23CSE111

OBJECT ORIENTED PROGRAMMING
LAB MANUAL

Department of Computer and Science Engineering Amrita School of Engineering
Amrita Vishwa Vidyapeetham, Amaravati Campus

NAME:- C.Umesh Chandra Reddy.
ROLL.NO:- av.sc.u4cse24037

VERIFIED BY:-

S.NO	Programs	DATE	PG.NO	SIGNATURE
WEEK-1		27-01-2025		
1.	Write the steps to download and install Java.			
2.	Write a java program to print the message“Welcome to java programming”.			
3.	Write a java program that prints name, roll number and section of a student.			
WEEK-2		03-02-2025		
1.	Write a java program to calculate the area of a rectangle.			
2.a)	Write a program to convert temperature from Celsius to Fahrenheit .			
2.b)	Write a java program to convert temperature from Fahrenheit to Celsius.			
3.	Write a java program to calculate the simple interest.			
4.	Write a java program to find the largest of three numbers using ternary operator.			
5.	Write a java program to find the factorial of a number.			
WEEK-3		11-02-2025		
1.	Create a java program with following instructions a)create a class with name car b) Create 4 attributes name car color, car brand, fuel type, milage. c) Create 3 methods named start, stop, services d) Create 3objects named car1, car2, car3. e) Create a constructor which should print “welcome to car garage”			
2.	Write a java program to create a class BackAccount with two methods deposit( ) and withdraw() b) In deposit( ) whenever an amount is deposited it has to be updated with current amount b) In withdraw( ) whenever an amount is withdrawn it has to be less than current amount else print “Insufficient funds”			
WEEK-4		02-03-2025		
1.	Write a java program with class named “Book”. The class should contain various attributes such as “Title of the book , author , year of publication “. It should also contain a constructor with parameters details of the book. i.e. “ Title of the book, author and year of publication”. Display the details of two books by creating two objects.			
2.	To create a java program with class named Myclass			

	with a staticvariable “Count” of “int type”, Initialized to 0 and a constant variable “pi” of type double initialized to 3.1415 as attributes of that class Now, define a constructor for “Myclass” that increments the “Count” variable each that an object of Myclass is created. Finally , print the final values of “Count” and “pi”variables.			
WEEK-5		09-03-25		
1.	Create a calc using the operations including add, sub, mul, div using multilevel inheritance and display the desired output			
2.	Creating a Rental Sysytem			
WEEK-6		16-03-2025		
1.	Write a java program to create a Vehicle class with displayInfo() method , overridden in Car subclass to provide info about carcompany ,model , price ,seating and petrol.			
2.	An automated admission system that verifies student eligibility for UG and PG with different criteria. 1.UG requires minimum of 60% 2.PG requires minimum of 70%			
3.	Create a calculator class with overloaded methods to perform additions 1.add two integers4 2.add two double values 3.add three integers			
4,	Create a shape class with method calculateArea() that is overloaded for different shapes (eg: square, rectangle).Then create a subclass Circle that overrides calculateArea() method for Circle.			
WEEk-7		14-4-2025		
1.	Write a java program to create an abstract class Animal with abstract method sound and create subclasses Lion and Tiger that implements the method.			
2.	Write a java program to create an abstract class shape3D with abstract methods to calculate volume and surfacearea and create subclasses for sphere and cube that implements these methods.			
3.	Create an abstract class PatternPrint with an abstract method printing to print the pattern and a concrete method to display the pattern . Implement the patterns 1) Star Pattern - prints a right angled triangle of			

	stars 2) Number Pattern – prints a right angled triangle of increasing numbers.			
WEEK-8		21-04-2025		
1.	Write a java program creating an interface Shape with the get perimeter method create 3 classes rectangle,triangle and circle that implements the shapeinterface ,implement the getperimeter method for each of the three classes			
2.	write a java program to create an interface playable with a method play() that takes no arguments and returns void create three classes football,volleyball and basketball that implements the playable and override the play method to play the respective sports			
3.	write a java program to implement a login system using interfaces			
WEEK-9		28-04-2025		
1.	Write a java program to create a method that takes integer as a parameter and throws an exception if the number is even			
2.	Write a java program to create a method that reads a file and throws an exception if the file is not found.			
3.	Write a java program to handle arithmetic exception using try catch and finally			
4.	Java program to stimulate a university system using inner classes .Create an outer class named University with a variable Universityname .Inside it define two non static classes 1.Department - with variable like deptName and deptCode and a method to display department details. 2.Student – variable like stdName and stdCode and a method to display Student Details 3.Create an object for each outer class and call their methods to disp			
WEEK-10		28-04-2025		
1.	Write a java program to generate a password for a student using his/her initials and age. the password displayed should the string 6 consists of first character of first name, middle name, last name with age			
2.	Design and implement a java program that will do the following operations to the strig “welcome! You are practicing strings concept”.			

	-convert all alphabets to capital letters and print the result -convert all alphabets to lower-case letters and print out the result -print out the length of string -print out the index of concept			
3.	Implement a java program using below array methods. -sorting the elements(numbers and strings) of an array -convert the array elements into string -fill the part of an array -copy the elements of one array into another			
4.	Implement a java program using the below array list methods -insert an element at a particular index in the array list -modify an element in the array list -access an element from the array list -remove an element from array list -clear the elements from the array list			

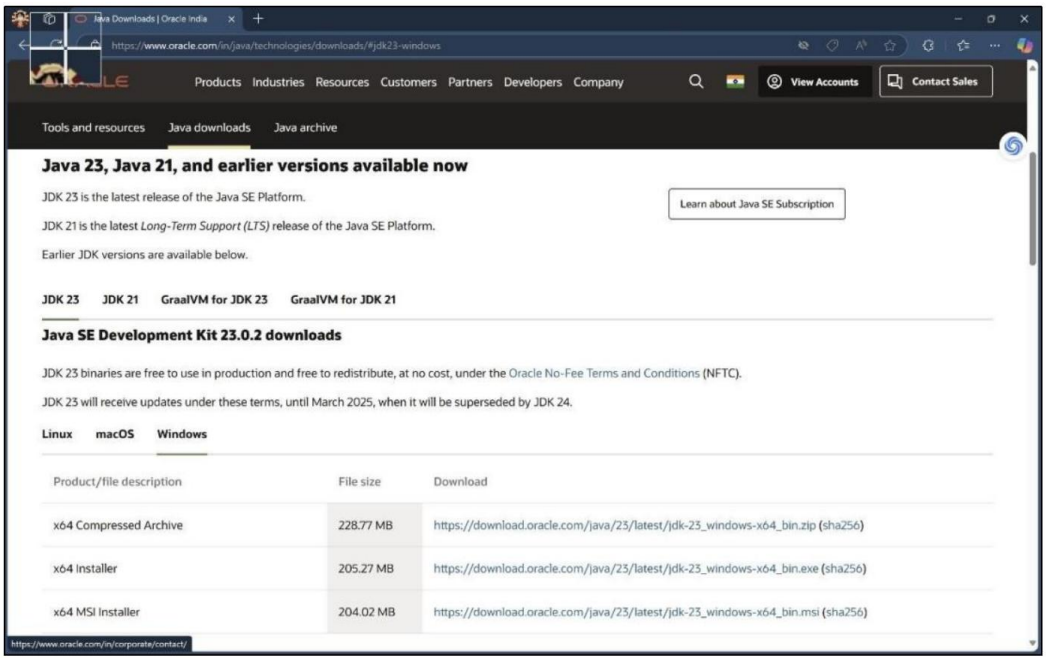
WEEK:-1

1. Write the steps to download and install Java.

Aim: To download and install java.

