OBJECT ORIENTED PROGRAMMING

LAB RECORD (20MCA132)

GOPIKA DAS

S2-RMCA A BATCH

ROLL NO:39

1.Add complex numbers

```
public class Complex{doublea, b;
   Complex(double r, double i){this.a=r;
    this.b=i;
   }
   publicstaticComplexsum(Complexc1,Complex c2)
   {
      Complextemp=newComplex(0,0);


      temp.a = c1.a + c2.a;temp.b = c1.b+ c2.b;returntemp;
    }
    public static void main(String args[])
    {
    Complex c1 = new Complex(5, 4);
    Complexc2 =new Complex(6, 3.5);
      Complextemp=sum(c1, c2);
      System.out.printf("Sumis:"+temp.a+"+ "+temp.b +"i");
    }
 }
```

Output

```
F:\javalab>javac Complex.java

F:\javalab>java Complex
Sum is: 11.0 + 7.5i
F:\javalab>
```

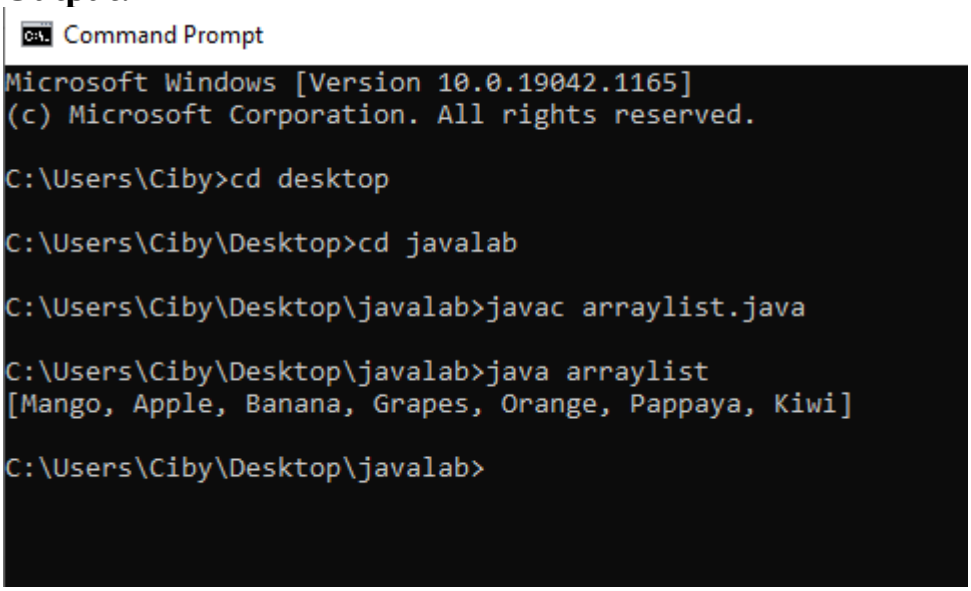
2.Maintain a list of Strings using ArrayList from collection framework, perform built-in operations.

Program:

```
import java.util.*;
public class arraylist
```

```
{
 public static void main(String args[])
 {
  ArrayList<String> list=new ArrayList<String>();
     list.add("Mango");
     list.add("Apple");
     list.add("Banana");
     list.add("Grapes");
     list.add("Orange");
     list.add("Pappaya");
     list.add("Kiwi");
     System.out.println(list);
 }
}
```

Output:



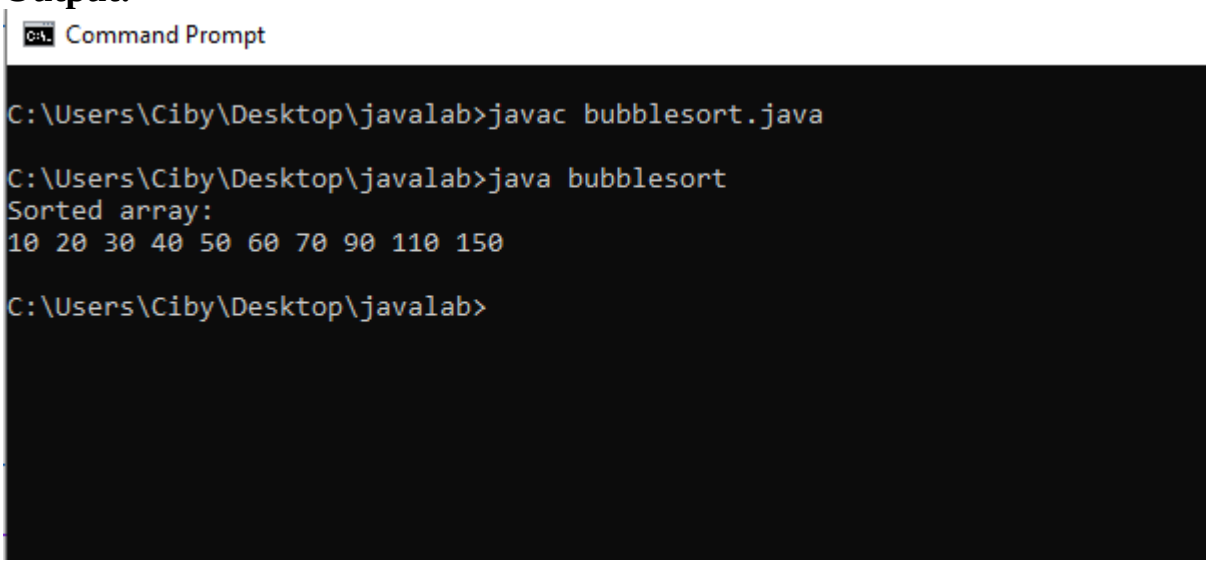
3.Using generic method perform Bubble sort.

Program:

```
import java.io.*;
class bubblesort
{
        static void bubbleSort(int arr[], int n)
        {
                int i, j, temp;
                boolean swapped;
                for (i = 0; i < n - 1; i++)
                {
                        swapped = false;
                        for (j = 0; j < n - i - 1; j++)
                        {
```

```
                        if (arr[j] > arr[j + 1])
                        {
                                temp = arr[j];
                                arr[j] = arr[j + 1];
                                arr[j + 1] = temp;
                                swapped = true;
                        }
                }
                if (swapped == false)
                        break;
        }
    }
    static void printArray(int arr[], int size)
    {
        int i;
        for (i = 0; i < size; i++)
        System.out.print(arr[i] + " ");
        System.out.println();
    }
    public static void main(String args[])
    {
        int arr[] = { 60, 90, 70, 10, 110, 50, 30, 150, 40, 20 };
        int n = arr.length;
        bubbleSort(arr, n);
        System.out.println("Sorted array: ");
        printArray(arr, n);
    }
}
```

Output:



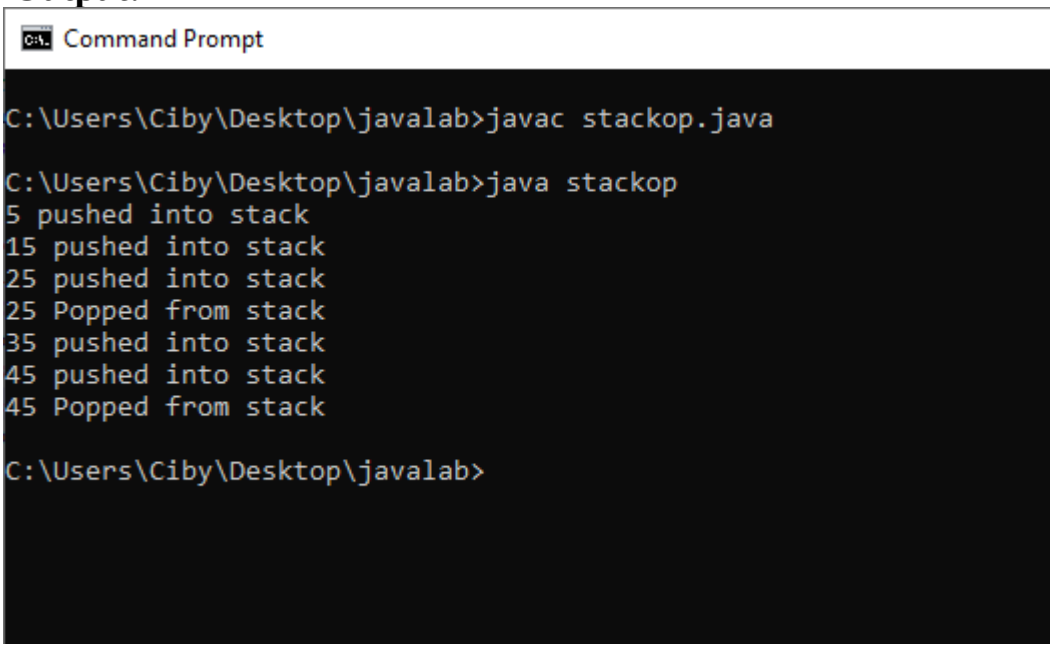
4.Program to create a generic stack and do the Push and Pop operations.

