Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

School of Computer Science and Engineering

FALL SEMESTER

Java Programming (CSE1007)

Lab Assessment -   I

NAME: BISURAJ SHARMA

REG NO: 20BCE2923

Slot: L51+52

Faculty: Deepika S, SITE

1. Write a program to find the factorial of a number using command line arguments.

Code:

```java
import java.util.Scanner;

public class main {
    public static void main(String[] args) {
        Scanner scan = new Scanner(System.in);

        int number = scan.nextInt();
        int fact = 1;
        for (int i = 1; i <= number; i++) {

            fact = fact * i;

        }

        System.out.println(fact);
    }
}
```

Output:

```
PS C:\Users\Bisuraj S
4
24
PS C:\Users\Bisuraj S
```

2. Write a program to print the multiplication table of a number.

Code:

```java
3.    import java.util.*;
4.    import java.util.Scanner;
5.
6.    public class main {
7.        public static void main(String [] args)
8.        {
9.        Scanner sc=new Scanner(System.in); int number= sc.nextInt();
10.       int a=1;
11.       for(int i=1;i<=10;i++)
12.       {
13.       a=number*i;
14.
15.       System.out.println(number +" * "+ i+" "+a);
16.       }
17.    }
18.    }
19.
```

Output:

```
5
5 * 1 5
5 * 2 10
5 * 3 15
5 * 4 20
5 * 5 25
5 * 6 30
5 * 7 35
5 * 8 40
5 * 9 45
5 * 10 50
```

3.Write a program to check whether the given number is an Armstrong number or not.

Code:

```java
import java.util.*;
import java.util.Scanner;

public class main {
    public static void main(String [] args)
    {
    Scanner sc=new Scanner(System.in); int number=sc.nextInt();
    int sum=0;
    int temp,digit; temp=number;
    while(number>0) { digit=number%10;
    sum = sum+(digit*digit*digit);
    number=number/10;
    }
    if(temp==sum)
    {System.out.println("armstrong");} else

    {System.out.println("not armstrong");}


    }
}
```

Output:

```
PS C:\Users\Bisuraj Sharma\
4736
not armstrong
PS C:\Users\Bisuraj Sharma\
153
armstrong
PS C:\Users\Bisur
```

4.Write a program to check whether the given number is a prime number or not
CODE:

```java
import java.util.*;
import java.util.Scanner;
```

```
public class main {
    public static void main(String[] args)
    {
    Scanner sc=new Scanner(System.in); int number =sc.nextInt();
    int flag=0; if(number==0)
    {
    System.out.println("neither prime nor composite");
    }
    int m=number/2; if(number==0||number==1)
    {
    System.out.println("Neither prime");
    }
    else {

    for(int i=2;i<m;i++)
    {
    if(number%i==0)
    {
    System.out.println(number+" is not prime");
    }
    flag=1; break;
    }
    if( flag==0) { System.out.println(number+" prime");
    }


    }

    }}
```

OUTPUT:

5.Write a program to generate the following patterns.
   i) 1   ii) *
   1 2   * *
   1 2 3   * * *
               * *
                *

CODE:
I)
```
public class main{
    public static void main(String args[]){
```

```java
        int i, j, number, n = 3;
        for (i = 0; i < n; i++) {
            number = 1;
            for (j = 0; j <= i; j++) {
                System.out.print(number + " ");
                number++;
            }
            System.out.println();
        }
    }}
```

OUTPUT:

```
1
1 2
1 2 3
DS C:\Use
```

II)
CODE:

```java
public class main
{
public static void main(String args[])
{
int  i, j, space = 1;
space = 3 - 1;
for (j = 1; j<= 3; j++)
{
for (i = 1; i<= space; i++)
{
System.out.print(" ");
}
space--;
for (i = 1; i <= 2 * j - 1; i++)
{
System.out.print("*");
}
System.out.println("");
}
space = 1;
for (j = 1; j<= 3 - 1; j++)
{
for (i = 1; i<= space; i++)
{
System.out.print(" ");
}
space++;
for (i = 1; i<= 2 * (3 - j) - 1; i++)
```

```
{
System.out.print("*");
}
System.out.println("");
}
}
}
```

OUTPUT:

```
    *
   ***
  *****
   ***
    *
PS C:\Users\Bisuraj S
```

6.Write a program to generate the Fibonacci series.