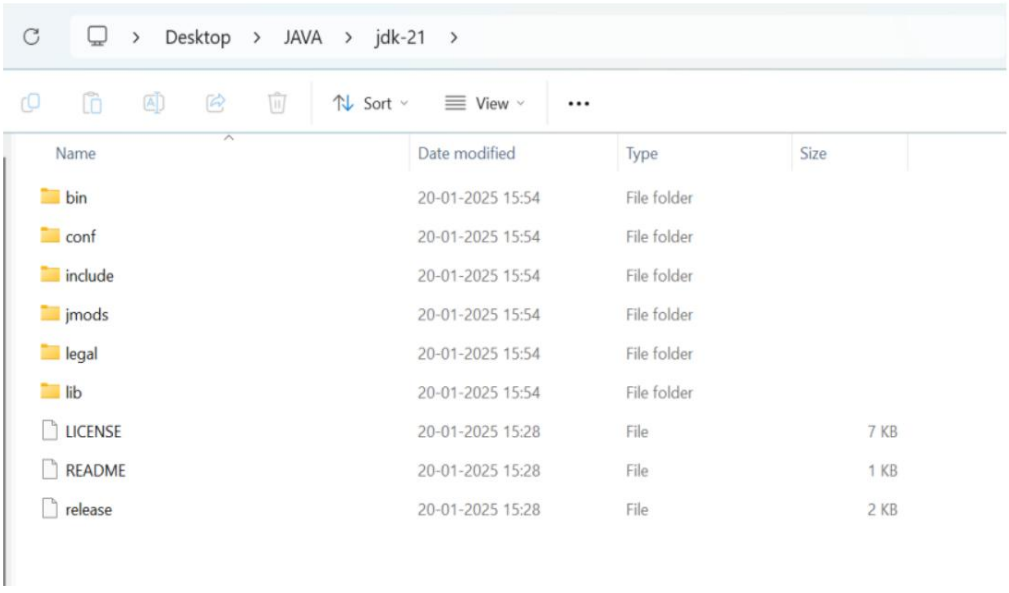
Procedure:

i. Visit oracle.com website to download Java

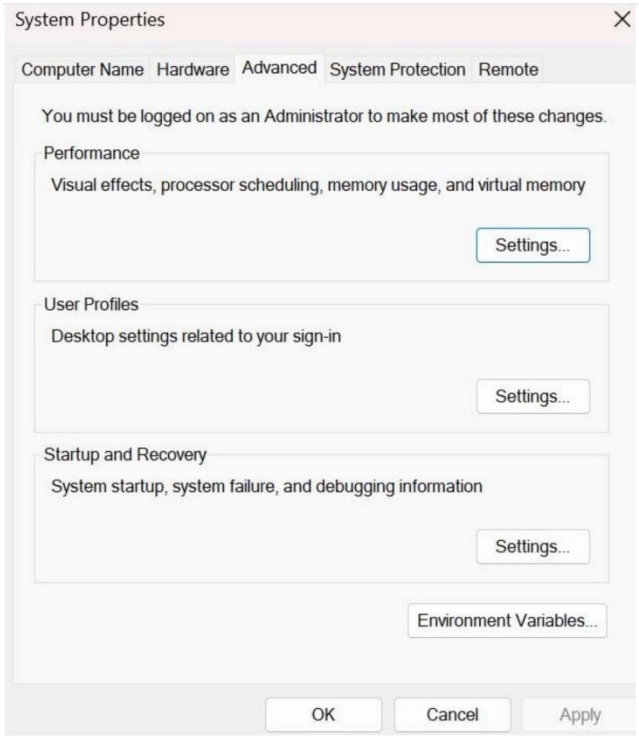


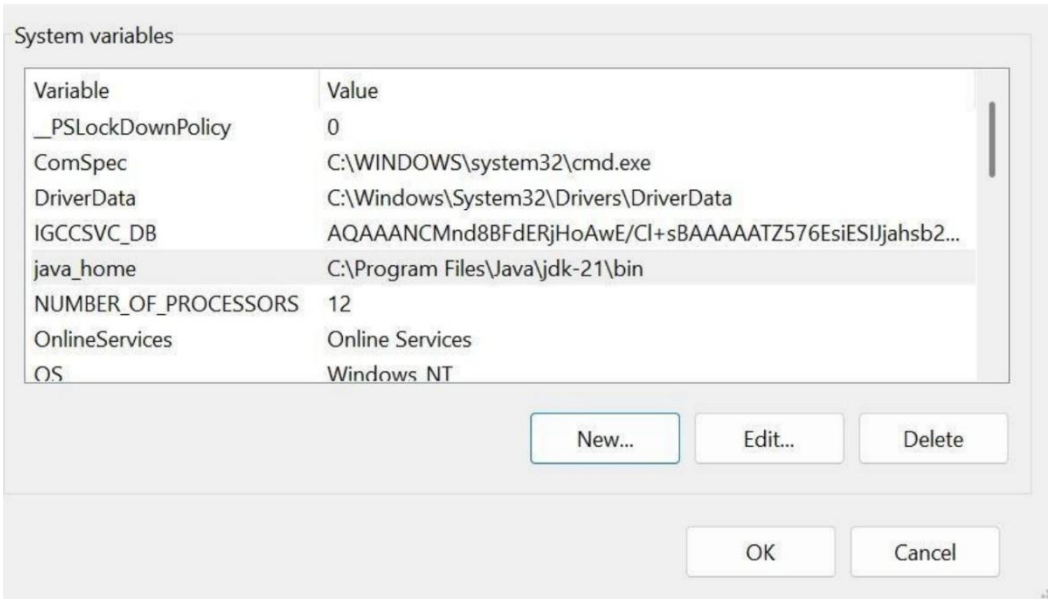
ii. Download the version which supports LTS (JDK 21) x64 installer for windows.

iii. Install and copy the path.

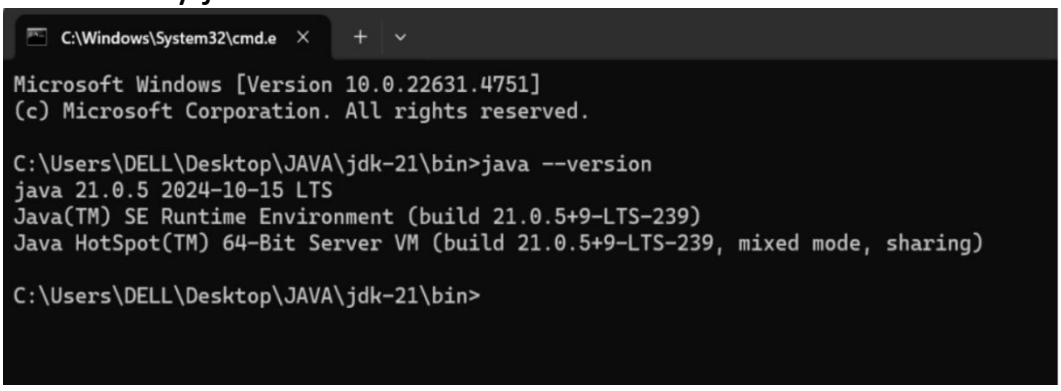


iv. Open environmental variables and add a new file with path.





v. Verify java version in command window.

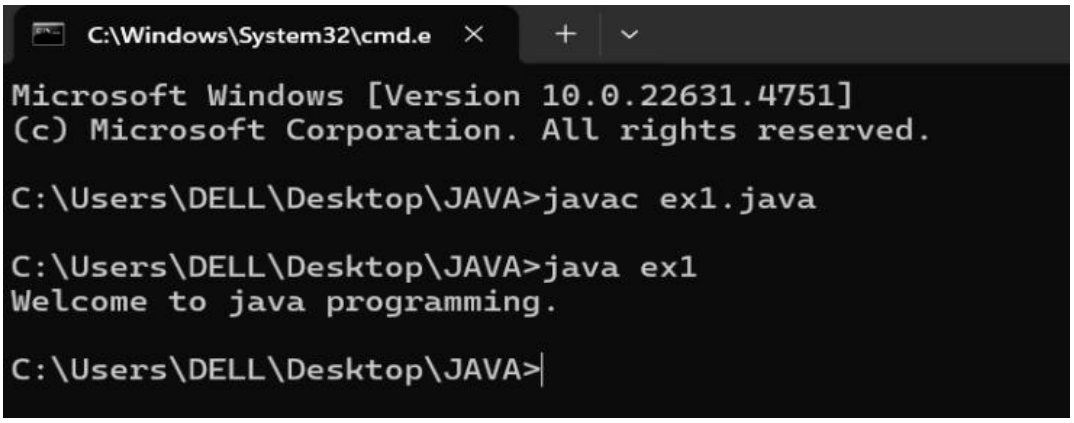


2. Write a java program to print the message “Welcome to java programming”.

CODE:

```
class ex1
{
public static void main(String[] args)
{
System.out.println("Welcome to java programming.");
} }
```