Program:

```
class stack {
 static final int MAX = 1000;
 int top;
 int a[] = new int[MAX];
 boolean isEmpty()
 {
 return (top < 0);
 }
 stack()
 {
 top = -1;
 }
 boolean push(int x)
 {
 if (top >= (MAX - 1)) {
 System.out.println("Stack Overflow");
 return false;
 }
 else {
 a[++top] = x;
 System.out.println(x + " pushed into stack");
 return true;
 }
 }
 int pop()
 {
 if (top < 0) {
 System.out.println("Stack Underflow");
 return 0;
 }
 else {
 int x = a[top--];
 return x;
 }
 }
 int peek()
 {
 if (top < 0) {
 System.out.println("Stack Underflow");
 return 0;
 }
```

```
 else {
 int x = a[top];
 return x;
 }
 }
}
class stackop{
 public static void main(String args[])
 {
 stack s = new stack();
 s.push(5);
 s.push(15);
 s.push(25);
 System.out.println(s.pop() + " Popped from stack");
 s.push(35);
 s.push(45);
 System.out.println(s.pop() + " Popped from stack");
 }
}
```

Output:



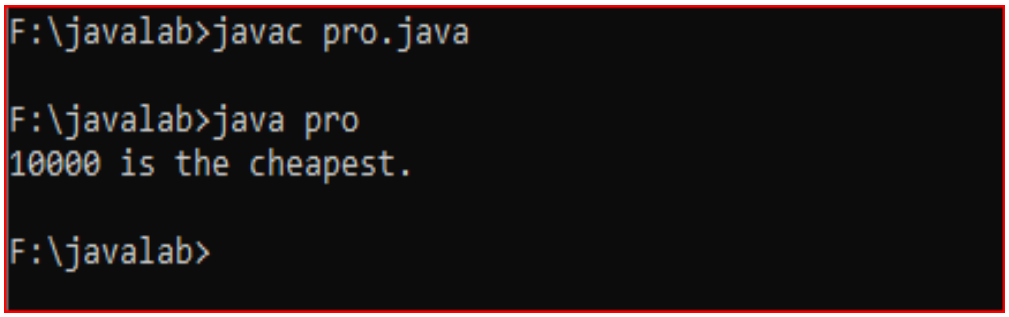
5. Define a class product with data members pcode ,pname ,price. Create 3 objects of the class and find the product having the lowest price

```
public class pro {
int pcode;String pname;int price;
public static void main(String[] args)
```

```
 {
 Int smallest;
  prop1=new pro();
pro p2 = new pro();
pro p3 = new pro();
p1.pcode=2000;
 p1.pname="laptop";
p1.price=10000;
 p2.pcode=1110;
p2.pname="hp";
 p2.price=35000;
 p3.pcode=2002;
p3.pname="intel i3";
p3.price=40000;
if(p1.price<p2.price) {if(p3.price<p1.price)
{
smallest=p3.price;
  }
  else
  {
  smallest=p1.price;
  }
  }
  else
  {
  if(p2.price<p3.price)
   {
  smallest=p2.price;
  }
```

```
else
{
smallest=p3.price;
}
}
System.out.println(smallest+"isthecheapest.");
}
}
```

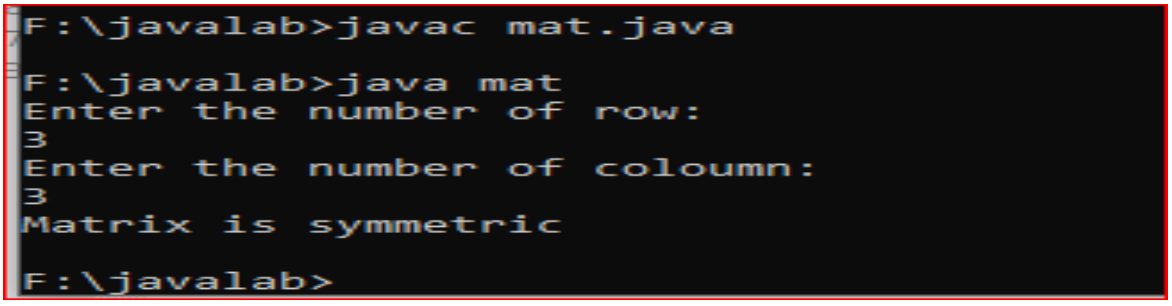
OUTPUT



6.Read a matrix from the console and check whether it is symmetric or not.

```
import java.util.*;

public class mat

 {
public static void main(String[] args) {Scannerip=newScanner(System.in);
System.out.println("Enter the number of row: ");
Int row=ip.nextInt();
System.out.println("Enter the number of coloumn: ");
Int col=ip.nextInt();
if(row==col)

{

System.out.println("Matrixissymmetric");

}

else

System.out.println("Matrixisnotsymmetric");

}

}
```

OUTPUT



7.Create CPU with attribute price. Create inner class Processor (no. of cores, manufacturer) and static nested class RAM (memory,manufacturer).Create an Processor and RAM.

```
Public class Cpu

{
```

```
int price;
Cpu(int p)
 {
this.price=p;
}
class Processor
{          Int cores;
String  manufacture;
 Processor(int n, String m) {
this.cores=n;
this.manufacture=m;
}
Void display(){
System.out.println("No of Cores : " + this.cores);
System.out.println("Processormanufactures:"+this.manufacture);
}         }
static class Ram
{         Int memory;


String manufacture;
Ram(int n, String m)   {
this.memory = n;
this.manufacture=m;         }

Void display(){
System.out.println("Memory Size : " + this.memory);
System.out.println("Memorymanufactures:"+this.manufacture);
}               }
Void display()       {
```

```
System.out.println("PriceofCPU:"+this.price);          }
public static void main(String[] args) {

Cpu intel =new Cpu(25000);
Cpu.Processori_processor = intel.newProcessor(4, "intel");
Cpu.Rami_ram= new Ram(1040,"Acer");
intel.display();
i_processor.display();
i_ram.display();
}
}
```

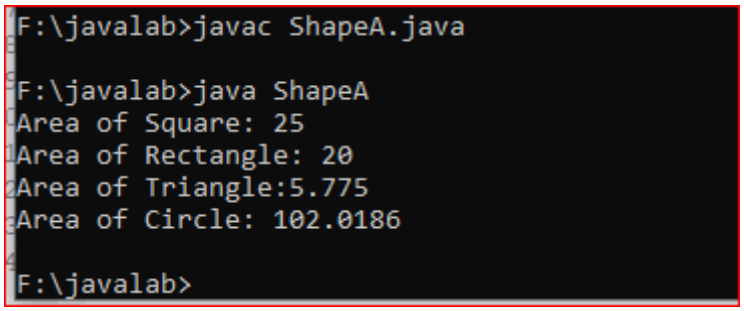
OUTPUT

8:Area of different shapes using overloaded functions

```
public class ShapeA{intarea(intside)
{          return side*side;   }
int area(int l,int b)
{         return l*b;       }
double area(double b,double h)
{    return(0.5*(b*h));      }
Double area(doubler)
{
return(3.14*r*r);
}
public static void main(String[]args)
{
```

```
ShapeA obj=new ShapeA();

 System.out.println("Area of Square:"+obj.area(5));

System.out.println("Area of Rectangle: "+obj.area(5,4)); System.out.println("Area of

Triangle:"+obj.area(5.5,2.1));

System.out.println("Area of Circle:"+obj.area(5.7));

}

}
```

OUTPUT



9: Create a class 'Employee' with data members Empid, Name, Salary, Addressand constructors to initialize the data members. Create another class 'Teacher'that inherit the properties of class employee and contain its own data membersdepartment, Subjects taught and constructors to initialize these data membersand also include display function to display all the data members. Use array ofobjectstodisplay detailsofNteachers.

```
import java.util.*;

classEmployee

{ int empid;

String name,address;
 double salary;

public Employee(int empid, String name, String address, double salary)
```

```
{       this.empid= empid;
this.name = name;this.address = address;this.salary=salary;
}
}
publicclass Teacherextends Employee
{
String subject ,department;
public Teacher(int empid, String name, String address, double salary, String department
,String subject)
{
super(empid, name, address, salary);this.subject = subject;this.department=department;
}

void display()
{
System.out.println("Employee id : "+this.empid+" Name : "+this.name+" Salary
:"+this.salary+" Address : "+this.address+" department : "+this.department+"Subjects
:"+this.subject);
}
public static void main(String[] args) {Scanner sc=new Scanner(System.in);int n;
System.out.println("Enter number of Teachers : ");n=sc.nextInt();
Teacher obj[]=new Teacher[n];for(inti=0;i<n;i++){
int j =i+1;
System.out.print("Enter Employee id of teacher "+j+" : ");intEmpid= sc.nextInt();
System.out.print("Enter Name of teacher "+j+" : ");StringName=sc.next();
System.out.print("Enter Salary of teacher "+j+" : ");double Salary =
sc.nextDouble();System.out.print("Enter Address of teacher "+j+" : ");StringAddress
=sc.next();
System.out.print("Enter department of teacher "+j+" : ");Stringdepartment=sc.next();
System.out.print("Enter Subjects of teacher "+j+" : ");StringSubjects=sc.next();
```

```
obj[i]=newTeacher(Empid,Name,Address,Salary,department,Subjects);
}

System.out.println("Teacher's List is \n");for(inti=0;i<n;i++){
obj[i].display();
}
}

}
```

OUTPUT

```
F:\javalab>javac Teacher.java

F:\javalab>java Teacher
Enter number of Teachers :
2
Enter Employee id of teacher 1 : 101
Enter Name of teacher 1 : Anu
Enter Salary of teacher 1 : 30000
Enter Address of teacher 1 : AnuHouse
Enter department of teacher 1 : mca
Enter Subjects of teacher 1 : Se
Enter Employee id of teacher 2 : 123
Enter Name of teacher 2 : Ammu
Enter Salary of teacher 2 : 5000
Enter Address of teacher 2 : ammuhouse
Enter department of teacher 2 : Mca
Enter Subjects of teacher 2 : ed
Teacher's List is

Employee id : 101 Name : Anu Salary : 30000.0 Address : AnuHouse department : mca Subjects : Se
Employee id : 123 Name : Ammu Salary : 5000.0 Address : ammuhouse department : Mca Subjects : ed
```

10. Create a class ‘Person’ with data members Name, Gender, Address, Age and a constructor toinitialize the data members and another class ‘Employee’ that inherits the properties of classPerson and also contains its own data members like Empid, Company_name, Qualification, Salaryand its own constructor. Create another class ‘Teacher’ that inherits the properties of classEmployee and contains its own data members like Subject, Department, Teacheridand alsocontain constructors and methods to display the data members. Use array of objects to displaydetailsofN teachers.