CODE:
```
import  java.util.*;

import java.util.Scanner;

public  class  main  {
public  static  void  main(String[]  args)
{
Scanner  sc=new  Scanner(System.in);
int  n=sc.nextInt();
int  n1=0,n2=1,n3,i;
System.out.print(n1+"  "+n2);
for(i=2;i<=n;++i)
{
n3=n1+n2; System.out.print("  "+n3); n1=n2;
n2=n3;
}

}}
```

OUTPUT:
```
PS C:\Users\Bisuraj Sharma\V
6
0 1 1 2 3 5 8
PS C:\Users\Bisuraj Sharma\V
```

7.Write a program to sort n numbers in ascending order.

CODE:

```java
import java.lang.reflect.Array;
import java.util.*;
import java.util.Scanner;

public class main {
public static void main(String[] args)
{
int temp;
Scanner sc=new Scanner(System.in); int n=sc.nextInt();
int [] arr=new int[n]; for(int i=0;i<n;i++)
{
arr[i]=sc.nextInt();
}

for(int j=0;j<n;j++)
{

for(int k=j+1;k<n;k++)
{

if(arr[j]>arr[k])
{
temp=arr[j]; arr[j]=arr[k]; arr[k]=temp;
}
}
System.out.println(arr[j]);
}


}
}
```

OUTPUT:

8.Write a program to search a number among n numbers using binary search.

CODE:

```java
import java.util.*;
import java.util.Scanner;
 public class main {
   public static void main(String[] args)
   {
   Scanner sc=new Scanner(System.in); int n=sc.nextInt();
   int[] arr=new int[n]; for(int i=0;i<n;i++)
   {

   arr[i]=sc.nextInt();

   }

   System.out.println("enter the item"); int item=sc.nextInt();
   int first=0; int last=n-1;
   int middle=(first+last)/2; while(first<=last)
   {
   if(arr[middle]<item) first=middle+1;
   else if(arr[middle]==item)
   {
   System.out.println(item +"found at the location "+(middle+1)); break;
   }
   else { last=middle-1;
   }
   middle=first+last/2;
   }
   if(first>last)
   {
   System.out.println("not found");
   }
   }}
```

OUTPUT:

6
34
23
21
54
32
65
enter the item
21
21found at the location 3

9.Write a program to read 'n' numbers and print their sum and average.

CODE:
```java
import java.util.*;
import java.util.Scanner;
public class main {
    public static void main(String[] args)
    {
    Scanner sc=new Scanner(System.in); int n=sc.nextInt();
    int sum=0;
    int average=0;
    int[] arr= new int[n]; for(int i=0;i<n;i++)
    {
    arr[i]=sc.nextInt(); sum=sum+arr[i]; average=sum/n;
    }
    System.out.print("sum: "+sum+" , "+" average: "+average);

    }}
```

OUTPUT:
```
PS C:\Users\Bisuraj Sharma\
4
21
34
23
56
sum: 134 ,  average: 33
PS C:\Users\Bisuraj Sharma\
```

10.Write a program that accepts a number as input and convert them into binary, octal and hexadecimal equivalents.

CODE:
```java
import java.util.*;
import java.util.Scanner;
 public class main {
    public static void main(String[] args)
    {
    Scanner sc=new Scanner(System.in); int n=sc.nextInt();
    System.out.println(Integer.toBinaryString(n)); System.out.println(Integer.toOctalStr
ing(n)); System.out.println(Integer.toHexString(n));

    }}
```