OUTPUT:-



ERROR:-

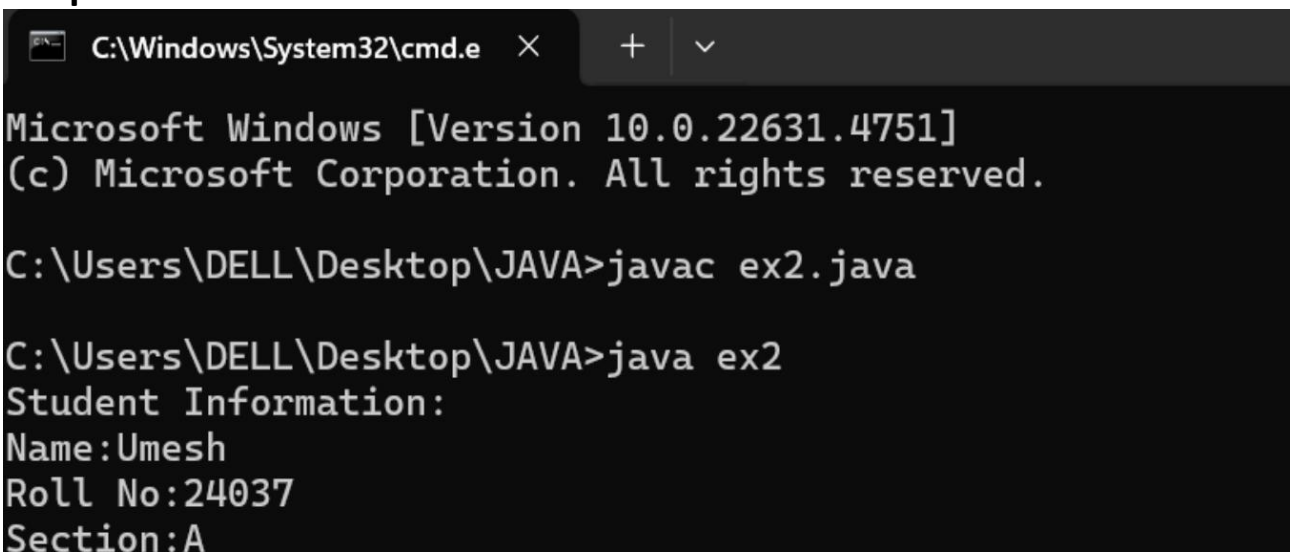
S.NO	EXPECTED ERROR	REASON
1.	;	; is expected at end
2.	S	Capital S is expected for String and System.

3.Write a java program to print the name, roll number and section of a student.

Code:

```
class ex2{
public static void main(String[] args){
String name = "Umesh";
int rollNo = 24037;
String section = "A";
System.out.println("Student Information:");
System.out.println("Name:" + name);
System.out.println("Roll No:" + rollNo);
System.out.println("Section:" + section);
} }
```

Output:



ERROR:-

S.No	EXPECTED ERROR	REASON
1.	S	Capital S is expected for String and System.

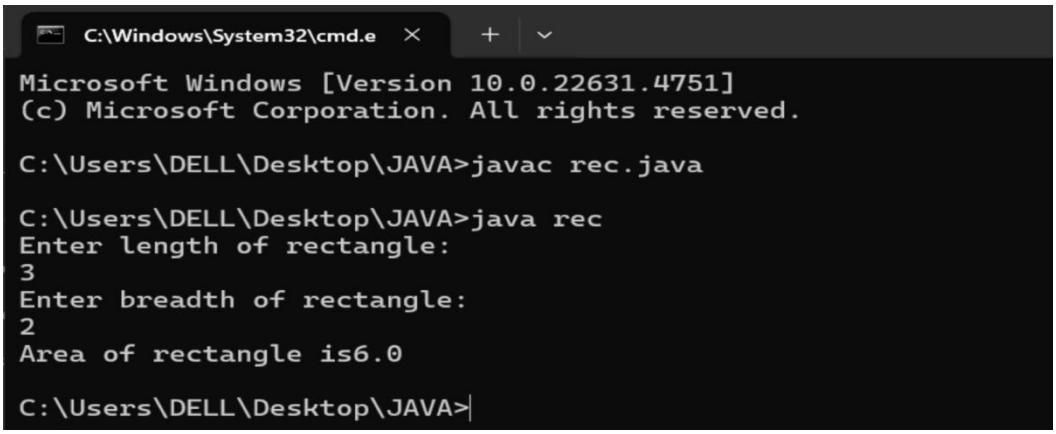
WEEK:-2

1. Write a java program to calculate the area of a rectangle.

Code:

```
import java.util.Scanner;
class rec{
public static void main(String[] args){
Scanner scan=new Scanner(System.in);
System.out.println("Enter length of rectangle:");
double l=scan.nextDouble();
System.out.println("Enter breadth of rectangle:");
double b=scan.nextDouble();
double a=l*b;
System.out.println("Area of rectangle is"+a);
} }
```

OUTPUT:-



ERROR:-

S.No	Expected Error	Reason
1	S	Capital S is expected for String and System.

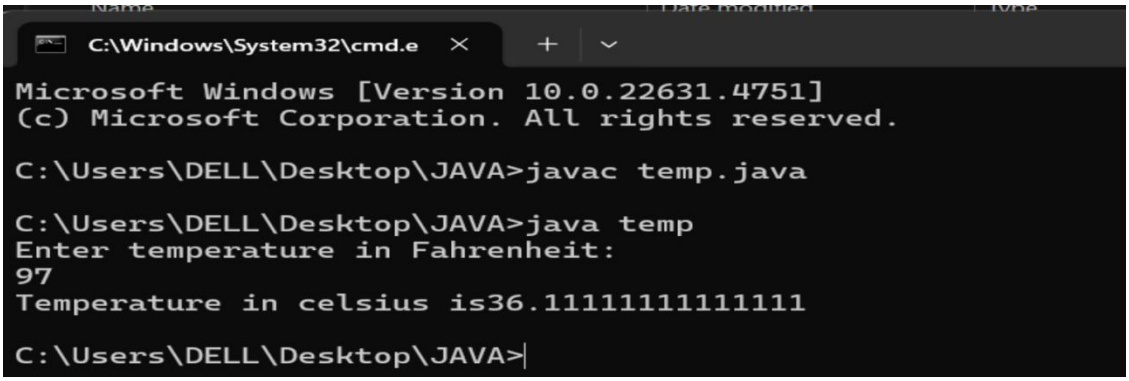
2a). Write a program to convert temperature from Fahrenheit to Celsius.

Code:

```
import java.util.Scanner;
class temp{
public static void main(String[] args){
Scanner scan=new Scanner(System.in);
System.out.println("Enter temperature in Fahrenheit:");
double f=scan.nextDouble();
```

```
double c=((f-32)/(1.8));
System.out.println("Temperature in celsius is"+c);
} }
```

OUTPUT:-



ERROR:-

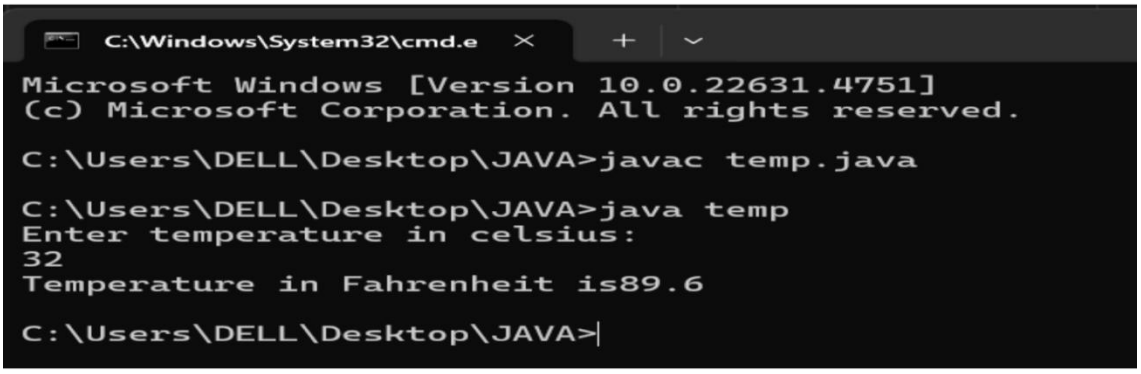
S.No	Expected Error	Reason
1	S	Capital S is expected for String and System.

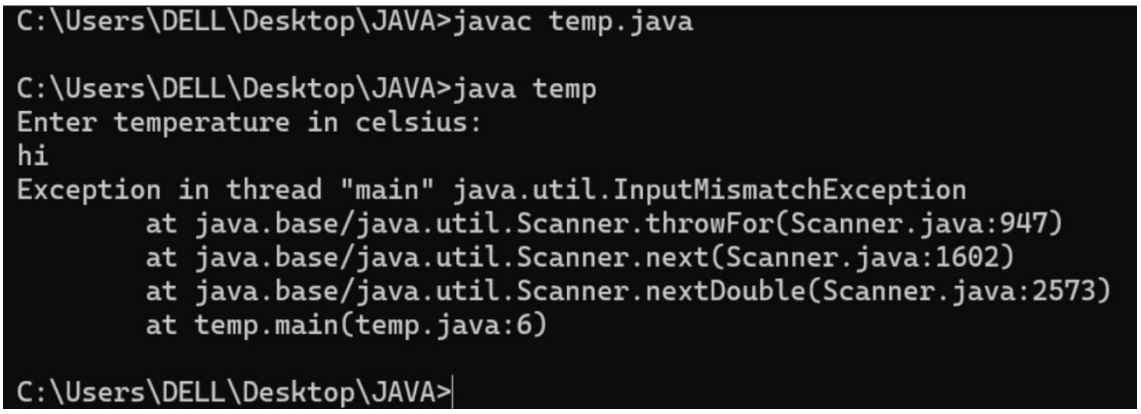
2b). Write a program to convert temperature from Celsius to Fahrenheit.