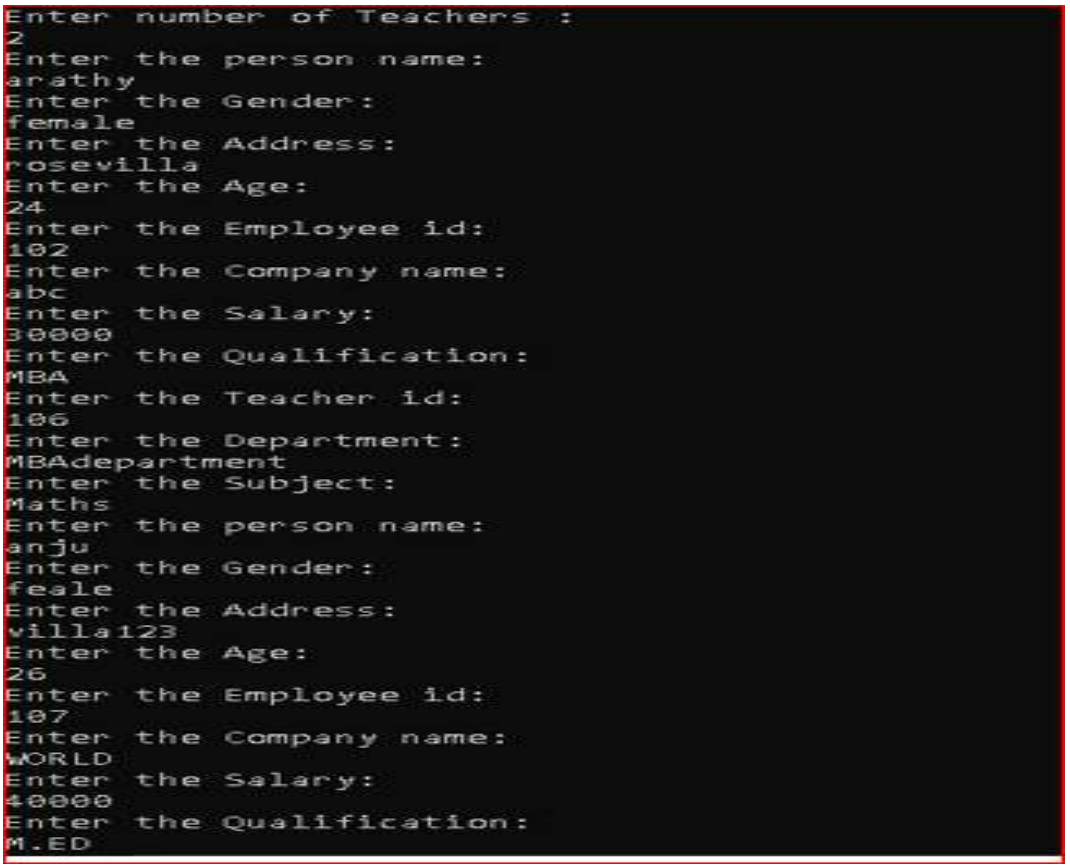
```
import java.util.Scanner;class Person
{
String name,gender,address;int age;
public Person(String name, String gender, String address, int age) {super();
 this.name = name;this.gender = gender;this.address = address;this.age =age;
}
}
class Employee extends Person {intempid;
String company_name,qualification;doublesalary;
public Employee(String name, String gender, String address, int age, int
empid,Stringcompany_name,
 String qualification, double salary) {super(name, gender, address, age);this.empid =
 empid;this.company_name = company_name;this.qualification =
 qualification;this.salary= salary;
```

```
}
}
classTeacherextendsEmployee
{
String subject,department;intteacherid;
public Teacher(String name, String gender, String address, int age, int
empid,Stringcompany_name,
 String qualification, double salary, String subject, String department, intteacherid){
super(name, gender, address, age, empid, company_name, qualification,
salary);this.subject= subject;
this.department = department;this.teacherid=teacherid;
}
voiddisplay()
{
System.out.println("Personaldetailsare");
 System.out.println("Name: "+this.name+"Gender:"+this.gender+"Age
:"+this.age);
System.out.println("Employee details
are");System.out.println("Empid:"+this.empid+"company_name:
"+this.company_name+" Salary : "+this.salary+" Address :
"+this.address+"qualification:"+this.qualification);
System.out.println("Teacher'sdetailsare");
 System.out.println(" teacherid : "+this.teacherid+ " department
:"+this.department+"Subjects :"+this.subject);
}

}
public class Main{
public static void main(String[] args) {Scanner s=new Scanner(System.in);int n;
 System.out.println("Enter number of Teachers : ");n=s.nextInt();
```

```
Teacher obj[]=new Teacher[n];for(inti=0;i<n;i++){
System.out.println("Enter the person name:");String
nam1=s.next();System.out.println("Enter the Gender:
");Stringgen1=s.next();System.out.println("Enter the Address:
");Stringadr1=s.next();System.out.println("Enterthe Age:");
intage1=s.nextInt();System.out.println("Enter the Employee id: ");intid1=s.nextInt();
System.out.println("Enter the Company name:
");Stringcname1=s.next();System.out.println("EntertheSalary:");
double sal1=s.nextDouble();System.out.println("Enter the
Qualification:");Stringqu1=s.next();

System.out.println("Enter the Teacher id: ");
 int tid1=s.nextInt();
System.out.println("Enter the Department:");
String dept1=s.next();
System.out.println("Enter the Subject:");
Stringsub1=s.next();
```

```
obj[i]=newTeacher(nam1,gen1,adr1,age1,id1,cname1,qu1,sal1,sub1,dept1,tid1);
}

for(int i=0;i<n;i++) {obj[i].display();
}     }
}
```

OUTPUT



11. Write a program has class Publisher, Book, Literature and Fiction. Read the information and print the details of books from either the category ,using inheritance.

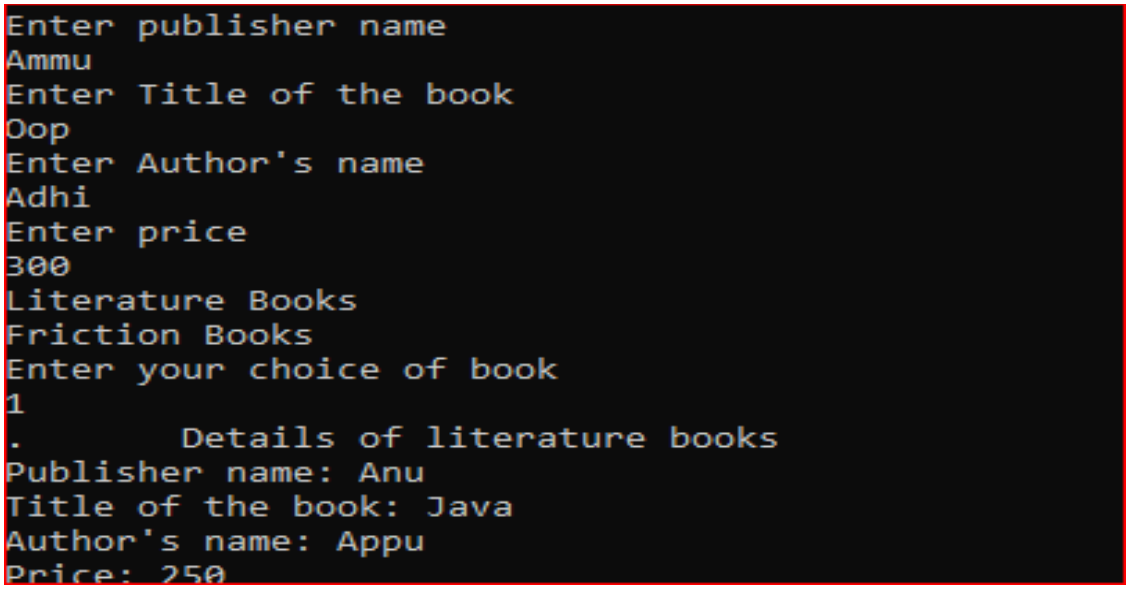
```
import java.util.Scanner;
classPublisher
 {
 String Pubname;Publisher()
 {
 Scanner s=new Scanner(System.in);System.out.println("Enter publisher name");
 Pubname=s.next();
 }
 }
 classBookextendsPublisher
 {
 String title, author;
 Int price;
 Book()
 {
 Scanner s=new Scanner(System.in);
 System.out.println("Enter Title of the book");
 title=s.next();
 System.out.println("Enter Author's name");
 author=s.next();
 System.out.println("Enter price");
 price=s.nextInt();
 }              }
 classLiterature extendsBook
 {
 Literature()
```

```
{
System.out.println("LiteratureBooks");
}
void display()
{
System.out.println("Publisher name: "+Pubname);
System.out.println("Title of the book: "+title);
System.out.println("Author's name: "+author);
System.out.println("Price:"+price);
}
}
Class Fiction extends Literature
{
Fiction()
{
System.out.println("FrictionBooks");
}
void display()
{
super. display ();
}
publicstaticvoidmain(Stringargs[])
{
Int n;
Scanners=newScanner(System.in);
System.out.println("Enter the No of literature book: ");inta=s.nextInt();
Literature L[]=new Literature[a];for(inti=0;i<a;i++)
{       L[i]=newLiterature();          }
System.out.println("Enter the No of Fiction book: ");intb=s.nextInt();
Fiction F[]=new Fiction[b];for(inti=0;i<b;i++)
{      F[i]=newFiction();          }
Int no;
```

```
System.out.println("Enter your choice of book");no=s.nextInt();
int type =no;
switch(no)
{
case1:
System.out.println(".      Detailsofliterature books");
for(int i=0;i<a;i++)L[i].display();break;
case2:
System.out.println(".      Detailsoffictionbooks");
for(int i=0;i<b;i++)F[i].display();break;
default:System.out.println("Wronginput");
}
}
 }
```