OUTPUT:

```
PS C:\Users\Bisuraj S
214
11010110
326
d6
PS C:\Users\Bisuraj S
```

11. Write a menu driven program to i) append a string ii) insert a string iii) delete a portion of the string.

CODE:

```java
import java.util.*;
import java.util.Scanner;

public class main {

    public static void main(String[] args)
    {
    Scanner sc=new Scanner(System.in); StringBuffer sb= new StringBuffer(); sb.append(sc
.next());


    String s=new String(sb); int a=45;
    String so=sb.append(a).toString();


    System.out.println("STRING "+s);
    System.out.println("APPEND "+so);
    System.out.println(sb.delete(2, 5));
    System.out.println(sb.insert(2,"keerthikeshar"));
    }
}
```

OUTPUT:

```
do
PS C:\Users\Bisuraj Sharma\Videos> cd
hello
STRING hello
APPEND hello45
he45
hekeerthikeshar45
PS C:\Users\Bisuraj Sharma\Videos>
```

12. Write a program to check whether a string is palindrome or not without using functions.

CODE:

```java
import java.util.*;

import java.util.Scanner;

public class main {

    static void akky() {
    Scanner sc=new Scanner(System.in);

    StringBuilder sb= new StringBuilder(); sb.append(sc.next());
    String sbb=sb.toString();

    System.out.println(sb);
    StringBuilder sr=new StringBuilder(sb);
     sr.reverse();

    String srr=sr.toString();
    System.out.println(sr);
    if(sbb.equals(srr)) {
        System.out.println("Palindrome");
    }
    else {
    System.out.println("Not palindrome");
    }


    }

    public static void main(String[] args)
    {

    akky();

    }}
```

OUTPUT:

```
PS C:\Users\Bisuraj Sharma\Videos> cd
MOM
MOM
MOM
Palindrome
PS C:\Users\Bisuraj Sharma\Videos>
```

**13. Write a menu driven program to i) compare two strings
ii) get the character in the specified position
iii) extract a substring
iv) replace a character with the given character v) get the position of a specified substring/character.**

CODE:

```java
import java.util.*;
import java.util.Scanner;
public class main {

    int temp;
    public static void main(String[] args)
    {
    Scanner sc=new Scanner(System.in);
    StringBuffer s=new StringBuffer(); s.append(sc.next());
    StringBuffer s1=new StringBuffer(); s1.append(sc.next());
    if(s.compareTo(s1)==0) {
    System.out.print("true");


    }
    else
    {


    }
    System.out.println(false);


    System.out.println(s1.charAt(0));

    System.out.println(s1.substring(2,4));
     System.out.println(s1.replace(5,8,"was"));
      System.out.println(s1.indexOf("w"));
    }}
```

OUTPUT:

```
PS C:\Users\Bisuraj Sharma\Vic
hello
world
false
w
rl
worldwas
0
```

14. Write a program to change the case of the letters in a string. Eg. ABCdef abcDEF

CODE:

```
15. import java.util.*;
16.
17. import java.util.Scanner;
18. public class main {
19.
20. public static void main(String []args){
21.     Scanner sc=new Scanner(System.in);
22. StringBuilder sb=new StringBuilder(sc.next());
23. StringBuilder sb1=new StringBuilder(sb);
24. for(int i=0;i<sb.length();i++) {
25.     if(Character.isLowerCase(sb.charAt(i))){
26. sb1.setCharAt(i, Character.toUpperCase(sb.charAt(i)));
27. }
28. else if(Character.isUpperCase(sb.charAt(i))){
29.     sb1.setCharAt(i, Character.toLowerCase(sb.charAt(i)));
30. }
31.
32. }
33. System.out.println(sb1);
34.
35. }}
36.
```

OUTPUT:

```
PS C:\Users\Bisur
HelloWorLd
hELLOwORlD
PS C:\Users\Bisur
```

15. Write a class with the following methods: wordCount: This method accepts a String object as an argument and returns the number of words contained in the object. arrayToString: This method accepts a char array as an argument and converts it to a String object. mostFrequent: This method accepts a String object as an argument and returns the character that occurs the most frequently in the object.

