OOPS PRACTICAL 6

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Course Code: 2CS302

Course Name: Object Oriented Programming

Practical 6A

```java
package com.company;
import java.util.*;
class Rectangle{
    public double len;
    public double bred;
    Rectangle(){
        len=0;
        bred=0;
    }
    public void set(double len,double bred){
        if(len>=0.0 && len<=20.0 && bred>=0.0 && bred<=20.0){
            this.len=len;
            this.bred=bred;
        }
        else{
            System.out.println("Enter values of length and breadth between 0.0 to
20.0.");
        }
    }
    Rectangle(double len,double bred){
        this.len=len;
        this.bred=bred;
    }
    public double getLen() {
        return len;
    }
    public void setLen(double len) {
        this.len = len;
    }
    public double getBred() {
        return bred;
    }
    public void setBred(double bred) {
        this.bred = bred;
    }
    public double perimeter(){
        return (2*len+2*bred);
    }
    public double area(){
        return (len*bred);
    }
    public void display(double len,double bred,double area,double perimeter){
        System.out.println("The Length is:"+len);
        System.out.println("The Breadth is:"+bred);
        System.out.println("The Perimeter is:"+perimeter());
        System.out.println("The Area is:"+area());
    }
}
public class TestRectangle {
    public static void main(String[] args) {
```

```java
        Scanner sc=new Scanner(System.in);
        double len,bred,area,perimeter;
        System.out.println("Rectangle 1");
        Rectangle r1=new Rectangle();
        System.out.println("Enter length and breadth:");
        r1.set(sc.nextDouble(),sc.nextDouble());
        len=r1.getLen();
        bred=r1.getBred();
        area=r1.area();
        perimeter=r1.perimeter();
        r1.display(len,bred,area,perimeter);
        System.out.println("\n");
        System.out.println("Rectangle 2");
        Rectangle r2=new Rectangle();
        System.out.println("Enter length and breadth:");
        r2.set(sc.nextDouble(),sc.nextDouble());
        len=r2.getLen();
        bred=r2.getBred();
        area=r2.area();
        perimeter=r2.perimeter();
        r2.display(len,bred,area,perimeter);
        System.out.println("\n");
        System.out.println("Rectangle 3");
        Rectangle r3=new Rectangle();
        System.out.println("Enter length and breadth:");
        r3.set(sc.nextDouble(),sc.nextDouble());
        len=r3.getLen();
        bred=r3.getBred();
        area=r3.area();
        perimeter=r3.perimeter();
        r3.display(len,bred,area,perimeter);
        System.out.println("\n");
        System.out.println("Rectangle 4");
        Rectangle r4=new Rectangle();
        System.out.println("Enter length and breadth:");
        r4.set(sc.nextDouble(),sc.nextDouble());
        len=r4.getLen();
        bred=r4.getBred();
        area=r4.area();
        perimeter=r4.perimeter();
        r4.display(len,bred,area,perimeter);
        System.out.println("\n");
        System.out.println("Rectangle 5");
        Rectangle r5=new Rectangle();
        System.out.println("Enter length and breadth:");
        r5.set(sc.nextDouble(),sc.nextDouble());
        len=r5.getLen();
        bred=r5.getBred();
        area=r5.area();
        perimeter=r5.perimeter();
        r5.display(len,bred,area,perimeter);
        System.out.println("\n");

    }
}
```

