Time: 80 minutes

BIRZEIT UNIVERSITY

COMP231 (Summer 2017/2018)

Midterm Exam (July 24th 2018)

/100

Student Name: _____ Student ID#:_____

[Q1 25%] Multiple choices:

Question	1	2	3	4	5	6	7	8	9	10
Answer										

1)	Which access modifier, used when defining a method, indicates that only one such method is available for all instances of the class?
○ A)	final
○ B)	private
○ C)	protected
○ D)	static
2)	Suppose a String variable **s** is initialized to the value "***I_Love_Jerusalem!***" . What value of **s** after executing the following statement: **s.substring(2, 6)**;
○ A)	_Love
○ B)	Love_
○ C)	Love
○ D)	I Love Jerusalem!
3)	Suppose **c1** and **c2** are objects of the class **Circle**. A **Circle** has a single data **double** member, its **radius**. The **Circle** class has **only** one-argument **double** constructor (implemented correctly). What will happen when we try to execute this code? **Circle c1 = new Circle(10);** **Circle c2 = new Circle(10.0);** **boolean same = (c1.equals(c2));**
○ A)	The code will not compile because **equals** method has not been implemented in **Circle**.
○ B)	The value of **same** will be **true**.
○ C)	The value of **same** will be **false**.
○ D)	The code will not compile because the class has no one-argument **int** constructor.
4)	When you compile your Java code, the files ending with **.class** has the:
○ A)	Source code
○ B)	Byte code
○ C)	Executable code
○ D)	None of the above
5)	In Java, a class can extend
○ A)	at most 1 class
○ B)	at most 16 classes
○ C)	at most 32 classes
○ D)	as many classes as required

6)	**What is the output of the following code:**
	public class Test {
	public static int foo(int a, String s) {
	s = "Yellow";
	a = a + 2;
	return a;
	}
	public static void bar() {
	int a = 3;
	String s = "Blue";
	a = foo(a, s);
	System.out.println("a = " + a + " s = " + s);
	}
	public static void main(String args[]) {
	bar();
	}
	}

○ A)	a = 3 s = Blue
○ B)	a = 5 s = Yellow
○ C)	a = 3 s = Yellow
○ D)	a = 5 s = Blue
7)	A method in a subclass is said to _____ an inherited method if it has the same method declarations as the inherited method.
○ A)	copy
○ B)	override
○ C)	overload
○ D)	cancel
8)	A superclass method can be accessed by a subclass, even though it has been overridden by the subclass, by using the _____ keyword.
○ A)	super
○ B)	final
○ C)	static
○ D)	this
9)	The _____ access modifier hides the members of a class from the class's clients but makes them available to a subclass and to another class within the same package.
○ A)	public
○ B)	protected
○ C)	private
○ D)	package access

10)	Analyze the following code:
	public class Test {
	private int t;
	public static void main(String[] args) {
	int x;
	System.out.println(t);
	}
	}

○ A)	The variable **t** is private and therefore cannot be accessed in the **main** method.
○ B)	The variable **x** is not initialized and therefore causes errors.
○ C)	**t** is non-static and it cannot be referenced in a static context in the **main** method.
○ D)	The variable **t** is not initialized and therefore causes errors.

[Q2 30%]

Write a Java program that will count the number of vowel characters (**a, e, i, o**, **u** and their uppercases), and sum of **odd** numeric digits (**1,3,5,7,9**) in an input string.

The following is a sample execution:

[Q3 45%]

a) You are asked to implement a **TV** (television) class. The TV behaves as follows:
The television remembers (knows) whether it is **on** or **off**, the **channel** number it is currently set to (channel number is an integer between 1 and 120), and the **volume** it is currently set to (volume is an integer between 1 and 10).

A **TV** instance can be **only** constructed using **3** arguments (on/off, channel, and volume).
The following are the actions that can be performed on a TV instance:

- The TV can be turned **on** or **off**.
- The channel can be set to any channel between 1 and 120. Setting the channel to another integer causes no change to the TV.
- The volume can be increased by 1. But if the volume is already at maximum, then no change occurs.
- The volume can be decreased by 1. But if the volume is already at minimum, then no change occurs.
- Override **toString** method to return TV instance specific information.

Draw a UML diagram for the TV class and then implement the class:

UML

b) Consider the TV class in part (**a**). Write a new subclass, **Plasma** that extends the **TV** class. The **Plasma** subclass has the following:

- A two-argument constructor that takes a String argument for the television **model** and a double for the television **cost**.
- Override **toString** method to return **Plasma** instance specific information.
- Override **equals** method to compare **Plasma** TVs based on price.

c) Assume you have another TV subclass called **LED** similar to **Plasma** (no need to write it). Write a driver program to create different kind of TV instances and store them into an **ArrayList** of type **TV** (e.g. 2 **Plasma** instances, and 3 **LED** instances). Then run a **for loop** over the ArrayList and find the most expensive TV and print its information.