CODE:

```
import java.util.*;

import java.lang.*;
```

```java
class main
{
private static int wordCount(String string1)
{
int number = 0;
for(int i = 0; i < string1.length(); i++)
{char ch = string1.charAt(i); if(Character.isWhitespace(ch))
{number = number + 1;}
}
return number + 1;
}

private static String arrayToString(char[] charArray)
{return String.valueOf(charArray);}

private static char mostFrequent(String string1)
{char mostOccurrence = ' '; int most = 0;
int j;
for(int i = 0; i < string1.length(); i++)
{
int count = 0;
char ch = string1.charAt(i);
for(j = 0; j < string1.length(); j++)
{
if(ch == string1.charAt(j)) count = count + 1;
}
if(count >= most)
{most = count; mostOccurrence = ch;
}
}
return mostOccurrence;
}

public static void main(String args[])
{
System.out.println("Enter a string:");
Scanner sc=new Scanner(System.in);
String string1=sc.nextLine();

int numberOfWords = wordCount(string1);
System.out.println("The string object is : " + string1);
System.out.println("Number of words in the above string is : "
+ numberOfWords);

char mostOccurrence = mostFrequent(string1);
System.out.println("The most occured character in the above string is : "
+ mostOccurrence);
```

```
System.out.println("Enter a character array and convert it to a String:");
char[] charArray = sc.next().toCharArray();
for (int i = 0; i < charArray.length; i++)
System.out.println(charArray[i]);

String character = arrayToString(charArray);
System.out.print("\nThe array is :");
for(int i = 0; i < charArray.length; i++)
System.out.println(charArray[i] + " ");
System.out.println("String from the above character array is : "
+ character);
}
}
```

```
Enter a string:
Hello world this is something new
The string object is : Hello world this is something new
Number of words in the above string is : 6
The most occured character in the above string is :
Enter a character array and convert it to a String:
hello
h
e
l
l
o

The array is :h
e
l
l
o
String from the above character array is : hello
```

16. Create a class Student (Regno, Name, Branch, Year, Semester and 5 Marks).
    Add methods to

read the student details, calculate the grade and print the mark statement.

CODE:

```java
import java.util.*;

class student{
Scanner sc=new Scanner(System.in);
int num,year,sem;
int marks[]; int total=0;
String name,branch; student(){ num=sc.nextInt(); name=sc.next(); year=sc.nextInt(); sem=
sc.nextInt(); branch=sc.next(); stu();
getmarks(); grade();

}
void stu() {
System.out.println(num + " "+name+" "+year+" "+sem+" "+branch+" ");
}
public  void  getmarks()  {

marks=new int[5];
 marks[0]=sc.nextInt();
marks[1]=sc.nextInt();
marks[2]=sc.nextInt();
 marks[3]=sc.nextInt();
 marks[4]=sc.nextInt();
 for(int i=0;i<3;i++) {

total+=marks[i];
}
System.out.println("total  marks:  "+total);
}
void grade() {
if(total>80)
{System.out.println("A");}
if(total>50&&total<80) {System.out.println("B");} if(total<50){
System.out.println("fail");
}

}
}

public class main {
public  static  void  main(String  args[])  { student s[]=new student[5];
for(int i=0;i<5;i++)
{ s[i]=new student();
}
```

```
}
}
```

OUTPUT:

```
PS C:\Users\Bisuraj Sharma
5
23

23
432
24
5 23 23 432 24
321
23
56
78
23
total  marks:  400
A

```

17. Write a program that displays an invoice of several items. Create a class called Item with members item_name, quantity, price and total_cost and methods to get and set values for the members. Derive a new class to print the bill using Item class.

CODE:

```java
import java.util.*;
class item{
String name;
 int quantity;
int price;
int total_cost=0;
 item() {
    System.out.println("the list of items are: ");
    Scanner sc=new Scanner(System.in);
    name=sc.nextLine();
    quantity=sc.nextInt();
    price=sc.nextInt();
    System.out.println("items are: "+name+" "+quantity+" "+price);
    }
    void total() { total_cost=quantity*price;
    System.out.println(" total cost :"+total_cost);
    }
    }
    class bill extends item{
    int tot;
    void sum() { tot=total_cost;
    }
    }

    public class main {
    public static void main(String args[]) { Scanner sc =new Scanner(System.in);
    int n =sc.nextInt(); item it[]=new item[n];{ for(int k=0;k<n;k++) { it[k]=new
item();
    it[k].total();
    }
    }
    }
    }
```