OUTPUT

```
Run:    TestRectangle ×
  ▶  ↑    "C:\Program Files\Java\jdk-16.0.1\bin\java.exe" "-javaagent:C:\Program Fi
  ■  ↓    Rectangle 1
  ⊙  ⇛    Enter length and breadth:
  ⬙  ⬛    12 6
  ⟶  ⎙    The Length is:12.0
  ▥  ⬛    The Breadth is:6.0
  ⌖        The Perimeter is:36.0
            The Area is:72.0


            Rectangle 2
            Enter length and breadth:
            9 8
            The Length is:9.0
            The Breadth is:8.0
            The Perimeter is:34.0
            The Area is:72.0


            Rectangle 3
            Enter length and breadth:
            21 8
            Enter values of length and breadth between 0.0 to 20.0.
            The Length is:0.0
            The Breadth is:0.0
            The Perimeter is:0.0
            The Area is:0.0
```

```
Run:    TestRectangle ×
  ▶  ↑    Rectangle 3
  ■  ↓    Enter length and breadth:
  ⊙  ⇛    21 8
  ⬙  ⬛    Enter values of length and breadth between 0.0 to 20.0.
  ⟶  ⎙    The Length is:0.0
  ▥        The Breadth is:0.0
  ⌖        The Perimeter is:0.0
            The Area is:0.0


            Rectangle 4
            Enter length and breadth:
            4 9
            The Length is:4.0
            The Breadth is:9.0
            The Perimeter is:26.0
            The Area is:36.0


            Rectangle 5
            Enter length and breadth:
            5 8
            The Length is:5.0
            The Breadth is:8.0
            The Perimeter is:26.0
            The Area is:40.0


            Process finished with exit code 0
```
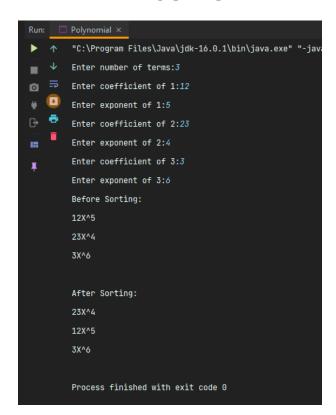
THEORETICAL PRINCIPLES USED:

In this practical we define a class Rectangle,
TestRectangle and other different methods to calculate
area and perimeter of Rectangle and also we have created
5 objects of class Rectangle.

Practical 6B

```java
import java.util.*;
class Term{
    int coeff,expo;
    Term() {
        this.coeff = 0;
        this.expo = -99;
    }
}
public class Polynomial {
    Term t[]=new Term[100];
    int len=0;
    Polynomial(){
        for(int i=0;i<100;i++){
            this.t[i]=new Term();
        }
    }
    public boolean excheck(int ex){
        for(int i=0;i<len;i++) {
            if (ex == this.t[len].expo)
                return true;
        }
        return false;
    }
    public void setTerm(int cf,int ex) {
        if (excheck(ex)) {
            System.out.println("Exponent already exists!!");
        }
        else if(len>100){
            System.out.println("Array limit is exceeded!!");
        }
        else if(ex<0){
            System.out.println("Exponent is Negative!!");
        }
        else {
            this.t[len].coeff = cf;
            this.t[len].expo = ex;
            len++;
        }
    }
    public void sort(){
        for(int i=0;i<this.len;i++){
            for(int j=i+1;j<this.len;j++){
                if(t[i].expo>t[j].expo){
                    Term temp=new Term();
                    temp=t[i];
                    t[i]=t[j];
                    t[j]=temp;
                }
            }
        }
    }
    public void display(){
        for(int i=0;i<len;i++){
            System.out.println(this.t[i].coeff+"X^"+this.t[i].expo);
        }
        System.out.print(" ");
    }
    public static void main(String[] args) {
    Scanner sc=new Scanner(System.in);
        System.out.print("Enter number of terms:");
        int n=sc.nextInt();
        Polynomial p=new Polynomial();
        for(int i=0;i<n;i++){
            System.out.printf("Enter coefficient of %d:",i+1);
            int c= sc.nextInt();
```

```
        System.out.printf("Enter exponent of %d:",i+1);
        int e= sc.nextInt();
        p.setTerm(c,e);
    }
    System.out.println("Before Sorting:");
    p.display();
    System.out.println("");
    System.out.println("After Sorting:");
    p.sort();
    p.display();
    }
}
```