OUTPUT

```
F:\javalab>java Fiction
Enter the No of literature book:
1
Enter publisher name
Anu
Enter Title of the book
Java
Enter Author's name
Appu
Enter price
250
Literature Books
Enter the No of Fiction book:
1
Enter publisher name
Ammu
Enter Title of the book
Oop
Enter Author's name
Adhi
Enter price
300
Literature Books
Friction Books
Enter your choice of book
1
.       Details of literature books
Publisher name: Anu
```



12. Create classes Student and sports.Create another class result inherited from student and sports. Display the academic and sports score of a student.

```
interfacestudent
{
voidstresullt();
}
interfacesports
{
voidspresult();
}
class result implements student,sports

{

publicvoidspresult()
{
String eighthundred="First";
String twohundred="Second";
```

```
String longjump="First";
Stringrelay="Second";
System.out.println("SportsResult");
System.out.println("eight hunderedmerter:"+ eighthundred); System.out.println("Two Hundred
Meter:"+twohundred); System.out.println("long jump:"+longjump);
System.out.println("Relay:"+relay);
}
public void stresullt()
{
int maths=45;
int hindi=43;
int malayalam=39;intenglish=40;
int IT=40; System.out.println("Marks"); System.out.println("maths:"+maths);
System.out.println("hindi:"+hindi);
System.out.println("malayalam:"+malayalam);
System.out.println("english:"+english);
System.out.println("IT:"+IT);
}
publicstaticvoidmain(String[]args)
{
result r = new result(); r.stresullt();r.spresult();
}
}
```

OUTPUT

```
F:\javalab>javac result.java

F:\javalab>java result
Marks
maths:45
hindi:43
malayalam:39
english:40
IT:40
Sports Result
eight hundered merter:First
Two Hundred Meter:Second
long jump:First
Relay:Second
```

13.Create an interface having prototype of functions area() and perimeter(). Create two classescircle and rectangle which implements the above interface. Create a menu driven program to find area and perimeter of objects.

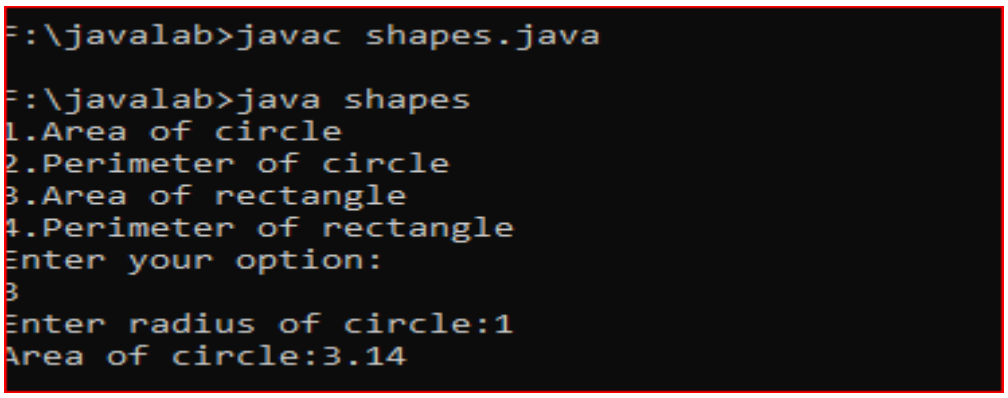
```
import java.util.Scanner;

interface Shape
{
void input();voidarea();
void perimeter();
}
Class Circle implements Shape
{
int r =0;
double pi = 3.14, ar = 0,per=0;

public void input()
{ Scanner s = new Scanner(System.in);
System.out.print("Enter radius of circle:");
r=s.nextInt();
```

```
}
Public void area()
{
ar =pi *r *r;
System.out.println("Areaofcircle:"+ar);
}
Public void perimeter()
{
per=2 *pi * r;
System.out.println("Perimeterofcircle:"+per);
}
}
Class Rectangle implements Shape
{
int l = 0, b = 0;

double ar,per;

public void input()
{
 Scanner s = new Scanner(System.in);
System.out.print("Enter length of rectangle:");
l=s.nextInt();
System.out.print("Enter breadth of rectangle:");
b= s.nextInt();
}
Public void area()
{
ar =l* b;
System.out.println("Areaofrectangle:"+ar);
}
Public void perimeter()
```

```
{
per =2 *(l +b);
System.out.println("Perimeterofrectangle:"+per);
}
}
publicclassshapes
{
Public static void main(String[]args)
{
int n;
Scanner s = new Scanner(System.in);

Rectangle obj1 =new Rectangle();
Circle obj2 = new Circle();
System.out.println("1.Area of circle");
System.out.println("2.Perimeter of circle");
System.out.println("3.Area of rectangle");
System.out.println("4.Perimeter of rectangle");
System.out.println("Enteryour option:");
n= s.nextInt();
switch(n)
 {
case1:
obj2.input();
obj2.area();

break;
case2:
obj2.input();

obj2.perimeter();
```

```
break;
case3:
obj2.input();
obj2.area();

break;
case4:
obj2.input();

obj2.perimeter();

break;
default:
System.out.println("Invalidoption");
}
}
}
```

OUTPUT



14.Prepare bill with the given format using calculate method from interface.

OrderNo.Date Productid name quantity price total101A22550102B1100100 Net.Amount150

```
interfacebill
{
intproductdetails();
}
```

```
Class product1 implements bill
{
Int id=101,quantity=2,unit=25,total=0;Stringname="A";
public int productdetails()
{
total = quantity * unit;

System.out.println("Product Id :"+id);

System.out.println("Name :"+name);

System.out.println("Quantity :"+quantity);

System.out.println("Unit price :"+unit);

System.out.println("Total :"+total);return(total);
}       }
Class product2 implements bill{
int id = 102,quantity= 1,unit=100,total=0;

String name="B";
Public int productdetails()
{           total = quantity * unit;
System.out.println("Product Id :"+id);

System.out.println("Name :"+name);

System.out.println("Quantity :"+quantity);

System.out.println("Unit price :"+unit);

System.out.println("Total :"+total);

return(total);          }       }

Public class productbill {
Public static void main(String[]args)
{    product1 p1 = new product1();
```

```
product2p2=newproduct2();

int t1= p1.productdetails();

int t2= p2.productdetails();

intt3=t1+t2;

System.out.println("Net.Amount:"+t3);

}          }
```

OUTPUT

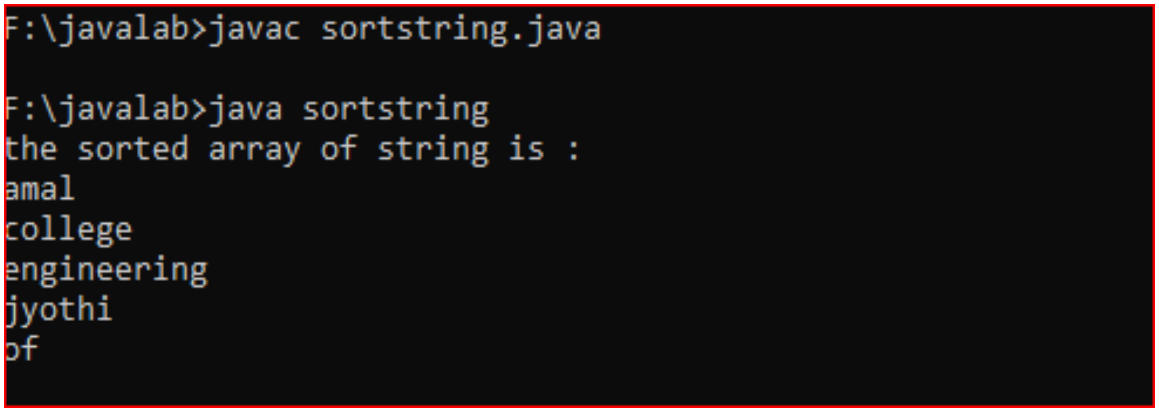
```
F:\javalab>javac productbill.java

F:\javalab>java productbill
Product Id :101
Name :A
Quantity :2
Unit price :25
Total :50
Product Id :102
Name :B
Quantity :1
Unit price :100
Total :100
Net. Amount :150
```

15. Program to sort strings

```
Public class sortstring

{
   Public static void main(String[] args)
   {
   String  names[]={"amal","jyothi","college","of","engineering"};
   String temp;
   int n= names.length;
   int i;
   int j;
   for(i=0;i<n;i++)
   {
   for(j=i+1;j<n;j++)
   {
   if(names[i].compareTo(names[j])>0)
   {     temp=names[i];names[i]=names[j];names[j]=temp;     }
   }     }
   System.out.println("the sorted array of string is :");
   for(i=0;i<n;i++)
   {         System.out.println(names[i]);         }
```

```
}
}
```

OUTPUT



16.search an element in an array

```
import java.util.*;

public class search

{
Public static void main(String[]args)
{
intn,i,b,flag=0;
Scanners=new Scanner(System.in);
System.out.println("enter the number of elements for the array :");

n=s.nextInt();
int a[]=newint[n];
System.out.println("enter the elements of the array :");

for(i=0;i<n;i++)
{
a[i]=s.nextInt();
}
```

```
System.out.println("enter the element want to search :");

b=s.nextInt();
for(i=0;i<n;i++)
{
if(a[i]==b)
{
flag=1;break;
}
else
{
flag=0;
}
}
if(flag==1)
{
System.out.println("element found at position:"+(i+1));
}
else
{
System.out.println("element not found");
}
}
}
```

OUTPUT

```
F:\javalab>javac search.java

F:\javalab>java search
enter the number of elements for the array :
4
enter the elements of the array :
7
8
5
4
enter the element want to search :
8
element found at position :2
```

17. Perform string manipulation

```
Public class Sample_String
{
    public static void main(String[] args)
     {
     String str_Sample="ALOVERAGEL";
    System.out.println("Length of String: " + str_Sample.length());
    System.out.println("Character at position 5: " + str_Sample.charAt(5));
    System.out.println("EndsWith character 'r': " + str_Sample.endsWith("r"));
    System.out.println("Replace'ALOVERA' with'GEL': " +
 str_Sample.replace("ALOVERA","HANDWASH"));
  }
  }
```

OUTPUT

```
F:\javalab>javac Sample_String.java

F:\javalab>java Sample_String
Length of String: 10
Character at position 5: R
EndsWith character 'r': false
Replace 'ALOVERA' with 'GEL': HANDWASHGEL
```

18.Javaprogramtocreategenericstackanddothepushandpopoperation

A stack class is provided by the Java collection framework and it implements theStack data structure. The stack implements LIFO i.e. Last In First Out. This meansthattheelementspushedlastaretheones thatarepoppedfirst.

