Java Workshop Lab File

Object Oriented Programming,Classes,Objects,Methods,Constructor

1. Create a class to calculate Area of circle with one data member to store the radius and another to store area value.

```java
public class CircleArea
{ double
radius;
double area;
void setRadius(double r)
{ radius=r; } void
calculateArea()
{
area=Math.PI*radius*radius;
}
void displayArea()
{
System.out.println("Radius : "+radius);
System.out.println("Area of Circle : "+area);
} public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); CircleArea circle=new CircleArea();
circle.setRadius(5.0); circle.calculateArea();
circle.displayArea();
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Radius : 5.0
Area of Circle : 78.53981633974483
```

2. Create a class MathOpera on with two data member X and Y to store the operand and third data member R to store result of opera on.Create method members

- init - to input X and Y from user

- add - to add X and Y and store in R

- mul ply - to mul ply X and Y and store in R

- power - to calculate X Y and store in R

- display- to display Result R

```java
import java.util.Scanner;
public class MathOperation
{ int x;
int y;
double r;
void
init()
{
Scanner sc=new Scanner(System.in);
System.out.print("Enter value of X: ");
x=sc.nextInt();
System.out.print("Enter value of Y: ");
y=sc.nextInt();
} void
add() {
r=x+y; }
void multiply()
{
r=x*y;
}
void power()
{
r=Math.pow(x,y);
}
void display()
{
System.out.println("Result: "+r);
} public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); MathOperation mo=new
MathOperation(); mo.init(); mo.add(); mo.display();
mo.multiply(); mo.display(); mo.power(); mo.display();
}
```

}

Enrollment Number : 0873CS231039

Enter value of X: 5

Enter value of Y: 3

Result: 8.0

Result: 15.0

Result: 125.0

3. Create a class MathOpera on containing method 'mul ply' to calculate mul plica on of following arguments.

a. two integers

b. three float

c. all elements of array

d. one double and one integer

```java
public class MathOperation
{ void multiply(int a,int
b)
{
int result=a*b;
System.out.println("Multiplication of two integers:
"+result);
} void multiply(float a,float b,float
c)
{
float result=a*b*c;
System.out.println("Multiplication of three floats:
"+result);
} void multiply(int[]
arr)
{ int result=1; for(int
i=0;i<arr.length;i++)
{
result=result*arr[i];
}
System.out.println("Multiplication of array elements: "+result);
}
void multiply(double a,int b)
{
double result=a*b;
System.out.println("Multiplication of one double and one integer: "+result);
}
public static void main(String[] args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment          Number          :
0873CS231039");          MathOperation          m=new
MathOperation(); m.multiply(5,4);
m.multiply(1.2f,3.4f,2.0f);
int[] arr={2,3,4};
m.multiply(arr);
m.multiply(5.5,3);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Multiplication of two integers: 20
Multiplication of three floats: 8.16
Multiplication of array elements: 24
Multiplication of one double and one integer: 16.5
```

4. Write a prog. to find prime numbers in an array.

    public class PrimeInArray

```java
{ boolean isPrime(int
n)
{ if(n<=1) return
false; for(int
i=2;i<=n/2;i++)
{ if(n%i==0) return false; } return
true; } public static void
main(String[] args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); int[] arr={3,4,5,6,7,8,9,11,13,15};
PrimeInArray obj=new PrimeInArray();
System.out.println("Prime numbers in the array:");
for(int i=0;i<arr.length;i++)
{
if(obj.isPrime(arr[i]))
System.out.println(arr[i]);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Prime numbers in the array:
3
5
7
11
13
```
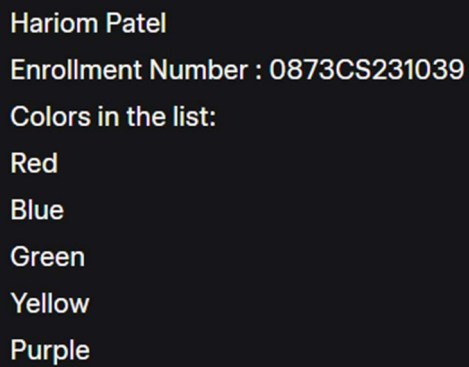
Array List Programs