OUTPUT

```
Run:    ☐ Polynomial ×
 ▶  ↑    "C:\Program Files\Java\jdk-16.0.1\bin\java.exe" "-java
 ■  ↓    Enter number of terms:3
 ◻  ⇥    Enter coefficient of 1:12
 ⏻  ⊡    Enter exponent of 1:5
 ⤷  🖨    Enter coefficient of 2:23
 ⎕  🗑    Enter exponent of 2:4
         Enter coefficient of 3:3
 📌      Enter exponent of 3:6
         Before Sorting:

         12X^5

         23X^4

         3X^6


         After Sorting:

         23X^4

         12X^5

         3X^6


         Process finished with exit code 0
```

THEORETICAL PRINCIPLES USED:

In this practical we create a class Term , Polynomial and
we define different methods like setTerm(), sort() (which
sorts according to ascending order of exponents) and
display().

Practical 6C

```java
package com.company;
import java.util.*;
import java.lang.*;
class complex{
    private float real,imag;
    complex(){
        real=1.f;
        imag=1.f;
    }
    complex(float a,float b){
        this.real=a;
        this.imag=b;
    }
    static void display(complex c1){
        if(c1.imag<0){

            System.out.print(c1.real + "+i ( "+ c1.imag +" )");
        }else {
            System.out.print(c1.real + "+i" + c1.imag);
        }
    }
    static void add(complex c1,complex c2){
        float x=c1.real+c2.real;
        float y=c1.imag+c2.imag;
        System.out.print(x+"+i"+y);
    }
    static void subtract(complex c1,complex c2){
        float x=c1.real-c2.real;
        float y=c1.imag-c2.imag;
        if(y<0){
            y=y*-1;
            System.out.print(x+"-i "+y);
        }else {
            System.out.print(x+"+i "+y);
        }


    }
}
public class complex6c {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        complex c1=new complex();
        float r1,i1,r2,i2;
        boolean ch=true;
        while(ch) {
            System.out.println("1->Addition of Complex Numbers.");
            System.out.println("2->Subtraction of Complex Numbers.");
            System.out.println("3->Exit");
            System.out.print("Enter your choice:");
            int c=sc.nextInt();
            switch(c){
                case 1:
                    System.out.println("Enter the real and imaginary values in the
complex number:");
                    r1=sc.nextFloat();
                    i1=sc.nextFloat();
                    complex c2 = new complex(r1, i1);
                    System.out.print("Sum of ");
                    complex.display(c1);
                    System.out.print(" & ");
                    complex.display(c2);
                    System.out.print(" is : \n");
                    complex.add(c1,c2);
                    break;
                case 2:
```

```
                     System.out.println("Enter the real and imaginary values in the
complex number:");
                     r2=sc.nextFloat();
                     i2=sc.nextFloat();
                     complex c3 = new complex(r2, i2);
                     System.out.print("Difference of ");
                     complex.display(c1);
                     System.out.print(" & ");
                     complex.display(c3);
                     System.out.print(" is : ");
                     complex.subtract(c1,c3);
                     break;
                 case 3:
                     System.exit(0);
             }
             System.out.print("\n");
         }
     }
}
```

OUTPUT
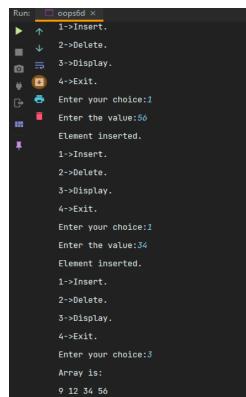

THEORETICAL PRINCIPLES USED:

In this practical we create a complex class which defines various methods like addition of the complex generated by constructor and other one input by user. It also provides method for subtraction for the same and also method for displaying the result complex number.

