كـلية الشـرق الأوسـط
Middle East College

COMP 20043

OOPM

LAB EXERCISE WEEK 4

```
class Person {
   String name; int age;
   void setName(String n) {
      name = n;
   }
String getName(){
return name;}

void setAge(int a){
age = a;
}
int getAge(){
return age;}
}

class Main {
   public static void main(String[] args) {
      Person P = new Person();
      P.setName( "Ahmed");
      P.setAge ( 25);
      System.out.println(“Person Name” + P.getName());
     System.out.println(“Person Age” + P.getAge());
   }}
```

This program features a class called Person with two instance variables, name and age, and set and get methods to set the values to the variables and return their values respectively.
In the Main class, we create an object of the Person class named P, set the values of its properties using **set** methods, and call its **get** methods to print the properties to the console.

Tasks

1. Create a class called Box having variables length , L, breadth,B and height,H. Also the following methods
    i. Method *giveValues*() to assign values to the variables with the values passed as parameter from the main method
    ii. Method *calcArea*() to calculate the area of the box and display all the area. The formula to calculate the area of the box is 2(LB + LH + BH)
    iii. Method calcVolume() to calculate the volume of the box and display all the volume. The formula to calculate the volume of the box is L* B* H

   Create another class that hosts the main method. And create 3 objects of the Box class. Call all the methods to check their functionality

2. Create a Parent class named *Employee*. The class should have three instance variables: empname, empid and salary. Also Two methods: getData() and setData() . setData() function should assign some value for the variables using parameters. getData() function should display the values of the variables. Create a derived class named Manager of Employee class. The class should have One variable: Bonus. Also two methods : getBonus() and setBonus() . setBonus function should set the values for Bonus. getBonus() method should display the values of Bonus. Create a main class in which you need to create an 2 objects of class manager .Call all the functions of both parent and child classes to check their functionalities.

3. Create a class called "Employee" with attributes empName, empID, and salary. Implement the concept of constructor overloading by having a parameterized constructor and non-parameterized constructor to initialize the class attributes. The class should also have a method display to print the value of the attributes.
   In a separate class, create two instances/objects of the Employee class, one using parameterized constructor and other using non parameterized constructor. Display the information of the two employees by calling the display method.

4. Design a Java program using the concept of method overloading in a class named Calculator. The class should have an attributes to store final calculation results. The class should have 4 multiply methods that can multiply two integer numbers, three integer numbers,2 double numbers and 3 double numbers respectively. A method to display the calculated result should also be available . In a separate class, create an instance of the Calculator class, perform various multiplication operations using the overloaded Multiply methods, and display the results.

5. Write a JAVA program to implement Run-Time Polymorphism (Dynamic Binding or Late Binding) through Method Overriding. First create a class called Animal with instance variables name and age, as well as methods to set and get the values of these variables. One more method sound() to print the message "Animal makes a sound". Then, create first subclass called Dog that adds additional instance variables breed and methods to set and get its values. One more method sound() to print the message "Dog barks" . Then, create second subclass called Cat that adds additional instance variables breed and methods to set and get their values. One more method

sound() to print the message " Cat meows"". Define another class that hosts the main method. Inside the main method: Create an object of the Animal class instance. Call the methods of Dog and cat class by assigning their objects to animal class. Call the **set** and **get and sound()** methods using the instance/object created to display their functionality.

6. Write a Java program to implement the concept of polymorphism using constructor overloading in class called **shape**. The class should have 2 instance variables called **length** and **breadth. Also** one default constructor which should initialize the instance variables with some values. The class should also have a second parameterized constructor that initializes the instance variables with the parameter passed from the main method. The class should also have a method called as **check** which displays a message whether it is a square or a rectangle. Create another class that hosts the main method. Create an object of the shape class which invokes the first constructor and create another object that invokes the second constructor. Call the **check** method for all the objects.