5. Write a Java program to create an ArrayList, add some colors (as strings), and print the collec on.

```java
import java.util.ArrayList;
public class ColorList
```

```java
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> colors=new
ArrayList<String>(); colors.add("Red");
colors.add("Blue"); colors.add("Green");
colors.add("Yellow"); colors.add("Purple");
System.out.println("Colors in the list:");
for(String color:colors)
{
System.out.println(color);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Colors in the list:
Red
Blue
Green
Yellow
Purple
```

6. Write a Java program to iterate through all elements in an ArrayList.

```java
import java.util.ArrayList;
public class IterateArrayList
{ public static void main(String[]
args)
```

```
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");

list.add("Cherry");
list.add("Date");
list.add("Elderberry");
System.out.println("Iterating through the ArrayList:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Iterating through the ArrayList:
Apple
Banana
Cherry
Date
Elderberry
```

7. Write a Java program to insert an element into the ArrayList at the first posi
on.

```java
import java.util.ArrayList;
public class
InsertAtFirstPosition
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
list.add(0,"Apple");
System.out.println("ArrayList after insertion at first position:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
ArrayList after insertion at first position:
Apple
Banana
Cherry
Date
Elderberry
```

8. Write a Java program to retrieve an element at a specified index from a given
ArrayList.

```java
import java.util.ArrayList;
public class RetrieveElement
```

```java
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
int index=2;
String element=list.get(index);
System.out.println("Element at index "+index+": "+element);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Element at index 2: Cherry
```

9. Write a Java program to update an ArrayList element by a given element.

```java
import java.util.ArrayList;
public class UpdateElement
{ public static void main(String[]
args)
```

```java
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
int index=1;
String newElement="Blueberry";
list.set(index,newElement);
System.out.println("ArrayList after update:");
for(String item:list)
{
System.out.println(item);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
ArrayList after update:
Apple
Blueberry
Cherry
Date
Elderberry
```

10. Write a Java program to remove the third element from an ArrayList.

```java
import java.util.ArrayList; public
class RemoveThirdElement
{ public static void main(String[]
args)
```

```java
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>();

list.add("Apple");
list.add("Banana");
list.add("Cherry");
list.add("Date");
list.add("Elderberry");
list.remove(2);
System.out.println("ArrayList after removing third element:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
ArrayList after removing third element:
Apple
Banana
Date
Elderberry
```

11. Write a Java program to search for an element in an ArrayList.

```java
import java.util.ArrayList;
public class SearchElement
{
public static void main(String[] args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
String searchElement="Cherry";
if(list.contains(searchElement))
System.out.println(searchElement+" is found in the ArrayList.");
else
System.out.println(searchElement+" is not found in the ArrayList.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Cherry is found in the ArrayList.
```

12. Write a Java program to sort a given ArrayList.

```java
import java.util.ArrayList;
import java.util.Collections;
public class SortArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Banana"); list.add("Apple");
list.add("Date"); list.add("Cherry"); list.add("Elderberry");
Collections.sort(list);
System.out.println("Sorted ArrayList:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Sorted ArrayList:
Apple
Banana
Cherry
Date
Elderberry
```

13. Write a Java program to copy one array list into another.

```java
import java.util.ArrayList;
public class CopyArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list1=new
ArrayList<String>(); list1.add("Apple");
list1.add("Banana"); list1.add("Cherry");
ArrayList<String> list2=new ArrayList<String>(list1);
System.out.println("Elements of copied ArrayList:");
for(String item:list2)
{
System.out.println(item);
}
}
}
```

```
Mayank Aylani
Enrollment No : 0873CS231065
Elements of copied ArrayList:
Apple
Banana
Cherry
```

14. Write a Java program to shuffle elements in an array list.

```java
import java.util.ArrayList;
import java.util.Collections;
public class ShuffleArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
Collections.shuffle(list);
System.out.println("Shuffled ArrayList:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Shuffled ArrayList:
Cherry
Apple
Elderberry
Banana
Date
```

15. Write a Java program to reverse elements in an array list.

```java
import java.util.ArrayList;
import java.util.Collections;
public class ReverseArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
Collections.reverse(list);
System.out.println("Reversed ArrayList:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Reversed ArrayList:
Elderberry
Date
Cherry
Banana
Apple
```