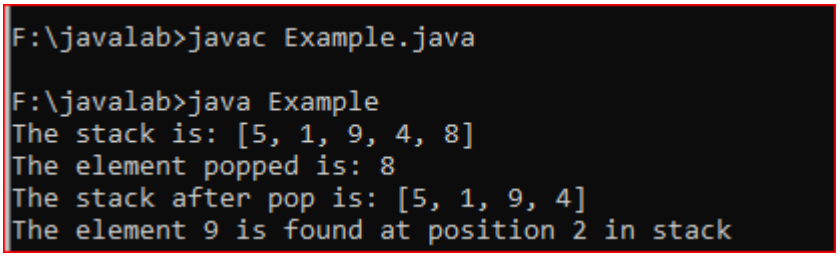
1. **push() Method adds element to the stack.**
2. **pop() Method removes the last element of the stack.**
3. **top()Method returns the last element of the stack.**

4.empty() Method returns whether the stack is empty or not.

```
import java.io.*;

import java.util.*;

public class Example{
 public static void main (String[] args)
 {
 Stack<Integer> s = new Stack<Integer>();
 s.push(5);
 s.push(1);
 s.push(9);
 s.push(4);
 s.push(8);
 System.out.print("The stack is: " + s);

 System.out.print("\nThe element popped is: ");

 Integer num1 = (Integer) s.pop();

 System.out.print(num1);System.out.print("\nThe stack after pop is: " + s);

 Integerpos =(Integer)s.search(9);
 if(pos== -1)
 System.out.print("\nThe element 9 not found in stack");else
```

```
System.out.print("\nTheelement9isfoundatposition"+pos+"instack");
 }
}
```

OUTPUT



19:Generic method implement bubblesort?

Bubble sort is a simple sorting algorithm. This sorting algorithm is a comparison-based algorithm in which each pair of adjacent elements is compared and the elements are swapped if they are not in order.This algorithm is not suitable for large datasets a sits average and worst case complexity is of O(n2) where n is the number of items.

```
Public class BubbleSort
 {
static void bubbleSort(int[] arr)
{
int n= arr.length;
int temp=0;
for(int i = 0; i< n; i++)
{
for(intj=1;j<(n-i);j++)
```

```
{
if(arr[j-1] >arr[j]) {temp = arr[j-1];arr[j-1] = arr[j];arr[j]= temp;
}
}
}
}
public static void main(String[] args)

{int arr[]= {2,5,-2,6,-3,8,0,-7, -9,4};
System.out.println("Array Before Bubble Sort");
for(int i = 0; i<arr.length; i++)
 {
System.out.print(arr[i]+" ");
}
System.out.println();

bubbleSort(arr);
System.out.println("Array After Bubble Sort");
for(int i = 0; i<arr.length; i++)
{
System.out.print(arr[i]+" ");
}
}
}
```

OUTPUT

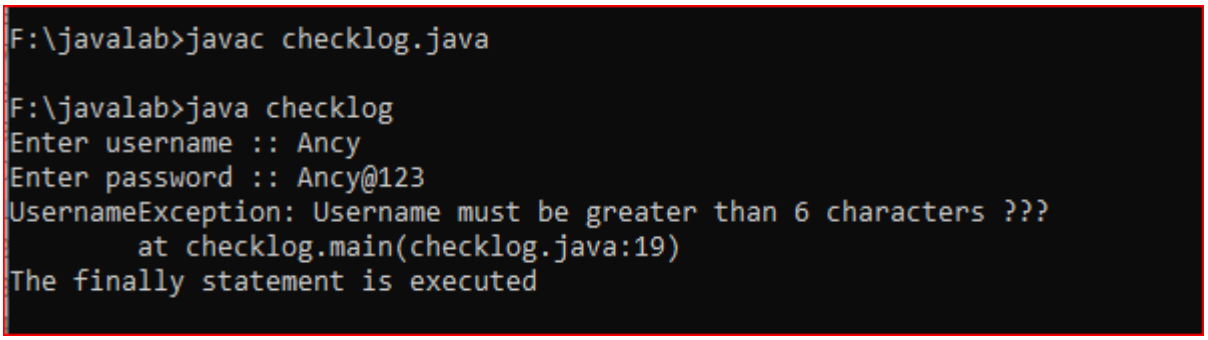
```
F:\javalab>javac BubbleSort.java

F:\javalab>java BubbleSort
Array Before Bubble Sort
2 5 -2 6 -3 8 0 -7 -9 4
Array After Bubble Sort
-9 -7 -3 -2 0 2 4 5 6 8
```

20.Write a user defined exception class to authentication the username and password.

```
importjava.util.Scanner;
class Username Exception extends Exception {

public Username Exception(String msg)

 {super(msg);
}
}
class PasswordException extends Exception {publicPasswordException(String msg)
{super(msg);
}
}
public class checklog{
public static void main(String[] args) {Scanner s = new
 Scanner(System.in);Stringusername, password;

 System.out.print("Enter username :: ");username =s.nextLine();
```

```
System.out.print("Enter password :: ");password=s.nextLine();


Int length=username.length();


try{if(length<6)
throw new UsernameException("Username must be greater than 6 characters ???");
else if(!password.equals("hello"))
throw new PasswordException("Incorrect password\nType correct password ???");
else
System.out.println("LoginSuccessful!!!");          }
catch (UsernameException u)  {
u.printStackTrace();       }
catch (PasswordException p)     {
p.printStackTrace();          }
finally  { System.out.println("Thefinallystatementisexecuted");
}   }   }
```

OUTPUT

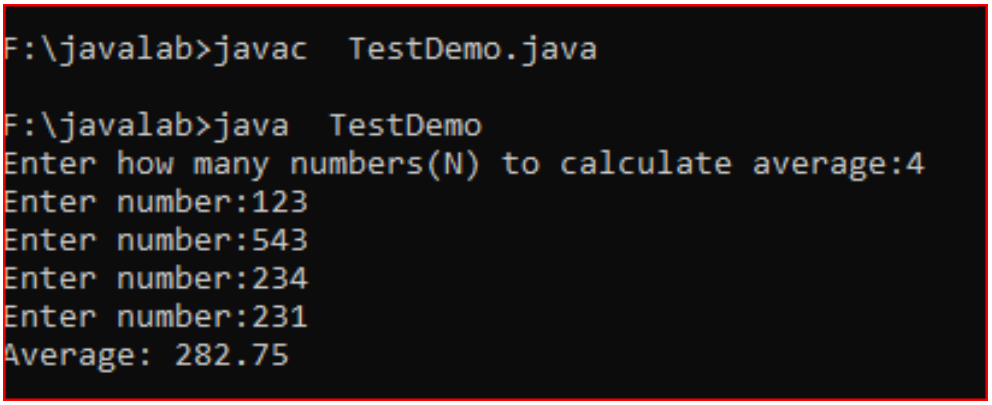


21.Find the average of N positive integers raising a user defined exception for each negative input

```
importjava.util.Scanner;
import java.util.InputMismatchException;

public class TestDemo
{
Public static void main(Stringargs[])
{
doubletotal=0,N,userInput;
Scanner input = new Scanner(System.in);

while (true)
{
System.out.print("Enter how many numbers(N) to calculate average:");

userInput= input.nextDouble();
if(userInput>0)
{
N = userInput;break;
}
else
System.out.println("Nmustbepositive.");
}
for(inti =0;i<N;i++)
{
while (true)
{
System.out.print("Enter number:");try
{
userInput = input.nextDouble();total+=userInput;
break;
```

```
}
catch(InputMismatchExceptione)
{
input.nextLine();
System.out.println("Inputmustbeanumber.Tryagain");
}
}
}
System.out.println("Average:"+total/N);
}
}
```

OUTPUT



22. Define 2 classes one for generating multiplication table of 5 and other for displayingfirstNprimenumbersimplementusing threads(threadclass)

```
class ThreadA extends Thread
{
public void run( )
 {
 int n=5;
 for (int i = 1; i<= 10; ++i)
```

```
System.out.println(n + " * " + i +" =" +n * i);
System.out.println("ExitingfromThreadA...");
}
}
class ThreadB extends Thread
{
public void run( )
{
Scanner sc = new Scanner(System.in);
int i,n,p,count,flag;
System.out.println("Enter the number of prime terms you want!"); n=sc.nextInt();
System.out.println("First "+n+" prime numbers are :-");
p=2;
i=1;
while(i<=n)
{
flag=1;
for(count=2;count<=p-1;count++)
{
if(p%count==0)//Will be true if is not prime
{
flag=0;
break;//Loop will terminate if is not prime
}
}
if(flag==1)
{
System.out.print(p+" ") ;i++;
}p++;
}
```

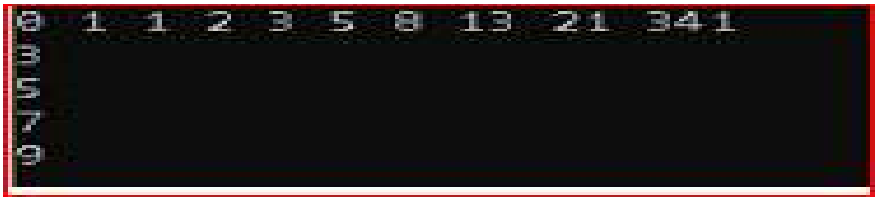
```
}
System.out.println("ExitingfromThreadB...");
}
}
public class Demonstration_111 {public static void main(String args[]) {ThreadAa=
new ThreadA();
ThreadB b = new ThreadB();a.start();
b.start();
System.out.println("...Multithreadingisover");
}
}
```