OUTPUT:

```
PS C:\Users\Bisuraj Sharma\Videos> cd   C:\Users\Bi
3
the  list  of  items  are:
Oil
10
321
items  are:  Oil  10  321
  total  cost  :3210
the  list  of  items  are:
Coconut
21
100
items  are:  Coconut  21  100
  total  cost  :2100
the  list  of  items  are:
Rice
10
211
items  are:  Rice  10  211
  total  cost  :2110
PS C:\Users\Bisuraj Sharma\Videos> []
```

18. Create a class Telephone with two members to hold customer's name and phone number.
The class should have appropriate constructor, input and display methods. Derive a class
TelephoneIndex with methods to change the name or phone number.Create an array of objects
and perform the following functions.
a. Search for a name when the user enters a name or the first few characters.
b. Display all of the names that match the user's input and their corresponding phone numbers.
c. Change the name of a customer.
d. Change the phone number of a customer.

CODE:

```java
import java.util.*;
class Telephone{
    String name;
    String mobile;

    Telephone(String n, String m)
    {
    name = n;
    mobile = m;
    }
    }
```

```java
class TelephoneIndex extends Telephone{ TelephoneIndex(String n, String m)
{
super(n, m);
}

public void ChangeName(String n)
{
name = n;
}
public void ChangeMobile(String m)
{
mobile = m;
}

public void Display()
{
System.out.println("Name: " + name);
System.out.println("Mobile: " + mobile);
}
}
class main{
public static void main(String[] args) {

Scanner sc = new Scanner(System.in); TelephoneIndex ti[] = new TelephoneIndex[5];

for(int i = 0; i < 5; i++)
{
System.out.println("Enter the name");
String name = sc.nextLine();
System.out.println("Enter the phone number");
String mobile = sc.nextLine();

ti[i] = new TelephoneIndex(name, mobile);

}



System.out.println("Enter a name to search");
String tname = sc.nextLine();
for (int i = 0; i < 5; i++)
{
    if(tname.equals(ti[i].name))
{
ti[i].Display();
}
}
```

```
System.out.println("Enter the index of the name to be changed");
int cnindex = sc.nextInt();
System.out.println("Enter the new name");
String cname = sc.next();

ti[cnindex].name = cname; ti[cnindex].Display();

System.out.println("Enter the index of the number to be changed");
int cmindex = sc.nextInt();
System.out.println("Enter the new phone number");
String cmobile = sc.next();

ti[cmindex].mobile = cmobile; ti[cmindex].Display();


    }
}
```

OUTPUT:

```
Enter the name
Neha
Enter the phone number
7365392067
Enter the name
Mehul
Enter the phone number
8967283602
Enter the name
Sonalika
Enter the phone number
9824368937
Enter a name to search
Neha
Name: Neha
Mobile: 7365392067
Enter the index of the name to be changed
2
Enter the new name
Neha rajput
Name: Neha
```

19. Create an abstract class called BankAccount with members customer name, date of birth, address, account number, balance and member functions to get values for the members and display it. Derive a class SavingsAccount with member functions to perform deposit and withdraw in the account. Write a menu driven program to create a new account, perform withdraw, deposit and delete an account.