16. Write a Java program to extract a por on of an array list.

```java
import java.util.ArrayList;
import java.util.List;
public class ExtractPortion
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
List<String> subList=list.subList(1,4);
System.out.println("Extracted portion of ArrayList:");
for(String item:subList)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Extracted portion of ArrayList:
Banana
Cherry
Date
```
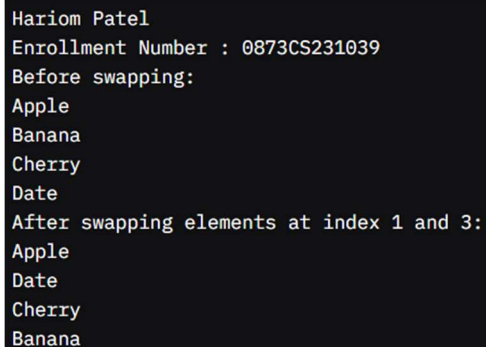
17. Write a Java program to compare two array lists.

```java
import java.util.ArrayList;
public class CompareArrayLists
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list1=new
ArrayList<String>(); list1.add("Apple");
list1.add("Banana"); list1.add("Cherry");
ArrayList<String> list2=new
ArrayList<String>(); list2.add("Apple");
list2.add("Banana"); list2.add("Cherry");
if(list1.equals(list2))
System.out.println("Both ArrayLists are equal.");
else
System.out.println("ArrayLists are not equal.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Extracted portion of ArrayList:
Banana
Cherry
Date
```

18. Write a Java program that swaps two elements in an array list.

```java
import java.util.ArrayList;
import java.util.Collections;
public class SwapElements
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date");
System.out.println("Before swapping:");
for(String item:list)
{
System.out.println(item);
}
Collections.swap(list,1,3);
System.out.println("After swapping elements at index 1 and 3:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Before swapping:
Apple
Banana
Cherry
Date
After swapping elements at index 1 and 3:
Apple
Date
Cherry
Banana
```

19. Write a Java program to join two array lists.

```java
import java.util.ArrayList;
public class JoinArrayLists
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list1=new
ArrayList<String>(); list1.add("Apple");
list1.add("Banana");
ArrayList<String> list2=new
ArrayList<String>(); list2.add("Cherry");
list2.add("Date"); list1.addAll(list2);
System.out.println("Joined ArrayList:");
for(String item:list1)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Joined ArrayList:
Apple
Banana
Cherry
Date
```

20. Write a Java program to clone an array list to another array list.

```java
import java.util.ArrayList;
public class CloneArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list1=new
ArrayList<String>(); list1.add("Apple");
list1.add("Banana"); list1.add("Cherry");
ArrayList<String>
list2=(ArrayList<String>)list1.clone();
System.out.println("Cloned    ArrayList:");    for(String
item:list2)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Cloned ArrayList:
Apple
Banana
Cherry
```

21. Write a Java program to empty an array list.

```java
import java.util.ArrayList;
public class EmptyArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry");
System.out.println("ArrayList before emptying:");
for(String item:list)
{
System.out.println(item);
}
list.clear();
System.out.println("ArrayList after emptying:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
ArrayList before emptying:
Apple
Banana
Cherry
ArrayList after emptying:
```

22. Write a Java program to test whether an array list is empty or not.

```java
import java.util.ArrayList;
public class CheckEmpty
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); if(list.isEmpty())
System.out.println("The ArrayList is empty.");
else
System.out.println("The ArrayList is not
empty."); list.add("Apple"); if(list.isEmpty())
System.out.println("The ArrayList is empty.");
else
System.out.println("The ArrayList is not empty.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
The ArrayList is empty.
The ArrayList is not empty.
```

23. Write a Java program for trimming the capacity of an array list.

```java
import java.util.ArrayList;
public class TrimArrayList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(20); list.add("Apple");
list.add("Banana"); list.add("Cherry");
System.out.println("Size before trim: "+list.size());
list.trimToSize();
System.out.println("Size after trim: "+list.size());
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Size before trim: 3
Size after trim: 3
Apple
Banana
Cherry
```

24. Write a Java program to increase an array list size.

```java
import java.util.ArrayList; public
class IncreaseArrayListSize
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.ensureCapacity(10);
list.add("Date"); list.add("Elderberry");
System.out.println("ArrayList after increasing capacity and adding elements:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
ArrayList after increasing capacity and adding elements:
Apple
Banana
Cherry
Date
Elderberry
```

25. Write a Java program to replace the second element of an ArrayList with the specified element.

```java
import java.util.ArrayList; public
class ReplaceSecondElement
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry");
System.out.println("Before replacing:");
for(String item:list)
{
System.out.println(item);
}
list.set(1,"Blueberry");
System.out.println("After replacing second element:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Before replacing:
Apple
Banana
Cherry
After replacing second element:
Apple
Blueberry
Cherry
```