23: Define 2 classes one for generating fibanocci numbers and other for displaying even numbers in a given range. Implement using threads (runnable interface).

```
Public  class Mythread
{
public static void main(String[] args)     {
Runnable r = new Runnable1();
Threadt=new Thread(r);
t.start();
Runnable r2 = new Runnable2();
Thread t2 = new Thread(r2);
t2.start();
}          }
class Runnable2 implements Runnable
{
Public void run() {
```

```
 for(int i=0;i<11;i++)
 {
 if(i%2 == 1)System.out.println(i);
 }
 }
}

class Runnable1 implements Runnable
{
Public void run(){
 intn1=0,n2=1,n3,i,count=10;
System.out.print(n1+""+n2);//printing0and1
for(i=2;i<count;++i)//loopstartsfrom2because 0and1arealreadyprinted
{
 n3=n1+n2;System.out.print(" "+n3);
 n1=n2;
 n2=n3;
}
  }
   }
```

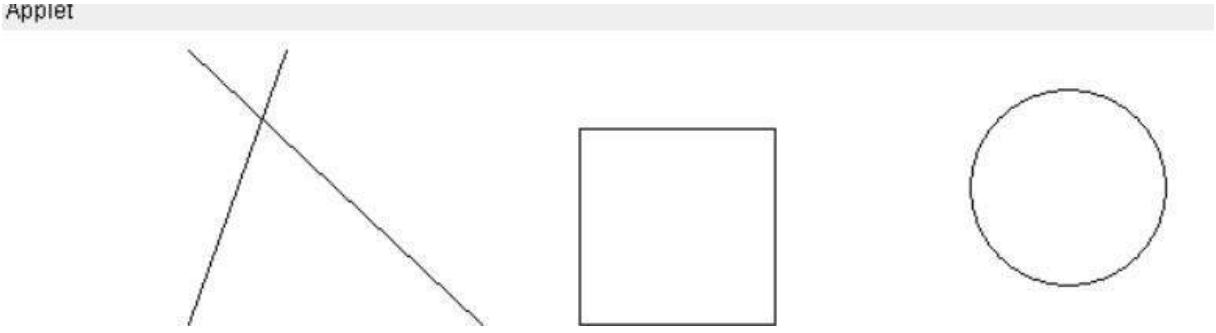
OUTPUT



24:Program to draw circle,rectangle,line in applet

```
import java.awt.*;

import java.applet.*;
public class line extends Applet
{
Public void paint(Graphics g)
{
 g.drawLine(100,10,250, 150);

 g.drawLine(100,150,150,10);
 g.setColor(Color.black);
 g.drawRect(300,50,100,100);
g.setColor(Color.black);
g.drawOval(500,30,100,100);
}
}
#.htmlcode
<html><head></head>
 <body><appletcode="line.class"width="420"height ="320"></applet>
 </body></html>
```

OUTPUT



25.Program to find maximum of three numbers using AWT

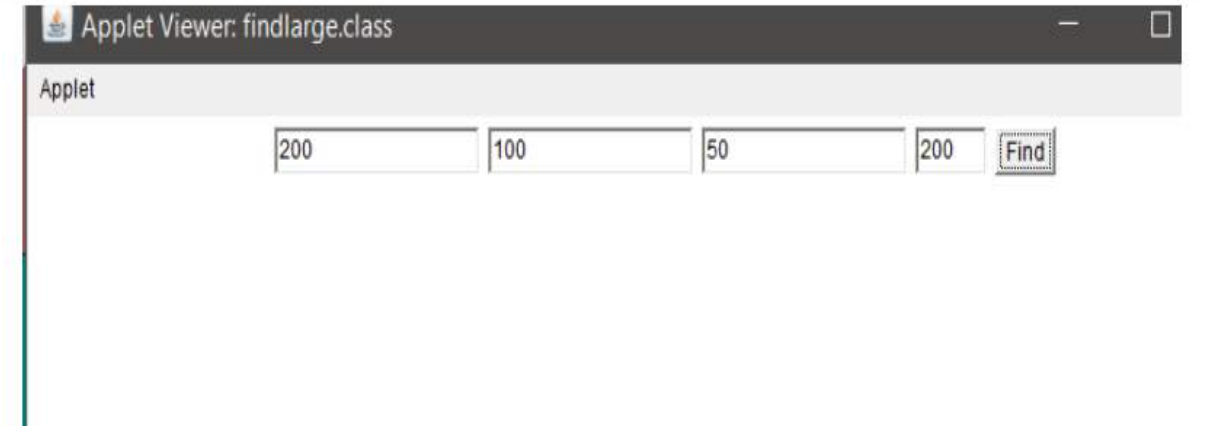
```
import java.awt.*;

import java.awt.Event;
```

```
importjava.applet.*;
public class largest extends Applet
{
TextField Txt1,Txt2,Txt3;
Public void init()
{
Txt1 = new TextField(10);
Txt2=newTextField(10);
Txt3 = new TextField(10);
add(Txt1);
add(Txt2);
add(Txt3);
}
public void paint(Graphics g)
{
inta, b, c,result;
String str;
g.drawString("Enter the numbers ",15,15);
str=Txt1.getText();
a=Integer.parseInt(str);
str=Txt2.getText();
b=Integer.parseInt(str);
str=Txt3.getText();


c=Integer.parseInt(str);
if(a>=b&&a>=c)
```

```
{
result=a;
}
else if(b>=a&& b>=c)
{
result=b;
}
else
{
result=c;
}
g.drawString("Largestnumberis"+result,10,70);
}
public Boolean action(Event e, Object o)

{

repaint();

return true;
}
}

# html
<html>
<head>
</head>
<body>
<divalign="center">
<appletcode="largest.class"width="800"height="500">
</applet>
</div>
</body>
```

</html>

OUTPUT



26: Find the percentage of marks obtained by a student in 5 subject.Display a happy face if hesecuresabove50% ora sadfaceifotherwise.

```
import java.awt.*;

import java.awt.event.*;



importjava.applet.*;
public class marks extends Applet implements ActionListener
{
publicint per =0;
Label l1 = new Label("enter Marks of Subject 1: ");
Label l2 = new Label("enter Marks of Subject 2: ");
Labell3 =newLabel("enterMarksofSubject3:");
Label l4 = new Label("enter Marks of Subject 4: ");
Label l5 = new Label("enter Marks of Subject 5: ");
Label l6 = new Label("Total Percentage: ");
```

```
TextFieldt1= newTextField(10);
TextField t2 = new TextField(10);
TextField t3 = new TextField(10);
TextField t4 = new TextField(10);
TextField t5 = new TextField(10);
TextFieldt6=newTextField(10);
Button b1 = new Button("CALCULATE PERCENTAGE");
publicmarks()
{
l1.setBounds(50,100,280,20);

l2.setBounds(50,150,280,20);
l3.setBounds(50,200,280,20);
l4.setBounds(50,250,280,20);
l5.setBounds(50,300,280,20);
l6.setBounds(50,350,280,20);
t1.setBounds(200,100,300,20);
t2.setBounds(200,150,300,20);
t3.setBounds(200,200,300,20);
t4.setBounds(200,250,300,20);
t5.setBounds(200,300,300,20);
t6.setBounds(200,350,300,20);
b1.setBounds(200,400,200,20);
GridLayout g1 = new GridLayout(20, 2, 5, 5);setLayout(g1);
add(l1);
add(t1);
add(l2);
add(t2);
add(l3);
add(t3);
add(l4);
```

```
add(t4);
add(l5);
add(t5);
add(l6);
add(t6);
add(b1);b1.addActionListener(this);
}


@Override
publicvoidactionPerformed(ActionEvente){
// TODO Auto-generated method stubint m1 = Integer.parseInt(t1.getText());int m2=
Integer.parseInt(t2.getText());int m3= Integer.parseInt(t3.getText());int m4=
Integer.parseInt(t4.getText());int m5=
Integer.parseInt(t5.getText());if(e.getSource()==b1)
{
int add=m1+m2+m3+m4+m5;per=add/5;t6.setText(String.valueOf(per)+"%");repaint();
}
}
publicvoidpaint(Graphicsg)
{
if(per>=50)
{
g.setColor(Color.yellow);g.drawOval(80,700,150,150);
g.fillOval(80,700,150,150);
g.setColor(Color.BLACK);g.fillOval(120,740,15,15);
g.fillOval(170,740,15,15);
g.drawArc(130,800,50,20,180,180);
}
elseif(per>0&& per<50)
{
```

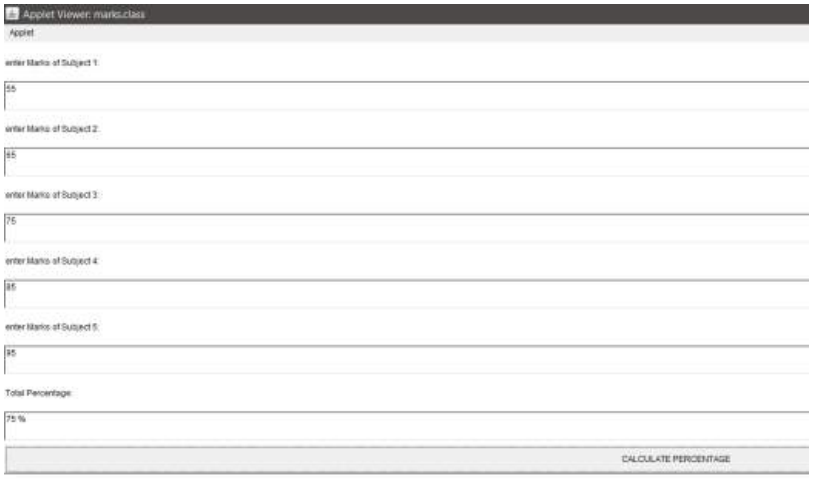
```
g.setColor(Color.yellow);g.drawOval(80,700,150,150);
g.fillOval(80,700,150,150);
g.setColor(Color.BLACK);g.fillOval(120,740,15,15);
g.fillOval(170, 740, 15, 15);g.drawArc(130,820,50,20,0,180);
}
}
public static void main(String args[]) {newmarks();
}
}
```

Html

```
<html>
<head>
</head>
<body>
<divalign="center">
<appletcode="marks.class"width="800"height="500">
</applet></div>
</body>
</html>
```

OUTPUT

Applet started.



