OOPS Assignment

Last date of submission: 20th April 2021

1. Write a program to count the number of vowels and consonants in a string. Make separate methods for counting.
2. Write a program to sort an array without using an in-built function.
3. Consider an outer class Area with two members: dimension1, dimension2. The outer class also has three inner classes: Circle, Rectangle and Triangle where the area of the corresponding shapes are computed by accessing the variables of the outer class.

4. Fix the error in the interface:

```
1 public interface SomethingIsWrong {
2       void aMethod(int aValue){
3             System.out.println("Hi Mom");
4       }
5 }
```

5. What will be the output of this program? Justify your answer

```
1 class A {
2       static {
3             System.out.println("THIRD");
4       }
5 }
6
7 class B extends A {
8             static {
9                   System.out.println("SECOND");
10            }
11 }
12
13 class C extends B {
14      static {
15            System.out.println("FIRST");
16      }
17 }
18
19 public class MainClass {
20      public static void main(String[] args) {
21            C c = new C();
22      }
23 }
```

6. What will be the output of this program? Justify your answer.

```
class A {
    int i = 10;
}

class B extends A {
    int i = 20;
    float j= 30;
}

public class MainClass {
    public static void main(String[] args) {
        A a = new B();
        System.out.println(a.i);
        System.out.println(a.j);
    }
}
```

7. Consider the following

```
public class ClassA {
    public void methodOne(int i) {
    }
    public void methodTwo(int i) {
    }
    public static void methodThree(int i) {
    }
    public static void methodFour(int i) {
    }
}

public class ClassB extends ClassA {
    public static void methodOne(int i) {
    }
    public void methodTwo(int i) {
    }
    public void methodThree(int i) {
    }
    public static void methodFour(int i) {
    }
}
```

a. Which method overrides a method in the superclass?
b. Which method hides a method in the superclass?
c. What do the other methods do?

8. If you have N eggs, then you have N/12 dozen eggs, with N%12 eggs left over. (This is essentially the definition of the / and % operators for integers.) Write a program that asks the user how many eggs he/she has and then tells the user how many dozen eggs he/she has and how many extra eggs are left over. A gross of eggs is equal to 144 eggs.

   Extend your program so that it will tell the user how many gross, how many dozen, and how many left over eggs she has. For example, if the user says that she has 1342 eggs, then your program would respond with Your number of eggs is 9 gross, 3 dozen, and 10 since 1342 is equal to 9*144 + 3*12 + 10.

9. Which integer between 1 and 10000 has the largest number of divisors, and how many divisors does it have? Write a program to find the answers and print out the results. It is possible that several integers in this range have the same, maximum number of divisors. Your program only has to print out one of them. You might need some hints about how to find a maximum value. The basic idea is to go through all the integers, keeping track of the largest number of divisors that you've seen so far. Also, keep track of the integer that had that number of divisors.
10. For this problem, you should write a very simple but complete class. The class represents a counter that counts 0, 1, 2, 3, 4, ... The name of the class should be Counter. It has one private instance variable representing the value of the counter. It has two instance methods: increment() adds one to the counter value, and getValue() returns the current counter value. Write a complete definition for the class, Counter.
11. Suppose that a class, Employee, is defined as follows:

```
class Employee {
        String lastName;
        String firstName;
        double hourlyWage;
        int yearsWithCompany;
        }
```

    Suppose that data about 100 employees is already stored in an array:

```
Employee[] employeeData = new Employee[100];
```

    Write a code segment that will output the first name, last name, and hourly wage of each employee who has been with the company for 20 years or more.
12. Write a program that reads one line of input text and breaks it up into words. The words should be output one per line. A word is defined to be a sequence of letters. Any characters in the input that are not letters should be discarded. For example, if the user inputs the line

    He said, "That's not a good idea."

    then the output of the program should be:

    He
    said
    that
    s
    not
    a
    good
    idea

13. Write a program to create a room class, the attributes of this class are room_no, room_type, room_area and ACmachine (boolean: whether the AC is on or off). In this class the member functions are set_data and display_data. Where set_data is used to set the attribute values and the method display_data is used to display the same.

14. Write a program and create a class ‘SimpleObject‘. Use a constructor to display the message.

15. Write a program in java to illustrate the use of “static” keyword. Create two methods:
    i) method to multiply two numbers without using static keyword
    ii) method to add two numbers using static keyword

16. Write a program to create a class named shape. In this class we have three subclasses: circle, triangle and square. Each class has two member functions named draw() and erase(). Create these using polymorphism concepts.

17. What will be the output

```
class Animal {

  // overridden method
  public void display(){
    System.out.println("I am an animal");
  }
}

class Dog extends Animal {

  // overriding method
  @Override
  public void display(){
    System.out.println("I am a dog");
  }

  public void printMessage(){
    display();
  }
}

class Main {
  public static void main(String[] args) {
    Dog dog1 = new Dog();
    dog1.printMessage();
  }
}
```