26. Write a Java program to print all the elements of an ArrayList using the elements' posi on.

```java
import java.util.ArrayList;
public class PrintUsingIndex
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); ArrayList<String> list=new
ArrayList<String>(); list.add("Apple"); list.add("Banana");
list.add("Cherry"); list.add("Date"); list.add("Elderberry");
System.out.println("Elements using index positions:");
for(int i=0;i<list.size();i++)
{
System.out.println("Element at index "+i+": "+list.get(i));
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Elements using index positions:
Element at index 0: Apple
Element at index 1: Banana
Element at index 2: Cherry
Element at index 3: Date
Element at index 4: Elderberry
```

Linked List Programs

27. Write a Java program to append a specified element to the end of a linked list.

```java
import java.util.LinkedList;
public class AppendElement
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Apple");
list.add("Banana"); list.add("Cherry");
list.addLast("Date");
System.out.println("LinkedList after appending an element:");
for(String item:list)
{
System.out.println(item);
}
}
```

```
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
LinkedList after appending an element:
Apple
Banana
Cherry
Date
```

28. Write a Java program to iterate through all elements in a linked list.

```java
import java.util.LinkedList;
public class IterateLinkedList
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Apple");
list.add("Banana"); list.add("Cherry"); list.add("Date");
list.add("Elderberry");
System.out.println("Iterating through the LinkedList:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Iterating through the LinkedList:
Apple
Banana
Cherry
Date
Elderberry
```

29. Write a Java program to iterate through all elements star ng from a specified
posi on in a linked list.

```
import java.util.LinkedList;
public class IterateFromPosition
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Apple");
list.add("Banana"); list.add("Cherry"); list.add("Date");
list.add("Elderberry"); int startIndex=2;
System.out.println("Iterating from index "+startIndex+":");
for(int i=startIndex;i<list.size();i++)
{
```

```
        System.out.println(list.get(i));
        }
    }
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Iterating from index 2:
Cherry
Date
Elderberry
```

30. Write a Java program to iterate a linked list in reverse order.

```
import java.util.LinkedList;
import java.util.Iterator;
public class ReverseIterate
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Apple");
list.add("Banana"); list.add("Cherry"); list.add("Date");
list.add("Elderberry");
```

```
Iterator<String> itr=list.descendingIterator();
System.out.println("LinkedList in reverse order:");
while(itr.hasNext())
{
System.out.println(itr.next());
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
LinkedList in reverse order:
Elderberry
Date
Cherry
Banana
Apple
```

31. Write a Java program to insert a specified element at a given posi on in a linked list.

```
import java.util.LinkedList;
public class InsertAtPosition
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Apple");
```

```
list.add("Banana"); list.add("Cherry"); int position=1;
String element="Date"; list.add(position,element);
System.out.println("LinkedList after insertion:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
LinkedList after insertion:
Apple
Date
Banana
Cherry
```

32. Write a Java program to insert elements at the first and last posi ons of a linked list.

```
import java.util.LinkedList;
public class InsertFirstLast
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); LinkedList<String> list=new
LinkedList<String>(); list.add("Banana");
list.add("Cherry"); list.addFirst("Apple");
list.addLast("Date");
```

```
System.out.println("LinkedList after inserting at first and last positions:");
for(String item:list)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
LinkedList after inserting at first and last positions:
Apple
Banana
Cherry
Date
```

Tree-Set Programs

33. Write a Java program to add all elements from one TreeSet to another TreeSet.

```
import java.util.TreeSet;
public class AddAllTreeSet
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set1=new
```

```java
TreeSet<String>(); set1.add("Apple"); set1.add("Banana");
set1.add("Cherry");
TreeSet<String> set2=new
TreeSet<String>(); set2.add("Date");
set2.add("Elderberry"); set2.addAll(set1);
System.out.println("Elements of second TreeSet after adding all from first:");
for(String item:set2)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Elements of second TreeSet after adding all from first:
Apple
Banana
Cherry
Date
Elderberry
```

