**LAB 1&2: WRITE OOP PROGRAMS WITH C++ AND JAVA**

**PRACTICES WITH CLASS, OBJECT, CONSTRUCTOR**

1. **Declare the Rectangle class to describe a rectangle. The class should have a method that calculates the rectangle area.**

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| **//JAVA**  **// WITHOUT CONSTRUCTOR**  **class Rectangle**  **{**  **private double width, height;**  **public void input(double x, double y)**  **{**  **width =x;**  **height =y;**  **}**  **public double area()**  **{**  **return width \* height;**  **}**  **public static void main(String args[])**  **{**  **Rectangle rec1 = new Rectangle();**  **Rectangle rec2 = new Rectangle();**  **rec1.input(23, 20);**  **rec2.input(40,50);**  **System.*out*.println("area of rec1 is : "+rec1.area());**  **System.*out*.println("area of rec2 is : "+rec2.area());**  **}**  **}** | **//C++**  **// WITHOUT CONSTRUCTOR**  **#include <iostream>**  **#include <conio.h>**  **using namespace std;**  **class Rectangle**  **{**  **private:**  **double** width, height;  **public:**  **void input(double x, double y)**  **{**  width =x;  height =y;  **}**  **double area()**  **{**  return width \* height;  **}**  **};**  **main()**  **{**  Rectangle rec1;  Rectangle rec2;  rec1.input(23, 20);  rec2.input(40,50);  cout<<"area of rec1 is : "<< rec1.area();  cout<<"\n area of rec2 is : "<<rec2.area();  getch();  **}** |

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| **//JAVA**  **// WITH CONSTRUCTOR**  **class Rectangle**  **{**  **private double width, height;**  **public Rectangle (double x, double y)**  **{**  **width =x;**  **height =y;**  **}**  **public double area()**  **{**  **return width \* height;**  **}**  **public static void main(String args[])**  **{**  **Rectangle rec1 = new Rectangle(23,20);**  **Rectangle rec2 = new Rectangle(40,50);**  **System.*out*.println("area of rec1 is : "+rec1.area());**  **System.*out*.println("area of rec2 is : "+rec2.area());**  **}**  **}** | **//C++**  **// WITH CONSTRUCTOR**  **#include <iostream>**  **#include <conio.h>**  **using namespace std;**  **class Rectangle**  **{**  **private:**  **double** width, height;  **public:**  **Rectangle (double x, double y)**  **{**  width =x;  height =y;  **}**  **double area()**  **{**  return width \* height;  **}**  **};**  **main()**  **{**  Rectangle rec1(23,20);  Rectangle rec2 (40,50);  cout<<"area of rec1 is : "<< rec1.area();  cout<<"\n area of rec2 is : "<<rec2.area();  getch();  **}** |

**2. Declare a class that describes a cube. The class should contain a method that calculates the cube volume. Test the class you wrote.**

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| **//JAVA**  **// WITH CONSTRUCTOR**  **class** Cube  {  **private** **double** size=10;  Cube(**double** val)  {  **if**(val>0)  {  size = val;  }  }  **void** setSize(**double** val)  {  **if**(val>0)  {  size = val;  }  }  **double** getSize()  {  **return** size;  }  **double** volume()  {  **return** size\*size\*size;  }  **void** details()  {  System.*out*.println("\ndetails of rectangle");  System.*out*.println("width="+size);  System.*out*.println("height="+size);  System.*out*.println("length="+size);  System.*out*.println("volume="+volume()+"\n\n");  }  **public** **static** **void** main(String args[])  {  Cube cube1, cube2, cube3;  cube1 = **new** Cube(4);  cube2 = **new** Cube(3);  cube3 = **new** Cube(-2);  cube1.details();  cube2.details();  cube3.details();  }  } | **//C++**  **// WITH CONSTRUCTOR**  **COMPLETE BY YOURSELF** |

**3.     Declare a class that describes a circle. The class should contain a method that calculates (and returns) the circle area and a method that calculates (and returns) the perimeter. You should use the PI static variable and the pow static method that belongs to the class Math. Test the class you wrote.**