27.Using 2D graphics commands in an applet ,construct a house .On mouse click event change the color of the door from blue to red.

```
import java.awt.*;

import java.applet.*;

import java.awt.event.*;

public class house extends Applet implements MouseListener, Runnable {

private Color doorColor =Color.WHITE;
```

```
public void paint(Graphics gp) {int[]i ={150,300,225};
int[]j = {150,150,25};
gp.drawRect(150,150,150,200);
gp.drawOval(200,75,50,50);
gp.drawPolygon(i, j, 3);

gp.setColor(doorColor);

gp.fillRect(200, 200, 50,150);

 gp.setColor(Color.BLACK);

gp.drawRect(200,200,50,150);
}
public void init() {

this.setSize(200, 200);

addMouseListener(this);
}
public void run() {while (true)

 {

repaint();
try
 {
Thread.sleep(17);
}
 catch (InterruptedException e)
 {
e.printStackTrace();
}
   }
     }
Public void mouseClicked(MouseEvente)
```

```
{
Int x=e.getX(),y=e.getY();
if (x >= 200 && x <= 250 && y >= 200 && y <= 350) doorColor=Color.RED;
else
doorColor = Color.BLUE;

repaint();
System.out.println("MousePosition:X="+x+"Y="+y+"");
}
publicvoidmousePressed(MouseEvente)
{
}
public void mouseReleased(MouseEvente)
{
}
public voidmouseEntered(MouseEvente)
{
}
publicvoidmouseExited(MouseEvente)
{
}
}
```

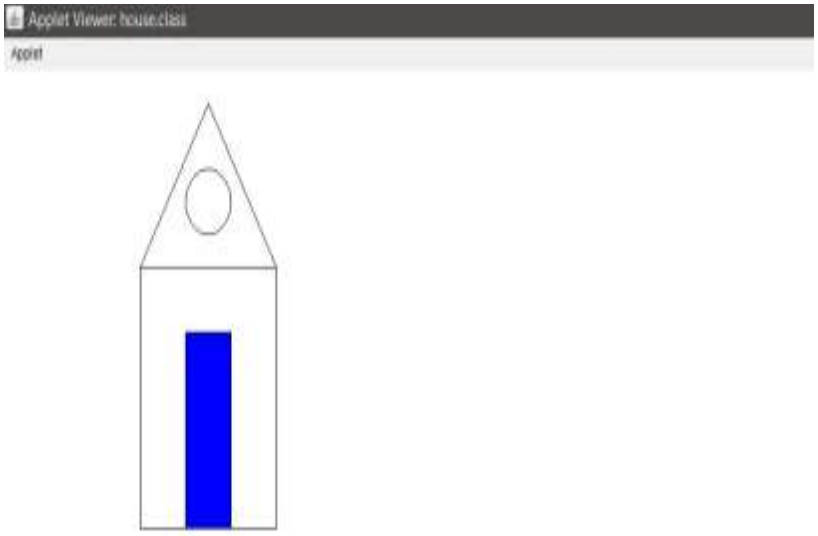
Html code

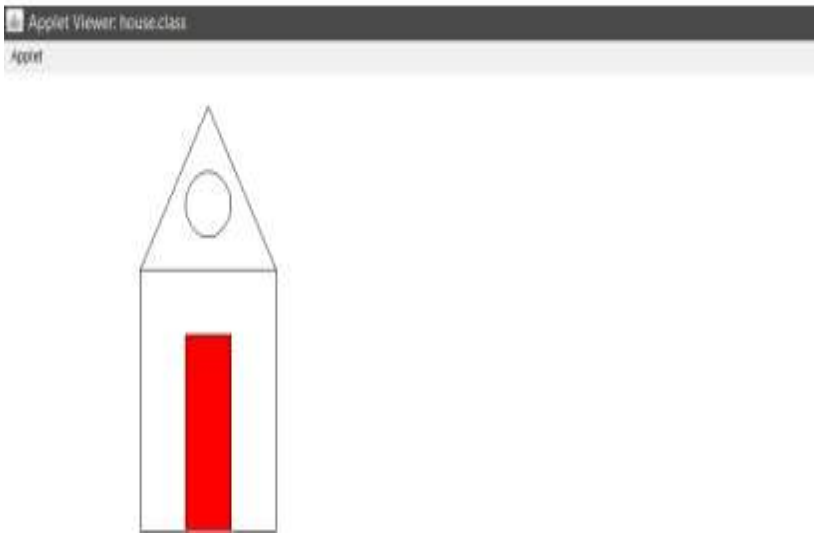
```
<html>
<head>
</head>
<body>
<divalign="center">
<appletcode="house.class"width="800"height="500">
</applet>
</div>
```

</body>

</html>

OUTPUT



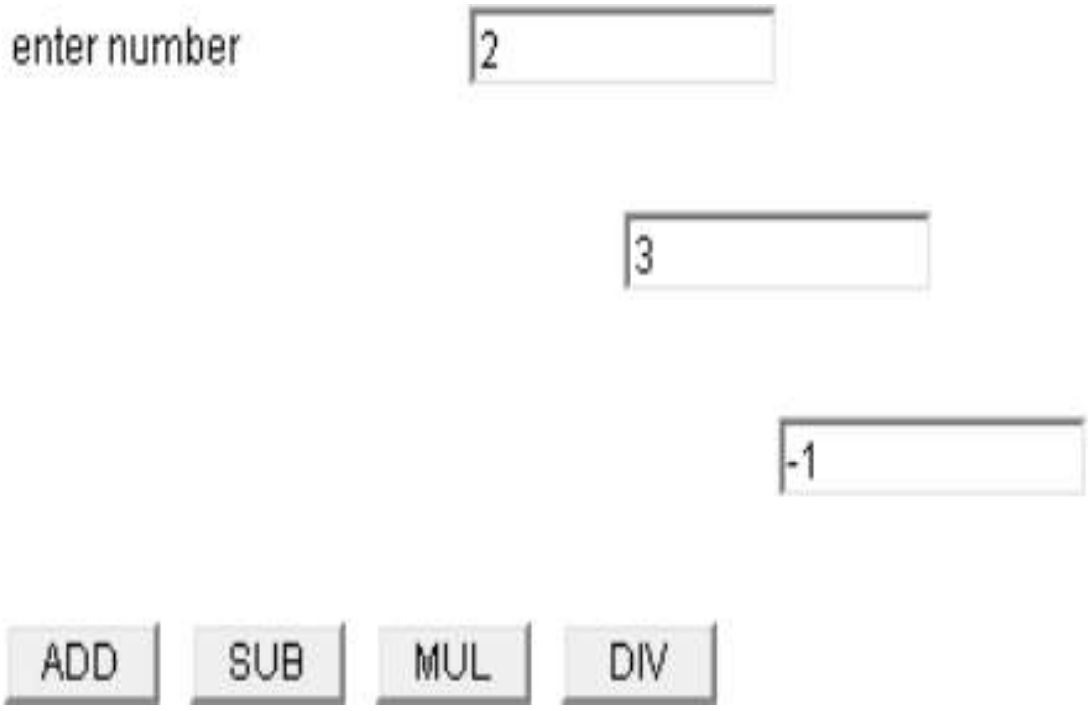


28:Implement a simple calculator using AWT components

```
import java.awt.*;

import java.awt.event.*;

import java.applet.*;
public class calc extends Applet implements ActionListener {Framef =newFrame();
 Label l1 = new Label("enter number");Label l2 = new Label("enter number");Label l3
 = new Label("result");TextField t1 = new
 TextField(10);TextFieldt2=newTextField(10);
 TextField t3 = new TextField(10);Button b1 = new Button("ADD");Button b2 = new
 Button("SUB");Button b3 = new Button("MUL");Button b4 = new
 Button("DIV");calc(){
 l1.setBounds(50,100,100,20);
 l2.setBounds(50,100,100,20);
 l3.setBounds(50,100,100,20);
 t1.setBounds(200,100,100,20);
 t2.setBounds(250,150,100,20);
 t3.setBounds(300,200,100,20);
 b1.setBounds(50,250,50,20);
 b2.setBounds(110,250,50,20);
 b3.setBounds(170,250,50,20);
 b4.setBounds(230, 250, 50, 20);f.add(l1);
 f.add(t1);
 f.add(l2);
 f.add(t2);



 f.add(l3);
```

```
f.add(t3);
f.add(b1);
f.add(b2);
f.add(b3);
f.add(b4);

b1.addActionListener(this);

b2.addActionListener(this);

b3.addActionListener(this);

b4.addActionListener(this);

f.setLayout(null);
f.setVisible(true);f.setSize(500,500);
}
public void actionPerformed(ActionEvent e) {inti= Integer.parseInt(t1.getText());
int j = Integer.parseInt(t2.getText());if (e.getSource() == b1)
{t3.setText(String.valueOf(i+j));
}
if (e.getSource() == b2) {t3.setText(String.valueOf(i-j));
}
if (e.getSource() == b3) {t3.setText(String.valueOf(i*j));
}
if (e.getSource() == b4) {t3.setText(String.valueOf(i/j));
}
}
public static void main(String args[]) {newcalc();
}
}
```