34. Write a Java program to display the elements of a TreeSet in reverse order.

```java
import java.util.TreeSet;
import java.util.NavigableSet;
public class ReverseTreeSet
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set=new
TreeSet<String>(); set.add("Apple"); set.add("Banana");
set.add("Cherry"); set.add("Date"); set.add("Elderberry");
NavigableSet<String> reverseSet=set.descendingSet();
System.out.println("TreeSet elements in reverse order:");
for(String item:reverseSet)
```

```
        {
        System.out.println(item);
        }
        }
        }
```

```
Hariom Patel
Enrollment Number : 0873CS231039
TreeSet elements in reverse order:
Elderberry
Date
Cherry
Banana
Apple
```

35. Write a Java program to retrieve the first and last elements from a TreeSet.

```java
import java.util.TreeSet;
public class FirstLastElement
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set=new
TreeSet<String>(); set.add("Apple"); set.add("Banana");
set.add("Cherry"); set.add("Date"); set.add("Elderberry");
String first=set.first();
String last=set.last();
System.out.println("First element: "+first);
System.out.println("Last element: "+last);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
First element: Apple
Last element: Elderberry
```

36. Write a Java program to clone a TreeSet into another TreeSet

```
import java.util.TreeSet;
public class CloneTreeSet
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set1=new
TreeSet<String>(); set1.add("Apple"); set1.add("Banana");
set1.add("Cherry");
TreeSet<String> set2=(TreeSet<String>)set1.clone();
System.out.println("Cloned TreeSet elements:");
for(String item:set2)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Cloned TreeSet elements:
Apple
Banana
Cherry
```

37. Write a Java program to count the number of elements in a TreeSet.

```java
import java.util.TreeSet;
public class CountElements
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set=new
TreeSet<String>(); set.add("Apple"); set.add("Banana");
set.add("Cherry"); set.add("Date"); set.add("Elderberry");
int count=set.size();
System.out.println("Number of elements in the TreeSet: "+count);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Number of elements in the TreeSet: 5
```

38. Write a Java program to compare two TreeSets.

```java
import java.util.TreeSet;
public class CompareTreeSets
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<String> set1=new
TreeSet<String>(); set1.add("Apple"); set1.add("Banana");
set1.add("Cherry");
TreeSet<String> set2=new
TreeSet<String>(); set2.add("Apple");
set2.add("Banana"); set2.add("Cherry");
if(set1.equals(set2))
```

```
System.out.println("Both TreeSets are equal.");
else
System.out.println("TreeSets are not equal.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Both TreeSets are equal.
```

Hash-Set Programs

39. Write a Java program to clone one HashSet into another.

```
import java.util.HashSet;
public class CloneHashSet
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> set1=new
HashSet<String>(); set1.add("Apple");
set1.add("Banana"); set1.add("Cherry");
```

```java
HashSet<String> set2=(HashSet<String>)set1.clone();
System.out.println("Cloned HashSet elements:");
for(String item:set2)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Cloned HashSet elements:
Apple
Banana
Cherry
```

40. Write a Java program to convert a HashSet into an array.

```java
import java.util.HashSet;
public class HashSetToArray
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> set=new
HashSet<String>(); set.add("Apple"); set.add("Banana");
set.add("Cherry");
```

```
String[] array=new String[set.size()];
set.toArray(array);
System.out.println("Array elements from HashSet:");
for(String item:array)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Array elements from HashSet:
Apple
Banana
Cherry
```

41. Write a Java program to convert a HashSet into a TreeSet.

```
import java.util.HashSet;
import java.util.TreeSet;
public class
HashSetToTreeSet
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> hashSet=new
```

```
HashSet<String>(); hashSet.add("Banana");
hashSet.add("Apple"); hashSet.add("Cherry");
TreeSet<String> treeSet=new TreeSet<String>(hashSet);
System.out.println("Elements of TreeSet (sorted):");
for(String item:treeSet)
{
System.out.println(item);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Elements of TreeSet (sorted):
Apple
Banana
Cherry
```
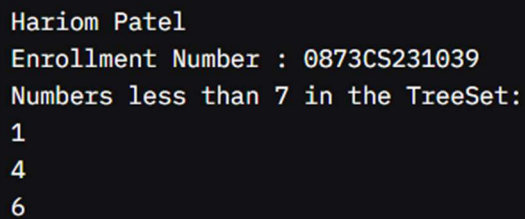
42. Write a Java program to find numbers less than 7 in a TreeSet.

```
import java.util.TreeSet; public
class FindLessThanSeven
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
```

```java
System.out.println("Enrollment Number :
0873CS231039"); TreeSet<Integer> set=new
TreeSet<Integer>(); set.add(1); set.add(4); set.add(6);
set.add(8); set.add(10);
TreeSet<Integer> result=(TreeSet<Integer>)set.headSet(7);
System.out.println("Numbers less than 7 in the TreeSet:");
for(Integer num:result)
{
System.out.println(num);
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Numbers less than 7 in the TreeSet:
1
4
6
```