Practical 6D

```java
package com.company;
import java.util.*;
import java.lang.*;
class GSSArray{
    private int arr[];
    int size;
    private int li=-1;
    GSSArray(int s){
        this.size=s;
        this.arr=new int[this.size];
    }
    public void insert(int val){
        if(li==-1){ //Empty
            arr[0]=val;
            li=0;
            System.out.println("Element inserted.");
        }
        else{//Not Empty
            if(li==size-1){
                increaseSize();
            }
            if(val<=arr[0]){
                for(int k=li;k>=0;k--){
                    arr[k+1]=arr[k];
                }
                arr[0]=val;
            }
            else if(val>arr[li]){
                arr[li+1]=val;
            }
            else{
                for(int i=li;i>=0;i--){
                    if(val>arr[i]){
                        for(int j=li;j>i;j--){
                            arr[j+1]=arr[j];
                        }
                        arr[i+1]=val;
                        break;
                    }
                }
            }
            li++;
            System.out.println("Element inserted.");
        }
    }
    public void display(){
        if(li==-1){
            System.out.println("Empty Array.");
        }
        else {
            for (int i = 0; i < arr.length; i++) {
                System.out.print(arr[i] + " ");
            }
        }
        System.out.println("");
    }
    private void increaseSize() {
        int a[] = new int[this.size]; //doubling size
        for (int i = 0; i < arr.length; i++) {
            a[i] = arr[i];
        }
        this.arr= new int[this.size*2];
        for (int i = 0; i < a.length; i++) {
            arr[i] = a[i];
        }
    }
```

```java
        }
        public boolean delete(int val){
        boolean ch=false;
            for(int i=0;i<arr.length;i++){
                if(arr[i]==val){
                    for(int j=i;j<li;j++){
                        arr[j]=arr[j+1];
                    }
                    arr[li]=0;
                    li--;
                    ch=true;
                    return ch;
                }
            }
            return ch;
        }
    }

public class oops6d {
    public static void main(String[] args) {
        Scanner sc=new Scanner(System.in);
        boolean ch=true;
        System.out.print("Enter intial size:");
        int n=sc.nextInt();
        GSSArray gs=new GSSArray(n);
        while(ch){
            System.out.println("1->Insert.");
            System.out.println("2->Delete.");
            System.out.println("3->Display.");
            System.out.println("4->Exit.");
            System.out.print("Enter your choice:");
            int yc=sc.nextInt();
            switch(yc){
                case 1:
                    System.out.print("Enter the value:");
                    int val=sc.nextInt();
                    gs.insert(val);
                    break;
                case 2:
                    System.out.print("Enter the value:");
                    int val1=sc.nextInt();
                if(gs.delete(val1)){
                    System.out.println("Element Deleted!!");
                }
                    else{
                        System.out.println("Element not found!!");
                }
                    break;
                case 3:
                    System.out.println("Array is:");
                    gs.display();
                    break;
                case 4:
                    System.exit(0);
            }
        }
    }
}
```

OUTPUT

```
Run:    oops6d ×
    ↑   "C:\Program Files\Java\jdk-16.0.1\bin\java.exe" "-
    ↓   Enter intial size:2
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:1
        Enter the value:12
        Element inserted.
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:1
        Enter the value:9
        Element inserted.
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:3
        Array is:
        9 12
```

```
Run:    oops6d ×
    ↑   1->Insert.
    ↓   2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:1
        Enter the value:56
        Element inserted.
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:1
        Enter the value:34
        Element inserted.
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:3
        Array is:
        9 12 34 56
```

```
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:2
        Enter the value:56
        Element Deleted!!
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:3
        Array is:
        9 12 34 0
        1->Insert.
        2->Delete.
        3->Display.
        4->Exit.
        Enter your choice:4

        Process finished with exit code 0
```

THEORETICAL PRINCIPLES USED:

In this practical we create a class named as GSSArray which stands for Growable self sorting Array which increase its size when the condition for filled occurs and it also sorts the value inputs and display in ascending order and it also defines a delete function which return true if the entered value exist and deletes that element and if it returns false it means that element does not exist in that array.