Code:

```
import java.util.Scanner;
class temp{
public static void main(String[] args){
Scanner scan=new Scanner(System.in);11
System.out.println("Enter temperature in celsius:");
double c=scan.nextDouble();
double f=(c*1.8)+32;
System.out.println("Temperature in Fahrenheit is"+f);
} }
```

OUTPUT:-





ERRORS:-

S.No	Expected Error	Reason
1	;	; is expected at end
2	Input.close();	The input is expected to be closed.

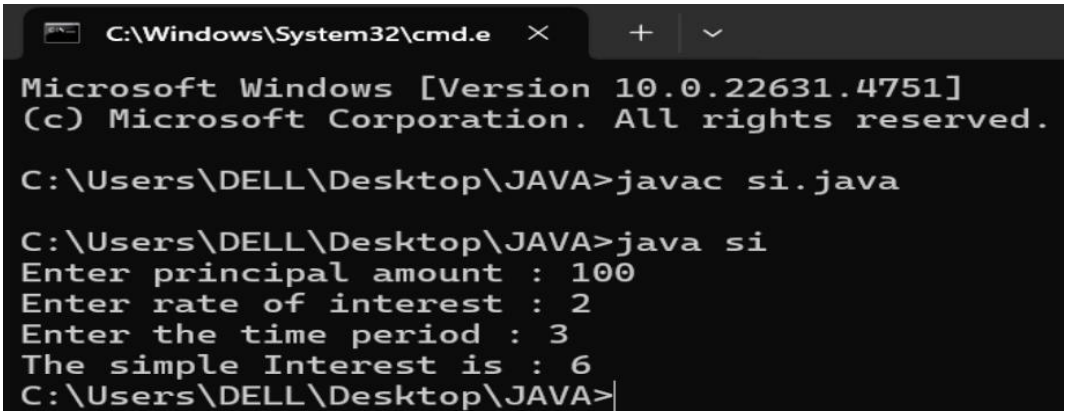
3)Write a java program to calculate the simple interest.

Code:

```
import java.util.Scanner;
public class si{
public static void main(String[] args){
Scanner input = new Scanner(System.in);
System.out.print("Enter principal amount : ");
int p = input.nextInt();
System.out.print("Enter rate of interest : ");
int r = input.nextInt();
System.out.print("Enter the time period : ");
int t = input.nextInt();
int SI = p*r*t/100;
System.out.print("The simple Interest is : " + SI);
```

```
input.close();
} }
```

CODE:-



ERROR:-

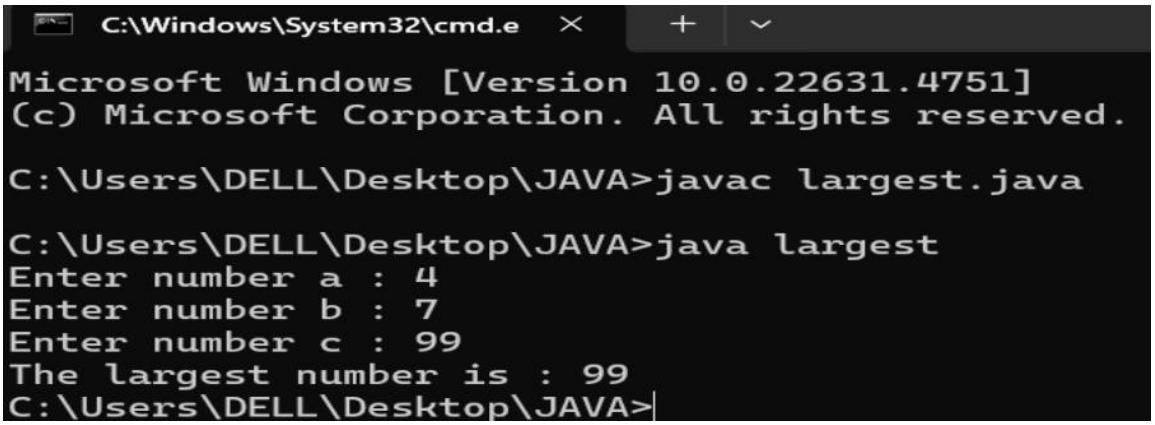
S.No	Expected Error	Reason
1	;	; is expected at end
2	Int t	Without declaring t the compiler cannot execute the program.

4) Write a java program to find the largest of three numbers using ternary
operation.

Code:

```
import java.util.Scanner;
public class largest{
public static void main(String[] args){
Scanner input = new Scanner(System.in);
System.out.print("Enter number a : ");
int a = input.nextInt();
System.out.print("Enter number b : ");
int b = input.nextInt();
System.out.print("Enter number c : ");14
int c = input.nextInt();
int largest = (a>=b) ? ((a>=c ) ? a : c) : ((b >=c) ? b : c);
System.out.print("The largest number is : " + largest);
input.close();
} }
```

CODE:-



ERRORS:-

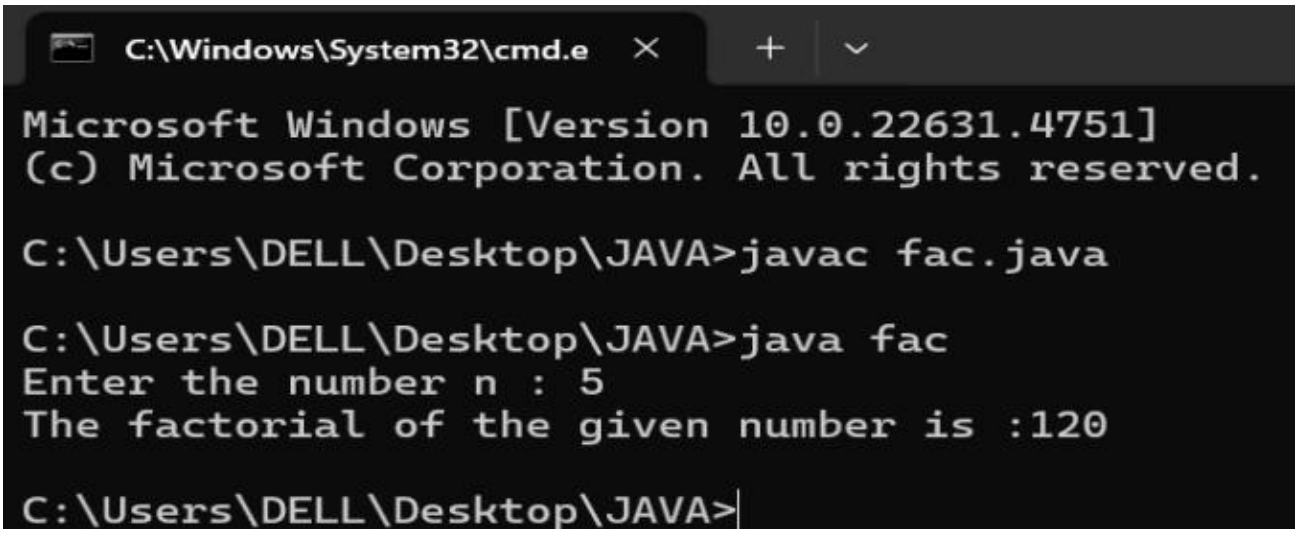
S.No	Expected Error	Reason
1	?	Checks the condition
2	:	Comparing between two variables

5) Write a java program to find the factorial of a number

Code:

```
import java.util.Scanner;
public class fac{
public static void main(String[] args){15
Scanner input = new Scanner(System.in);
System.out.print("Enter the number n : ");
int n = input.nextInt();
int fac = 1;
for(int i = 2; i<=n;i++){
fac *= i;
}
System.out.println( "The factorial of the given number is :" + fac);
input.close();
} }
```

OUTPUT:-



ERRORS:-

S.no	EXPECTED ERROR	REASON
1.	}	To close for loop
2.	System.out.println	IF we place the print statement inside the for loop it will print the each i value every time but to print only the final value we must place it outside the for loop.