OUTPUT

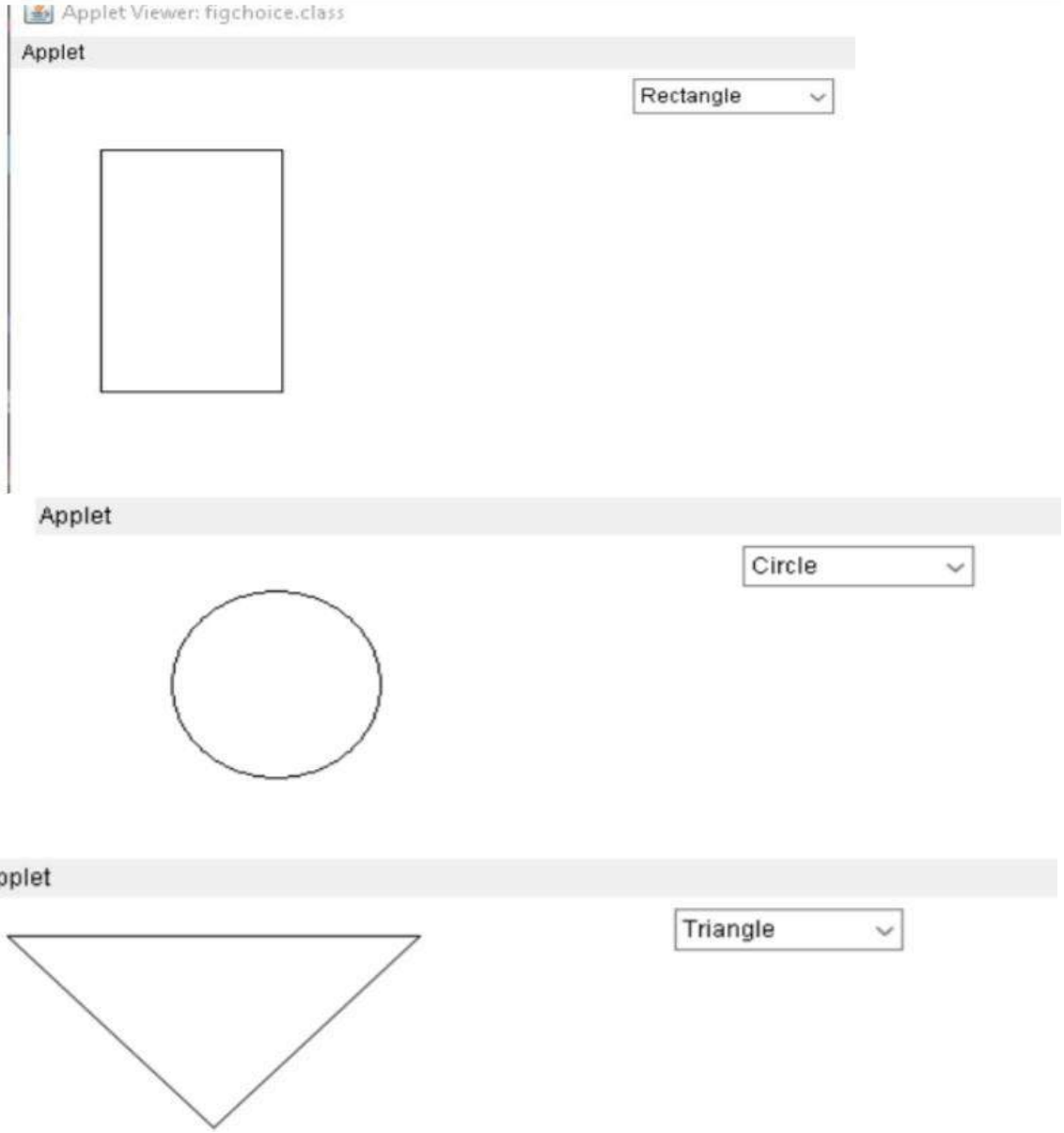


29: Develop a program that has a choice component which contains the names of shapes such asrectangle ,triangle.square and circle,Draw the corresponding shapes for given parameters as peruser'schoice.

```
import java.applet.Applet;importjava.awt.*;
import java.awt.Graphics;importjava.awt.event.*;
public class figchoice extends Applet implements ItemListener{Choicech;
intx1[]={50,120,220,20};
inty1[]={50,120,20,20};
intn=4;
int Selection;publicvoidinit()
{
ch= newChoice();ch.addItem("SelectaShape");
ch.addItem("Rectangle");ch.addItem("Triangle");ch.addItem("Square");ch.addItem("Ci
rcle");add(ch);ch.addItemListener(this);
}
publicvoiditemStateChanged(ItemEvente)
{
Selection = ch.getSelectedIndex();repaint();
}
publicvoidpaint(Graphicsg)
{
super.paint(g);
if(Selection==1)
{
g.drawRect(50,50,100,150);
}
if(Selection==2)
{
g.drawPolygon(x1,y1,n);
}
if(Selection==3)
```

```
{
g.drawRect(50,50,100,100);
}
if(Selection==4)
{
g.drawOval(70,30,100,100);
}
```

OUTPUT



30. Maintain a list of Strings using Array List from collection framework ,perform built-in

```
import java.util.*;

classJavaExample{
  public static void main(String args[])
  {
  ArrayList<String>
   alist=new ArrayList<String>();
    alist.add("avani");
    alist.add("jisha");
    alist.add("Lucy");
    alist.add("Pathu");
    alist.add("timle");
    alist.add("zain");
    //displaying elementsSystem.out.println(alist);
    alist.add(3,"zain");
    //displaying elementsSystem.out.println(alist);
  }
}
```

OUTPUT

```
F:\javalab>java JavaExample

F:\javalab>javac JavaExample.java

F:\javalab>java JavaExample
[ancy, arya, Lucy, zain, Pathu, timle, zain]
```

31. Program to remove all the elements from a linkedlist

```
Import java.util.*;
```

```
Public class removelink {
Public static void main(String[]args){

//createanemptylinkedlist
LinkedList<String>l_list=newLinkedList<String>();
// use add() method to add values in the linked listl_list.add("blue");
l_list.add("yellow");l_list.add("white");l_list.add("skyblue");l_list.add("green");


//print thelist
System.out.println("TheOriginallinkedlist:"+l_list);
// Removing all the elements from the linked listl_list.clear();
System.out.println("TheNewlinkedlist:"+l_list);
}
}
```

OUTPUT

```
F:\javalab>javac removelink.java

F:\javalab>java removelink
The Original linked list: [yellow, white, skyblue, green]
The New linked list: [yellow, white, skyblue, green]
```

32.Program to demonstrate the addition and deletion of elements in dequeue

```
Import java.util.*;

public class DequeExample   {

public static void  main(String[]args) {

Deque<String>deque=newLinkedList<String>();

deque.add("Element1(Tail)");

// Add at the firstdeque.addFirst("Element2(Head)");

// Add at the lastdeque.addLast("Element3(Tail)");

// Add at the firstdeque.push("Element4(Head)");

// Add at the lastdeque.offer("Element5(Tail)");

// Add at the firstdeque.offerFirst("Element 6 (Head)");System.out.println(deque+"\n");

//We canremovethefirstelement

// or the last element.deque.removeFirst();deque.removeLast();

System.out.println("Dequeafterremoving"+"first andlast: "

+deque);

}

}
```

OUTPUT

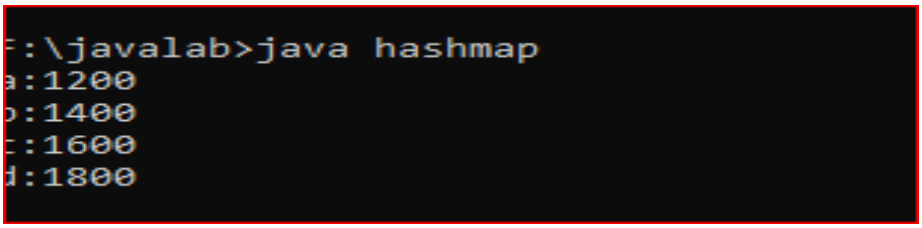
```
F:\javalab>javac DequeExample.java

F:\javalab>java DequeExample
Deque after removing first and last: [Element 1 (Tail)]
```

33 .program todemonstrate the working of map interface by adding ,removing,changing

```
import java.util.*;classhashmap{

publicstaticvoidmain(Stringargs[])

{
```

```
Map<String,Integer>hm=newHashMap<String,Integer>();
hm.put("a",newInteger(1200));
hm.put("b",newInteger(1400));
hm.put("c",newInteger(1600));
hm.put("d",newInteger(1800));

//Traversingthrough themap
for (Map.Entry<String, Integer>me :hm.entrySet()) {System.out.print(me.getKey() +
":");System.out.println(me.getValue());
}
}
}
```

OUTPUT



34:program toconvert hashmap to treemap

```
importjava.util.*;
import java.util.stream.*;publicclass HT {
public static void main(String args[]) {Map<String, String> map = new
HashMap<>();map.put("1","One");
map.put("2","Two");
map.put("3","Three");
map.put("4","Four");
map.put("5","Five");
map.put("6","Six");
map.put("7","Seven");
map.put("8","Eight");
map.put("9", "Nine");System.out.println("HashMap = " + map);Map<String,
```

```
String>treeMap = new TreeMap<>();treeMap.putAll(map);
System.out.println("TreeMap(HashMaptoTreeMap)"+treeMap);

}

}
```

OUTPUT

```
F:\javalab>javac HT.java

F:\javalab>java HT
HashMap = {1=One, 2=Two, 3=Three, 4=Four, 5=Five, 6=Six, 7=Seven, 8=Eight, 9=Nine}
TreeMap (HashMap to TreeMap) {1=One, 2=Two, 3=Three, 4=Four, 5=Five, 6=Six, 7=Seven, 8=Eight, 9=Nine}
```