43. Write a Java program to compare two HashSets.

```java
import java.util.HashSet;
public class CompareHashSets
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> set1=new
HashSet<String>(); set1.add("Apple");
set1.add("Banana"); set1.add("Cherry");
HashSet<String> set2=new
HashSet<String>(); set2.add("Apple");
```

```
set2.add("Banana"); set2.add("Cherry");
if(set1.equals(set2))
System.out.println("Both HashSets are equal.");
else
System.out.println("HashSets are not equal.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Both HashSets are equal.
```

44. Write a Java program to retain common elements from two sets.

```
import java.util.HashSet; public
class RetainCommonElements
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> set1=new
HashSet<String>(); set1.add("Apple");
set1.add("Banana"); set1.add("Cherry");
HashSet<String> set2=new
HashSet<String>(); set2.add("Banana");
set2.add("Cherry"); set2.add("Date");
set1.retainAll(set2);
System.out.println("Common elements:");
for(String item:set1)
```

```
        {
        System.out.println(item);
        }
        }
        }
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Common elements:
Banana
Cherry
```

45. Write a Java program to remove all elements from a HashSet.

```java
import java.util.HashSet; public
class RemoveAllElements
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039"); HashSet<String> set=new
HashSet<String>(); set.add("Apple"); set.add("Banana");
set.add("Cherry");
System.out.println("HashSet before removing all elements:");
for(String item:set)
{
System.out.println(item);
}
set.clear();
System.out.println("HashSet after removing all
elements:"); if(set.isEmpty())
{
System.out.println("HashSet is empty.");
```

```
} else { for(String
item:set)
{
System.out.println(item);
}
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
HashSet before removing all elements:
Apple
Banana
Cherry
HashSet after removing all elements:
HashSet is empty.
```

46. Write a Java program to copy all mappings from one map to another.

```java
import java.util.HashMap;
public class CopyMap
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :0873CS231039");
HashMap<Integer,String> map1=new
HashMap<Integer,String>(); map1.put(1,"Apple");
map1.put(2,"Banana"); map1.put(3,"Cherry");
HashMap<Integer,String> map2=new HashMap<Integer,String>();
map2.putAll(map1);
System.out.println("Contents of second map after copying:");
for(Integer key:map2.keySet())
{
System.out.println(key+" : "+map2.get(key));
}
}
}
```

```
Hariom Patel
Enrollment Number :0873CS231039
Contents of second map after copying:
1 : Apple
2 : Banana
3 : Cherry
```

47. Write a Java program to remove all key-value pairs from a map.

```java
import java.util.HashMap;
public class ClearMap
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number : 0873CS231039");
HashMap<Integer,String> map=new
HashMap<Integer,String>(); map.put(1,"Apple");
map.put(2,"Banana"); map.put(3,"Cherry");
System.out.println("Map before clearing:");
for(Integer key:map.keySet())
{
System.out.println(key+" : "+map.get(key));
}
map.clear();
System.out.println("Map after clearing:");
if(map.isEmpty())
{
System.out.println("Map is empty.");
} else { for(Integer
key:map.keySet())
{
System.out.println(key+" : "+map.get(key));
}
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Map before clearing:
1 : Apple
2 : Banana
3 : Cherry
Map after clearing:
Map is empty.
```

48. Write a Java program to check if a map is empty or contains key-value mappings.

```java
import java.util.HashMap;
public class CheckMapEmpty
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number : 0873CS231039");
HashMap<Integer,String> map=new HashMap<Integer,String>();
if(map.isEmpty())
System.out.println("Map is empty.");
else
System.out.println("Map contains key-value
mappings."); map.put(1,"Apple"); if(map.isEmpty())
System.out.println("Map is empty.");
else
System.out.println("Map contains key-value mappings.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Map is empty.
Map contains key-value mappings.
```