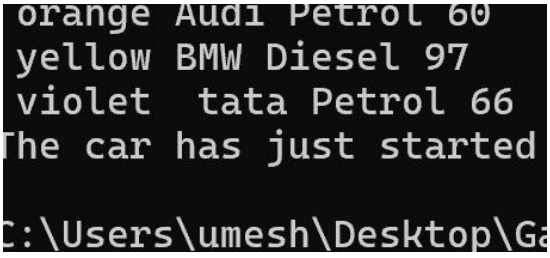
WEEK:-3

1.Create the java program with the following instructions
i) Create a class with name Car
ii) Create 4 attributes named Car_Color , Car_brand, fuel_type, mileage
iii) Create 3 method named Start( ) , Stop( ), Service( )
iv) Create 3 objects Car1 , Car2 , Car3
v) Create a constructor which should print “Welcome to Car Garage”

Code:

```
public class car {
   public String carColor;
   private String carBrand;
   private String fuelType;
   public int mileage;
   car(String carColor, String carBrand, String fuelType, int mileage) {
      this.carColor = carColor;
      this.carBrand = carBrand;
      this.fuelType = fuelType;
      this.mileage = mileage;
      System.out.println(carColor + " " + carBrand + " " + fuelType + " " +
            mileage);
   }
   public void Start() {
      System.out.println("The car has just started");
   }
   public void Stop() {
      System.out.println("The car has just stopped");
   }
   public void Service() {
      System.out.println("The car is in good condition");
   }
   public static void main(String[] args) {
      car car1 = new car(" orange", "Audi", "Petrol", 60);
      car car2 = new car(" yellow", "BMW", "Diesel", 97);
      car car3 = new car(" violet", " tata", "Petrol", 66);
      car1.Start();
   } }
```

OUTPUT:-



ERRORS:-

S.No	Expected Error	Reason
1	}	} is expected at end of the class
2	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first

CLASS:-

Car
+ carColor : String - carBrand : String - fuelType : String + mileage : int
+ Car() : void + Start( ) : void + Stop( ) : void + Service( ) : void

2.Write a java program to create a class BackAccount with two methods deposit( ) and withdraw( )

i) In deposit( ) whenever an amount is deposited it has to be updated with current amount

ii) In withdraw( ) whenever an amount is withdrawn it has to be less than current amount else print “Insufficient funds”

CODE:-

```
public class BankAccount {
   private String Name;
   private int AccNo, CurrBal;
   public BankAccount(String Name, int AccNo, int CurrBal) {
      this.Name = Name;
      this.AccNo = AccNo;
      this.CurrBal = CurrBal;
      System.out.println("The customer is: " + this.Name);
   }
   public int deposit(int dAmt) {
      CurrBal += dAmt;
      return CurrBal;
   }
```

```
  public void withdraw(int wAmount) {
    if (wAmount <= CurrBal) { // Allowing withdrawal if balance is equal
      CurrBal -= wAmount;
      System.out.println("Remaining Balance: " + CurrBal);
    } else {
      System.out.println("Insufficient funds");
    } }
  public static void main(String[] args) {
    BankAccount Umesh = new BankAccount("UMESH CHANDRA REDDY", 1500,
10000);
    Umesh.withdraw(9000); // Should print "Insufficient funds"
    Umesh.withdraw(5900); // Should print remaining balance
    int FinalAmount = Umesh.deposit(5000);
    System.out.println("Final Balance: " + FinalAmount);
  } }
```

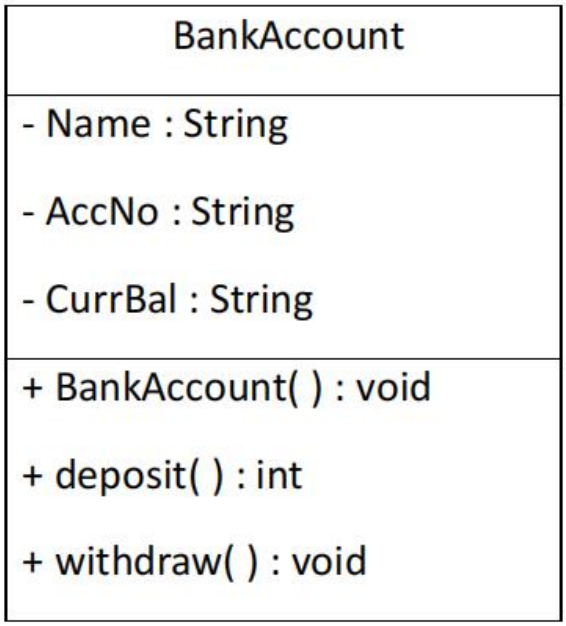
OUTPUT:-

```
The customer is: UMESH CHANDRA REDDY
Remaining Balance: 1000
Insufficient funds
Final Balance: 6000
```

ERRORS:-

S.No	Expected Error	Reason
1	}	} is expected at end of the class
2	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first

CLASS:-


BankAccount
- Name : String
- AccNo : String
- CurrBal : String
+ BankAccount( ) : void
+ deposit( ) : int
+ withdraw( ) : void

WEEK-4

1) Write a java program with class named “Book”. The class should contain various attributes such as “Title of the book , author , year of publication “. It should also contain a constructor with parameters details of the book. i.e. “ Title of the book, author and year of publication”. Display the details of two books by creating two objects.

Code:

```
import java.util.Scanner;
class book {
   public String title;
   public String author;
   public int year;
   book(String title, String author, int year) {
      this.title = title;
      this.author = author;
      this.year = year;
   }
  public void display() {
      System.out.println("Title of the book is: " + title);
      System.out.println("Author of the book is: " + author);
      System.out.println("Year of publishion of the book is: " + year);
   }
   public static void main(String[] args) {
      Scanner scan = new Scanner(System.in);
       System.out.println("Enter name of the book:");
      String title = scan.nextLine();
      System.out.println("Enter author of the book:");
      String author = scan.nextLine();
      System.out.println("Enter year of publishion of the book:");
      int year = scan.nextInt();
      book third = new book(title, author, year);
      third.display();
      book first = new book("The kill a mocking bird", "Harper Lee", 2005);
      book second = new book("The alchemist", "Paulo Coelho", 1995);
      first.display();
      second.display();
}
```

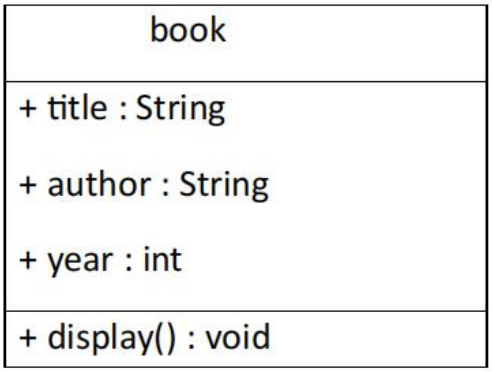
OUTPUT:-

```
PS D:\java\programmes.java>  & 'C:\Program Files\
orkspaceStorage\aa70e02bfaa37ab73229e2e8da5912df\
Enter name of the book:
the kill a mocking bird
Enter author of the book:
harper lee
Enter year of publishion of the book:
2005
Title of the book is: the kill a mocking bird
Author of the book is: harper lee
Year of publishion of the book is: 2005
Title of the book is: The kill a mocking bird
Author of the book is: Harper Lee
Year of publishion of the book is: 2005
Title of the book is: The alchemist
Author of the book is: Paulo Coelho
Year of publishion of the book is: 1995
PS D:\java\programmes.java>
```

ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

Class diagram:-

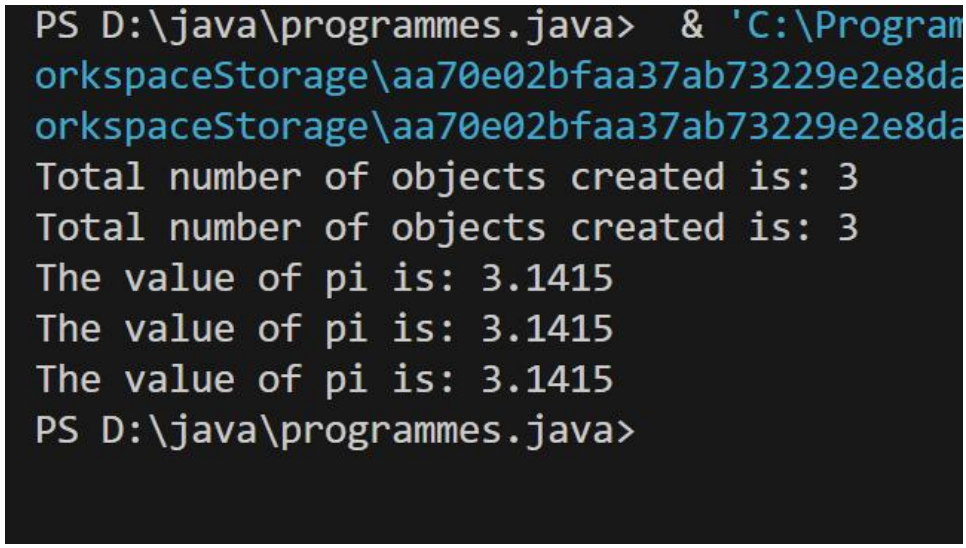


2) To create a java program with class named Myclass with a static variable “Count” of “int type”, Initialized to 0 and a constant variable “pi” of type double initialized to 3.1415 as attributes of that class Now, define a constructor for “Myclass” that increments the “Count”variable each that an object of Myclass is created. Finally ,print the final values of “Count” and “pi” variables.