CODE:

```java
import java.util.Scanner;

abstract class BankAccount{String name;

String dob;
String Address;
String  acno;
int balance;


public void getValues()
{
Scanner sc = new Scanner(System.in);
name = sc.nextLine();
dob = sc.nextLine();
Address = sc.nextLine();
acno = sc.nextLine();
 balance = sc.nextInt();

System.out.println("name: " + name);
System.out.println("dob: " + dob);
System.out.println("address: " + Address);
System.out.println("acno: " + acno);
System.out.println("balance: " + balance);
}
}

class SavingsAccount extends BankAccount{
Scanner sc;
SavingsAccount()
{
sc = new Scanner(System.in);
}


void Deposit()
{
System.out.println("Enter the amount to be deposited: ");
```

```java
balance += sc.nextInt();
System.out.println("balance: " + balance);
}

void Withdraw()
{
System.out.println("Enter the amount to be withdrawn: " );
balance -= sc.nextInt();
System.out.println("balance: " + balance);
}
}


class main{

public static void main(String[] args) {

SavingsAccount acc;
Scanner sc = new Scanner(System.in);
System.out.println("1) Create an account\n2) Withdraw\n3) Deposit\n4) Delete account");
int n = sc.nextInt();

if(n == 1)
{
acc = new SavingsAccount();
acc.getValues();
}
else if(n == 2)
{
acc = new SavingsAccount();
acc.getValues();
acc.Withdraw();

}
else if(n == 3)
{
acc = new SavingsAccount();
acc.getValues();
acc.Deposit();
}
else if(n == 4)
{
acc = new SavingsAccount();
acc.getValues();

}


}
}
```

OUTPUT:

```
PS C:\Users\Bisuraj Sharma\Videos> cd "c:\U
1) Create an account
2) Withdraw
3) Deposit
4) Delete account
1
Bisuraj Sharma
01 sep 2002
Nepal
27452789347
19000
name: Bisuraj Sharma
dob: 01 sep 2002
address: Nepal
acno: 27452789347
balance: 19000
PS C:\Users\Bisuraj Sharma\Videos> []
```

20. Create an Interface with methods add(), sub(), multiply() and divide(). Write two classes FloatValues to perform arithmetic operations on floating point numbers and IntegerValues on integer numbers by implementing the interface.

CODE:

```java
import java.util.*;
interface Maths{
void add(int a,int b);void multiply(int a,int b);void sub(int a,int b);void divide(int a
,int b);



}
class floatnum implements Maths{
    float c;
float d;
float e;
float f;
 @Override
public void add(int a, int b) { c=a+b;

System.out.println("float addition:"+c);


}

@Override
public void multiply(int a, int b) { d=a*b;
System.out.println("float mutiplication"+d);


}

@Override
public void sub(int a, int b) { e=a-b;
System.out.println("float subtraction"+e);


}

@Override
public void divide(int a, int b) { f=a/b;
System.out.println("float division"+f);


}

}
class intnum implements Maths{ int g;
int h; int i; int j;
```

```java
@Override
public void add(int a, int b) { g=a+b;
System.out.println("int addition:"+g);


}

@Override
public void multiply(int a, int b) { h=a*b;
System.out.println("int mutiplication"+h);


}

@Override
public void sub(int a, int b) { i=a-b;
System.out.println("int subtraction"+i);


}

@Override
public void divide(int a, int b) { j=a/b;
System.out.println("int division"+j);


}

}

public class main {
public static void main(String args[]) { floatnum num= new floatnum(); num.add(5,3);
num.sub(5,3); num.multiply(5,3); num.divide(5,3);

intnum num1= new intnum(); num1.add(5,3);
num1.sub(5,3); num1.multiply(5,3); num1.divide(5,3);
}
}
```

OUTPUT:

```
1 error
PS C:\Users\Bisuraj Sharma\Videos> cd "c:\Users
float addition:8.0
float subtraction2.0
float mutiplication15.0
float division1.0
int addition:8
int subtraction2
int mutiplication15
int division1
PS C:\Users\Bisuraj Sharma\Videos> |
```

21. Write the following two methods under an interface Number // Return the reversal of an integer, i.e. reverse(456) returns 654 public static int reverse(int number) // Return true if number is palindrome public static boolean isPalindrome(int number) Use the reverse method to implement isPalindrome. A number is a palindrome if its reversal is the same as itself. Write a test program to implement the interface Number and prompts the user to enter an integer and reports whether the integer is a palindrome.