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| **//JAVA**  **// WITH CONSTRUCTOR**  **COMPLETE BY YOURSELF** | **//C++**  **// WITH CONSTRUCTOR**  **#include <iostream>**  **#include <conio.h>**  **#include <math.h>**  **using namespace std;**  **class Circle**  **{**  **private:**  **double radius;**    **public:**    **Circle(double value)**  **{**  **radius = value;**  **}**  **double perimeter()**  **{**  **return 2\*M\_PI\*radius;**  **}**  **double area()**  **{**  **return M\_PI \* pow(radius,2);**  **}**  **};**  **main()**  **{**  **Circle circ1(8), circ2(16);**  **cout<<"area of circ1 is : "<< circ1.area();**  **cout<<"perimeter of circ1 is : "<<circ1.perimeter();**  **cout<<"area of circ2 is : "<< circ2.area();**  **cout<<"perimeter of circ2 is : "<<circ2.perimeter();**    **getch();**  **}** |

**4.     Declare a class that describes a point in the 3D space (each object of this class should have three variables: x, y and z). The class should have the following instance methods:  
- a method that calculates the distance between the current point (on which the method in invoked) to another point.  
- a method that calculates the distance between the current point (on which the method is invoked) to the center.  
- a method that prints all the details of the point.  
You should check the class using a main method.**

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| **//JAVA**  **// WITH CONSTRUCTOR**  **public** **class** Point3D  {  **private** **double** x,y,z;  **public** Point3D(**double** x, **double** y, **double** z)  {  **this**.x = x;  **this**.y = y;  **this**.z = z;  }  **public** **double** distanceFromCenter()  {  **return** distanceFrom(0,0,0);  }  **public** **double** distanceFrom(Point3D other)  {  **return** Math.*sqrt*( Math.*pow*(x-other.x,2)+  Math.*pow*(y-other.y,2)+  Math.*pow*(z-other.z,2));  }    **public** **double** distanceFrom(**double** xVal, **double** yVal, **double** zVal)  {  **COMPLETE BY YOURSELF**  }  **public** **void** details()  {  System.*out*.println("x="+x+ "y="+y+" z="+z);  }  **public** **static** **void** main(String args[])  {  Point3D point1, point2;  point1 = **new** Point3D(2,3,4);  point2 = **new** Point3D(3,7,8);  System.*out*.print("point1:");  point1.details();  System.*out*.print("point2:");  point2.details();  System.*out*.println("The distance between point1 and (0,0,0) is : " +  point1.distanceFromCenter());  System.*out*.println("The distance between point1 and point2 is : " +  point1.distanceFrom(point2));  }  } | **//C++**  **// WITH CONSTRUCTOR**  **COMPLETE BY YOURSELF** |

**5.     The following class describes a student. Since the Student class has a main method you can run it as a standalone application. You should add a new method that computes the average marks of the student, and check it by removing the remarks signs.**public class Student   
{  
          private String name;  
          private long id;  
          private double mathMark, englishMark, physicsMark, chemistryMark;  
          public Student(String name, long id)  
          {  
                   this.name = name;  
                   this.id = id;  
          }  
          public void setMathMark(double value)  
          {  
                   if(value>0 && value<=100)  
                   {  
                             mathMark = value;  
                   }

                    }  
                   public void setEnglishMark (double value)  
                   {  
                             if(value>0 && value<=100)

                             {

                                      englishMark = value;

                             }

                   }

                   public void setPhysicsMark (double value)

                   {

                             if(value>0 && value<=100)

                             {

                                      physicsMark = value;

                             }

                   }

                   public void setChemistryMark (double value)

                   {

                             if(value>0 && value<=100)

                   {

                             chemistryMark = value;

                   }

          }

          public double getAverage()

          {

                   double result=0;

                   //add your code here

                   return result;

          }

          public void displayDetails()

          {

                   System.out.println(“name=”+name);

                   System.out.println(“id=”+id);

                   //System.out.println(“average=”+getAverage());

}

          public static void main(String args[])

          {

                   Student std = new Student(“Haim”,123123);

                   std.setChemistryMark(98);

                   std.setEnglishMark(88);

                   std.setPhysicsMark(78);

                   std.setMathMark(100);

                   std.displayDetails();

}

}

**CONVERT THE PROGRAM BELOW INTO C++**

**6.     Declare a class that describes a bank account. The class should have the following variables:  
- balance: double  
- id: long  
and it should also have the following two methods:  
- deposit(double): void  
- withdraw(double): void  
Check the class you declared by instantiating it and invoking the deposit and the withdraw methods.**

**COMPLETE IT BY YOURSELF IN JAVA AND C++**