Code:

```
class myclass {
   static int count = 0;
   final double pi = 3.1415;
   myclass() {
      count++;
   }
   void display() {
      System.out.println("The value of pi is: " + pi);
   }
   public static void main(String[] args) {
      myclass obj1 = new myclass();
      myclass obj2 = new myclass();
      myclass obj3 = new myclass();
      int fc = count;
      System.out.println("Total number of objects created is: " + fc);
      obj1.display();
      obj2.display();
      obj3.display();
   } }
```

OUTPUT:



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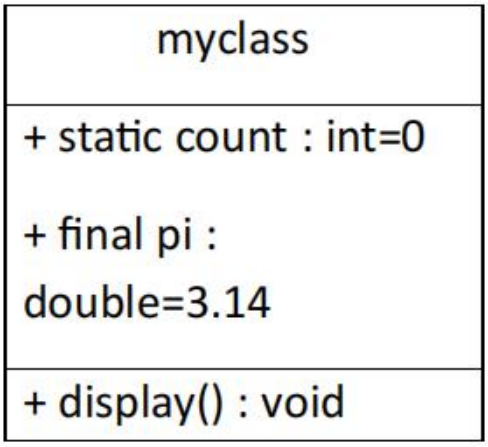
ERRORS:-

S.No.	Expected Error	Reason
1	.variable	We must mention variable name to call the variable
2	static	Static variables contain only one value

Class Diagram:



WEEK-5

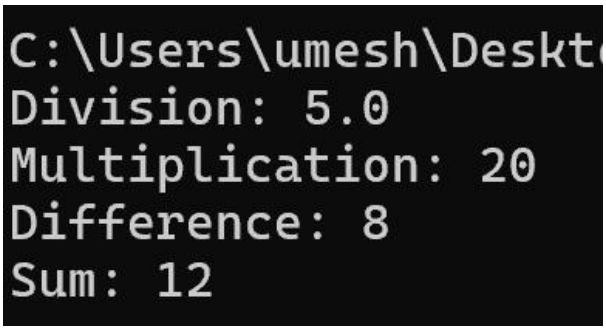
1) Create a calc using the operations including add, sub, mul, div using multilevel inheritance and display the desired output.

CODE:-

```
class bcalc {
   int a, b;
   int sum, diff;
   bcalc(int a, int b) {
      this.a = a;
      this.b = b;
   }
   public void add() {
      diff = a - b;
     sum = a + b;
      System.out.println("Difference: " + diff);
      System.out.println("Sum: " + sum);
   } }
class acalc extends bcalc {
   int mul;
   acalc(int a, int b) {
    super(a, b);
   }
  public void mult() {
      mul = a * b;
      System.out.println("Multiplication: " + mul);
 } }
class aacalc extends acalc {
  float div;
   aacalc(int a, int b) {
  super(a, b);
   }
   public void divi() {
     if (b != 0) { // Check to avoid division by zero
      div = (float) a / b;
        System.out.println("Division: " + div);
   } else {
         System.out.println("Division by zero error!");
```

```
    } }}
class ocalc {
  public static void main(String[] args) {
 aacalc c = new aacalc(10, 2);
    c.divi();
  c.mult();
  c.add();
   } }
```

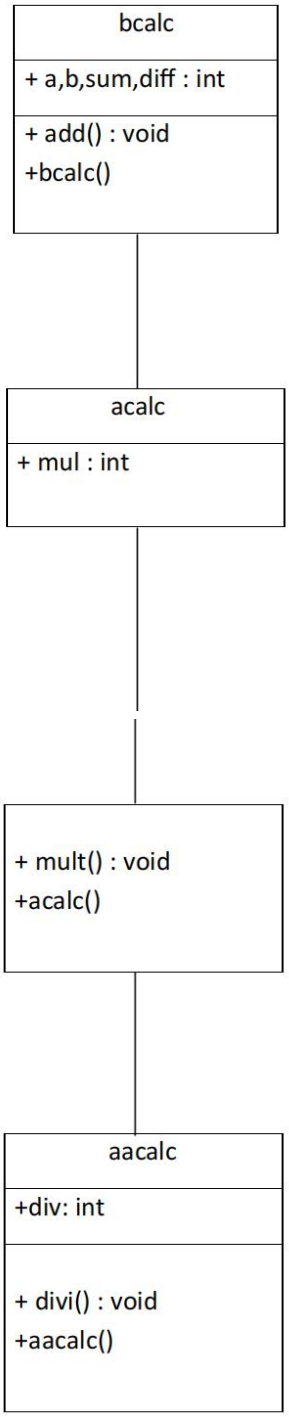
OUTPUT:-



ERRORS:-

S.No.	Expected Error	Reason
1	.variable	We must mention variable name to call the variable
2	static	Static variables contain only one value

CLASS DIAGRAM:-



2) A vehicle rental company wants to develop a system that maintains information about different types of vehicles available for rent. The company rents out cars and bikes and they need a program to store details about each vehicle such as brand and speed cars should have an additional properties(attributes)- no.of doors , seating capacity bikes should have a property indicating whether they have gears or not the system should also include a function to display details about each vehicle and indicate when a vehicle is starting each class should have a constructor .
a) which oops concept is used in the above program ? Explain why it is useful in this scenario b)If the company decides to add a new type of vehicle truck how would u modify the above program

1) truck should include an additional property called capacity(in tons)
2)create a show truck details method() to display the trucks capacity
3)write a constructor for truck that initializes all the properties
c)Implement the truck class and update the main method to create the truck object and also create an object for car and bike subclass. Finally display its details
CODE:-

```
class Vehicle {
String brand;
int speed;
Vehicle(String brand, int speed) {
this.brand = brand;
this.speed = speed;
}
void displayDetails() {
System.out.println("Brand: " + brand);
System.out.println("Speed: " + speed + " km/h");
}
void startVehicle() {
System.out.println(brand + " is starting...");
} }
 class Car extends Vehicle {
int noOfDoors;
int seatingCapacity;
Car(String brand, int speed, int noOfDoors, int seatingCapacity) {
super(brand, speed);
this.noOfDoors = noOfDoors;
this.seatingCapacity = seatingCapacity;
}
@Override
void displayDetails() {
super.displayDetails();
System.out.println("Number of Doors: " + noOfDoors);
System.out.println("Seating Capacity: " + seatingCapacity);
} }
class Bike extends Vehicle {
boolean hasGears;
Bike(String brand, int speed, boolean hasGears) {
super(brand, speed);
this.hasGears = hasGears;
}
@Override
void displayDetails() {
```

```
super.displayDetails();
System.out.println("Has Gears: " + (hasGears ? "Yes" : "No"));
} }
class Truck extends Vehicle {
double capacity;
Truck(String brand, int speed, double capacity) {
super(brand, speed);
this.capacity = capacity;
}
void showTruckDetails() {
System.out.println("Truck Capacity: " + capacity + " tons");
}
@Override
void displayDetails() {
super.displayDetails();
showTruckDetails();
} }
 public class VehicleRentalSystem {
public static void main(String[] args) {
Car car = new Car("audi", 158, 5, 3);
Bike bike = new Bike("tata", 520, true);
Truck truck = new Truck("benz", 100, 16.5);
System.out.println("Car Details:");
car.displayDetails();
car.startVehicle();
System.out.println();
System.out.println("Bike Details:");
bike.displayDetails();
bike.startVehicle();
System.out.println();
System.out.println("Truck Details:");
truck.displayDetails();
truck.startVehicle();
}}
```