Code:

```java
public class Main
{

    public static int reverse(int number) {
        int reverse = 0;
        while (number != 0) {
            reverse = (reverse * 10) + number % 10;
            number = number / 10;
        }
        return (reverse);
    }

    public static boolean isPalindrome(int number) {
        return (number == reverse(number));
    }

    public static void main(String[] args) {
        System.out.print("Enter an integer: ");
        java.util.Scanner input = new java.util.Scanner(System.in);
        int number = input.nextInt();
        System.out.println("Reversed: " + reverse(number));

    if (isPalindrome(number)) {
        System.out.println(number + " is a palindrome.");
    }
        else{
        System.out.println("It is not a palindrome.");
    }
    }
}
```

Output:

22.

Write a method to implement the binary search. Use a package that has the class sort with a method void bubble_sort(double[] array) to perform a bubble sort public void search(double[] array) Write a test program that prompts the user to enter n numbers, and a search element. Invokes this method to return the position of the search element.

Code:

Sort.java code:

```java
package sort;

public class sort {
    public static void bubbleSort(double arr[]) {
        int n = arr.length;
        for (int i = 0; i < n - 1; i++)
            for (int j = 0; j < n - i - 1; j++)
                if (arr[j] > arr[j + 1]) {
                    double temp = arr[j];
                    arr[j] = arr[j + 1];
                    arr[j + 1] = temp;
                }
    }
}
```

Search.java Code:

```java
import java.util.Scanner;
import sort.sort;

public class search {
    static int binarySearch(double arr[], int first, int last, double x) {
        if (last >= first) {
            int mid = first + (last - first) / 2;
            if (arr[mid] == x)
                return mid;
            if (arr[mid] > x)
```

```
            return binarySearch(arr, first, mid - 1, x);
            return binarySearch(arr, mid + 1, last, x);
        }
        return -1;
    }

    public static void main(String[] args) {
        System.out.print("Enter the number of elements in an array: ");
        Scanner in = new Scanner(System.in);
        int n = in.nextInt();
        System.out.println("Enter the numbers: ");
        in.nextLine();
        double arr[] = new double[n];
        for (int i = 0; i < n; i++) {
            double x = in.nextDouble();
            arr[i] = x;
            in.nextLine();
        }
        sort.bubbleSort(arr);
        System.out.print("\nInput the value to be searched: ");

        double val = in.nextDouble();
        int pos = binarySearch(arr, 0, n, val);
        System.out.println("Position is " + pos);
    }
}
```

Output:

```
Enter the number of elements in an array: 5
Enter the numbers:
23
23
54
67
23

Input the value to be searched: 54
Position is 3
DS C:\Users\Risunai Sharma\Videos\Captures> []
```

23. Write a program that has a class Factor with a method boolean isFactor(int n, in m) that checks if n is a factor of m. Write another class Divisibleby2 that derives Factor class. Override the isFactor(n,m) method to find it is divisible by 2 or not. Write another class Divisibleby3 that derives Factor class. Override the isFactor(n,m) method to find it is divisible by 3 or not. Write a test method that creates object for 2 classes. Get a number n from the user and check whether it is divisible by 6.

Code:
```
import java.util.*;
```

```java
class Factor {
    boolean isFactor(int n, int m) {
        if (m % n == 0)
            return true;
        return false;
    }
}

class Divisibleby2 extends Factor {
    boolean isFactor(int n, int m) {
        n = 2;
        if (m % n == 0)
            return true;
        return false;
    }
}

class Divisibleby3 extends Factor {
    boolean isFactor(int n, int m) {
        n = 3;
        if (m % n == 0)
            return true;
        return false;
    }
}

public class main {
    static Scanner scan = new Scanner(System.in);

    static void test() {
        Factor k;
        for (int i = 0; i < 2; i++)
            k = new Factor();

    }

    public static void main(String[] args) {
        test();
        System.out.println("Enter the value of n");
        Factor k;
        k = new Factor();
        int n = scan.nextInt();
        if (k.isFactor(6, n)) {
            System.out.printf("%d is divisible by 6", n);
        } else
            System.out.printf("%d isn't divisible by 6", n);

    }
}
```

Output:

```
PS C:\Users\Bisuraj Sharma\
Enter the value of n
36
36 is divisible by 6
PS C:\Users\Bisuraj Sharma\
```