49. Write a Java program to create a shallow copy of a HashMap instance.

```java
import java.u l.HashMap;
public class ShallowCopyHashMap
{
public sta c void main(String[] args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number : 0873CS231039");
HashMap<Integer,String> map1=new
HashMap<Integer,String>(); map1.put(1,"Apple");
map1.put(2,"Banana"); map1.put(3,"Cherry");
HashMap<Integer,String>
map2=(HashMap<Integer,String>)map1.clone();
System.out.println("Original          HashMap:");          for(Integer
key:map1.keySet())
{
System.out.println(key+" : "+map1.get(key));
}
System.out.println("Shallow copied HashMap:");
for(Integer key:map2.keySet())
{
System.out.println(key+" : "+map2.get(key));
}
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Original HashMap:
1 : Apple
2 : Banana
3 : Cherry
Shallow copied HashMap:
1 : Apple
2 : Banana
3 : Cherry
```

50. Write a Java program to test whether a specified key exists in the map.

```java
import java.util.HashMap;
public class TestKeyExists
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number : 0873CS231039");
HashMap<Integer,String> map=new
HashMap<Integer,String>(); map.put(1,"Apple");
map.put(2,"Banana"); map.put(3,"Cherry"); int keyToTest=2;
if(map.containsKey(keyToTest))
System.out.println("Key "+keyToTest+" exists in the
map."); else
System.out.println("Key "+keyToTest+" does not exist in the map.");
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Key 2 exists in the map.
```

51. Find the result of following (accept values for variables used in right side of expression)

a. y=x 2 +3x-7 (print value of Z)

b. y=x++ + ++x (print value of x and y)

c. z= x++ - --y - --x + x++ (print value of x ,y and z)

d. z = x && y || !(x||y) (print value of Z)

```
import java.util.Scanner;
public class ExpressionResults
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039");
Scanner sc=new Scanner(System.in);
// a. y = x^2 + 3x - 7
System.out.println("Enter value for x (expression
a):"); int x1=sc.nextInt(); int z1=x1*x1 + 3*x1 - 7;
System.out.println("Z (expression a) : "+z1);
// b. y = x++ + ++x
System.out.println("Enter value for x (expression
b):"); int x2=sc.nextInt(); int y2=x2++ + ++x2;
System.out.println("x (expression b) : "+x2);
System.out.println("y (expression b) : "+y2);
// c. z = x++ - --y - --x + x++
System.out.println("Enter value for x (expression c):");
int x3=sc.nextInt();
System.out.println("Enter value for y (expression c):");
int y3=sc.nextInt();
int z3=x3++ - --y3 - --x3 + x3++;
System.out.println("x (expression c) : "+x3);
System.out.println("y (expression c) : "+y3);
System.out.println("z (expression c) : "+z3);
// d. z = x && y || !(x || y)
System.out.println("Enter boolean value for x (true/false) (expression d):");
boolean xb=sc.nextBoolean();
```

System.out.println("Enter boolean value for y (true/false) (expression d):"); boolean yb=sc.nextBoolean(); boolean zb=xb && yb || !(xb || yb);
System.out.println("Z (expression d) : "+zb);
}
}

```
Hariom Patel
Enrollment Number : 0873CS231039
Enter value for x (expression a):
Z (expression a) : 33
Enter value for x (expression b):
x (expression b) : 7
y (expression b) : 12
Enter value for x (expression c):
Enter value for y (expression c):
x (expression c) : 6
y (expression c) : 2
z (expression c) : 4
Enter boolean value for x (true/false) (expression d):
Enter boolean value for y (true/false) (expression d):
Z (expression d) : false
```

52. In a company an employee is paid as under:
If his basic salary is less than Rs. 1500, then HRA = 10% of basic salary and

DA=90% of basic salary. If his salary is either equal to or above Rs. 1500, then HRA = Rs. 500 and DA=98% of basic salary. If the employee's salary is input by the user write a program to find his gross salary. GS=Basic+DA+HRA

```java
import java.util.Scanner;
public class GrossSalary
{ public static void main(String[]
args)
{
System.out.println("Hariom Patel");
System.out.println("Enrollment Number :
0873CS231039");
Scanner  sc=new  Scanner(System.in);
System.out.println("Enter        basic
salary:"); double basic=sc.nextDouble();
double hra,da,gs; if(basic<1500)
{
hra=0.10*basic;
da=0.90*basic;
} else {
hra=500;
da=0.98*basic
;
}
gs=basic+hra+da;
System.out.println("Gross Salary : "+gs);
}
}
```

```
Hariom Patel
Enrollment Number : 0873CS231039
Enter basic salary:
Gross Salary : 4460.0
```