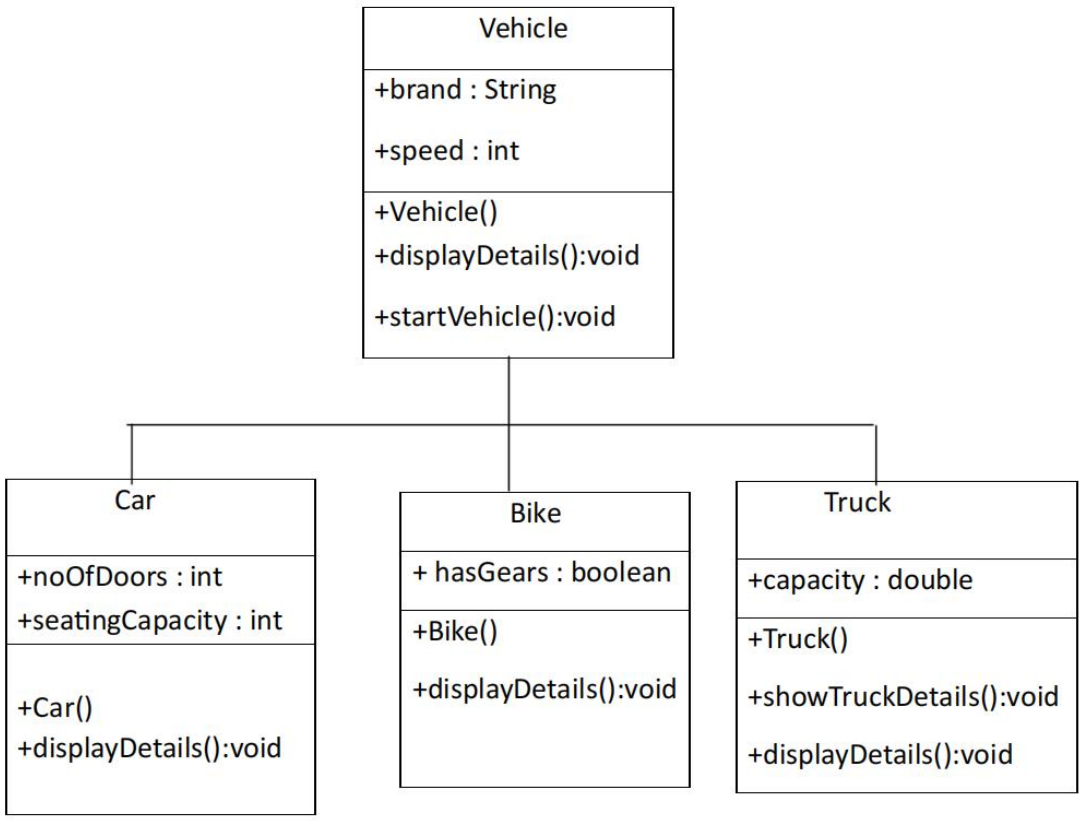
OUTPUT:-

```
Car Details:
Brand: audi
Speed: 158 km/h
Number of Doors: 5
Seating Capacity: 3
audi is starting...

Bike Details:
Brand: tata
Speed: 520 km/h
Has Gears: Yes
tata is starting...

Truck Details:
Brand: benz
Speed: 100 km/h
Truck Capacity: 16.5 tons
benz is starting...

C:\Users\umesh\Desktop\Gau
```

ERRORS:-

S.No.	Expected Error	Reason
1	.variable	We must mention variable name to call the variable
2	static	Static variables contain only one value

CLASS DIAGRAM:-



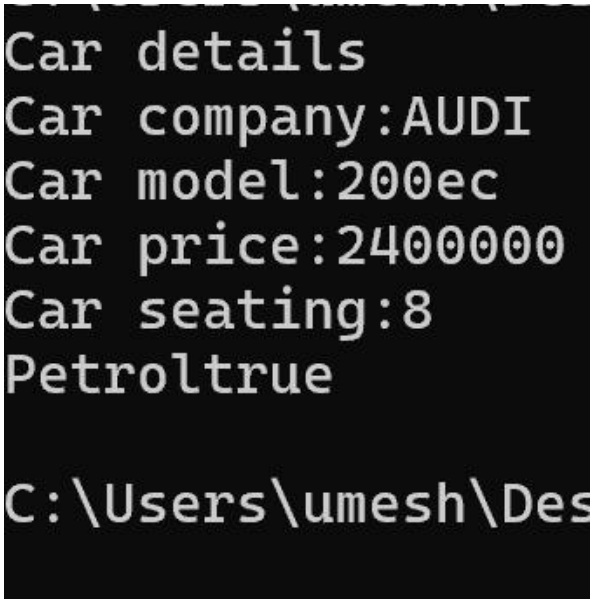
WEEK-6

1. Write a java program to create a Vehicle class with displayInfo() method overridden in Car subclass to provide info about carcompany , model , price, seating and petrol.

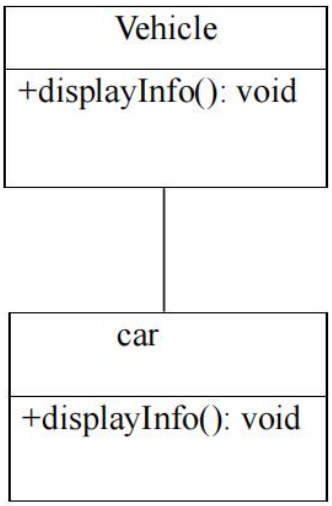
CODE:-

```
class Vehicle{
public void displayInfo(String comp,String model,int price,int
seating,boolean petrol){
System.out.println("Details");
} }
class car extends Vehicle{
public void displayInfo(String comp,String model,int price,int
seating,boolean petrol){
System.out.println("Car Details");
System.out.println("Car company:"+comp);
System.out.println("Car model:"+model);
System.out.println("Car seating:"+seating);
System.out.println("Car price:"+price);
System.out.println("Petrol:"+petrol);
} }
class maruti{
public static void main(String[] args){
car c=new car();
c.displayInfo("AUDI","200ec",2400000,8,true);
} }
```

OUTPUT:-



CLASS DIAGRAM:-



ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

2. An automated admission system that verifies student eligibility for UG and PG with different criteria.
.UG requires minimum of 60%
.PG requires minimum of 70%

CODE:

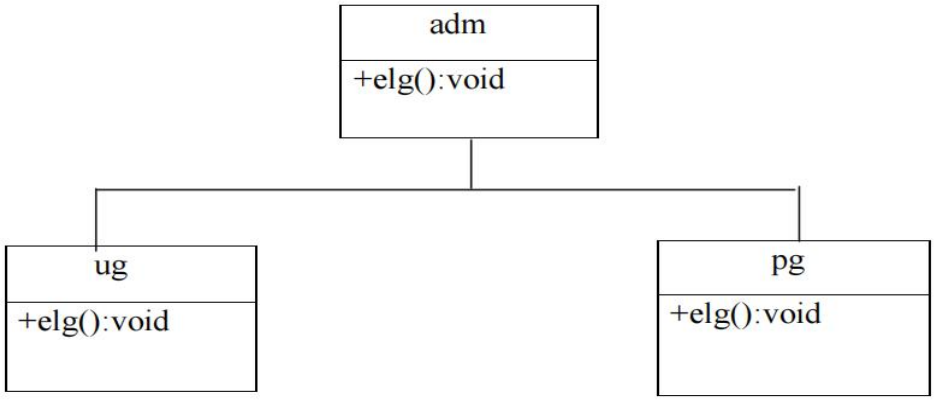
```
class adm{
public void elg(float score){
System.out.println("Eligibility");
} }
class ug extends adm{
public void elg(float score){
if(score>=60){
System.out.println("Eligible");
}
 else{
System.out.println("Not Eligible");
}
} }
class pg extends adm{
public void elg(float score){
if(score>=70){
System.out.println("Eligible");
```

```
}
else{
System.out.println("Not Eligible");
} } }
class score{
public static void main(String[] args){
ug stu1=new ug();
pg stu2=new pg();
stu1.elg(89);
stu2.elg(70);
} }
```

OUTPUT:-

```
Eligible
Eligible
```

CLASS DIAGRAM:-



ERROR:

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

3.Create a calculator class with overloaded methods to perform additions .add two integers .add two double values .add three integers

CODE:

```
class cal{
public int add(int a,int b){
```

```
return a+b;  }
public double add(double a, double b){
return a+b;
}
public int add(int a,int b,int c){
return a+b+c;
} }
class ocal{
public static void main(String[] args){
cal c=new cal();
System.out.println(c.add(6,7));
System.out.println(c.add(5.5,7.7));
System.out.println(c.add(6,7,8));
} }
```

OUTPUT:-

```
13
13.2
21

C:\Users\umesh\Desk
```

CLASS DIAGRAM:-

cal
+add(int a,int b):int +add(double a,double b):double +add(int a,int b,int c):int

ERROR:

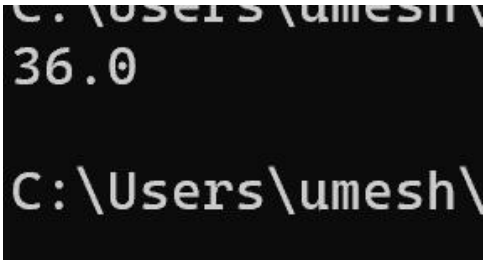
S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

4. Create a shape class with method calculateArea() that is overloaded for different shapes (eg: square, rectangle).Then create a subclass Circle that overrides calculateArea() method for Circle.

