
 }
 System.out.println("After the try and catch");
 }
 static void method(){
 String s = "5.6";
 Integer.parseInt(s);
 int i = 0;
 int y = 2 / i;
 System.out.println("Welcome to Java");
 }
```

5) .

```
public class Test1 {
 public static void main(String [] args){
 String s1 = new String ("Java");
 String s2 = new String ("Java");
 System.out.println((s1==s2) + " " + (s1.equals(s2)));
 }
}
```

Code writing (4 questions, 10 points each)

6) A palindrome is a word, phrase, number, or other sequence of characters which reads the same backward or forward. For example, 'radar', 'level' and 'kayak' are all palindromes. Write a method called isPalindrome that uses recursion to evaluate if a input string is a palindrome. For example: isPalindrome(“kayak”) → true and isPalindrome(“abc”) → false

7) Write a method called findLongest to find the longest consecutive block of a given number in an array. For example, if array myArray contains the values [7, 10, 10, 15, 15, 15, 15, 10, 10, 10, 15, 10, 10], the call findLongest(myArray, 10) should return 3, the length of the longest consecutive block of 10s. If the number is not in the array, it should return a zero.

8) Write a method called findLongest to find the longest consecutive block of a given number in an array. For example, if array myArray contains the values [7, 10, 10, 15, 15, 15, 15, 10, 10, 10, 15, 10, 10], the call findLongest(myArray, 10) should return 3, the length of the longest consecutive block of 10s. If the number is not in the array, it should return a zero.

9) The ShoppingCart class will be composed with an array of Item objects. The Item class should have a price field, a getPrice() method that returns a double and a one-argument constructor that takes a double that specifies the price. The ShoppingCart class should have:
Constructors: A no-argument constructor and a constructor that takes an array of Items as an argument.
Fields:
• Items: an array of Item objects (maximum 10 objects).
• numItems: An int that tracks the number of items in the users cart.
• taxRate: A double representing the tax rate to be applied, defaulted to .05
Methods:
• Setters and getters for numItems and taxRate
• addItem(Item i): Adds an item to the cart. Returns a boolean. If the cart is full, return false and do not add the item to the cart. Otherwise, add the item to the array and return true.
• subtotal(): Returns a double representing the combined cost of all the items in the cart not including tax.
• total(): Returns a double representing the subtotal plus tax. The tax amount is subtotal times the taxRate.
Write a class called ‘TestShoppingCart’ with a main method that does the following:
1. Create a ShoppingCart object.
2. Adds 10 Items to it, each item should have a randomly generated price between $0 and $100.
3. Print the subtotal, tax and total dollar amount that the customer would have to pay.