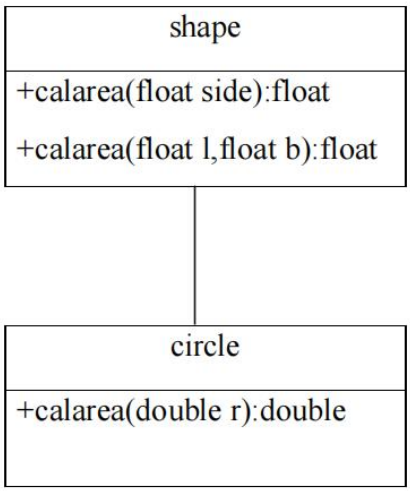
CODE:

```
class shape{
public float calarea(float side){
return side*side;
}
public float calarea(float l,float b){
return l*b;
}
 }
class circle extends shape{
public double calarea(double r){
return 3.14*r*r;
}
 }
class s{
public static void main(String[] args){
circle c=new circle();
System.out.println(c.calarea(6));
}
  }
```

OUTPUT:-



CLASS DIAGRAM:-



ERROR:

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

WEEK-7

1.Create an abstract class PatternPrint with an abstract method printing to print the pattern and a concrete method to display the pattern .
Implement the patterns
1) Star Pattern - prints a right angled triangle of stars
2) Number Pattern – prints a right angled triangle of increasing numbers.

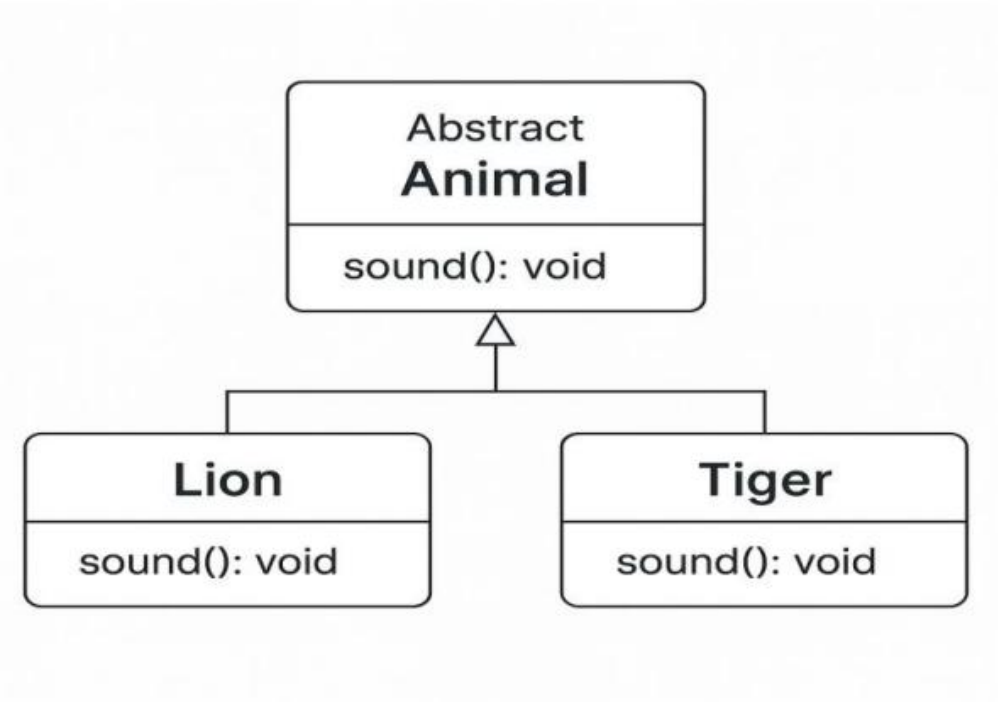
CODE:

```
abstract class Animal{
public abstract void sound();
}
class Lion extends Animal{
public void sound(){
System.out.println("Lion Roars");
}
 }
class Tiger extends Animal{
public void sound(){
System.out.println("Tiger Growls");
}
 }
class Animalsound{
public static void main(String[] args){
System.out.println(“UMESHCHANDRAREDDY,AV.SC.U4CSE24037,CSE-A")
Lion l=new Lion();
Tiger t=new Tiger();
l.sound();
t.sound();
}
}
```

OUTPUT:-

```
main
UMESH CHANDRA REDDY,AV.SC.U4CSE24037,CSE-A
lRoar
tRoar
```

CLASS DIAGRAM:-



ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

2. Write a java program to create an abstract class shape3D with abstract methods to calculate volume and surfacearea and create subclasses for sphere and cube that implements these methods.

CODE:

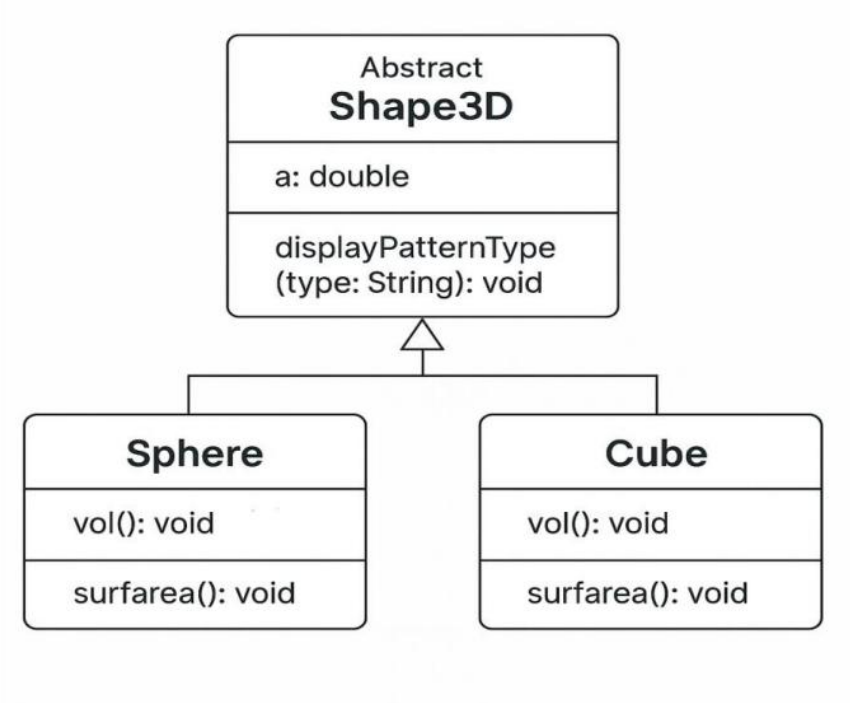
```
abstract class Shape3D{
double a;
Shape3D(double a){
this.a=a;
}
abstract void vol();
abstract void surfarea();
}
class Sphere extends Shape3D {
Sphere(double r) {
```

```
super(r);
}
void vol() {
double vol = (4.0 / 3) * Math.PI * a * a * a;
System.out.println("Volume of sphere with radius " + a + " is " + vol);
}
void surfarea() {
double surfArea = 4 * Math.PI * a * a;52
System.out.println("Surface Area of sphere with radius " + a+ " is " +
surfArea);
} }
class Cube extends Shape3D {
Cube(double side) {
super(side);
}
void vol() {
double vol = a*a*a;
System.out.println("Volume of cube with side " + a + " is " + vol);
}
void surfarea() {
double surfArea = 6 * a * a;
System.out.println("Surface Area of cube with side " + a+ " is " +
surfArea);
}
 }
class ssc{
public static void main(String[] args){
System.out.println(“UMESHCHANDRAREDDY,AV.SC.U4CSE24037,CSE-A")
Cube c=new Cube(2);
Sphere s=new Sphere(3);
c.vol();
c.surfarea();
s.vol();
s.surfarea();
}
  }
```

OUTPUT:

```
UMESH CHANDRA REDDY,AV.SC.U4CSE24037,CSE-a
Volume of Sphere: 50.965010421636
Surface Area of Sphere: 66.47610054996001
Volume of Cube: 12.166999999999996
Surface Area of Cube: 31.739999999999995
```

CLASS DIAGRAM:-



ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

3) Create an abstract class PatternPrint with an abstract method printing to print the pattern and a concrete method to display the pattern . Implement the patterns

1) Star Pattern - prints a right angled triangle of stars

2) Number Pattern – prints a right angled triangle of increasing numbers.

CODE:

```
abstract class PatternPrint {
```

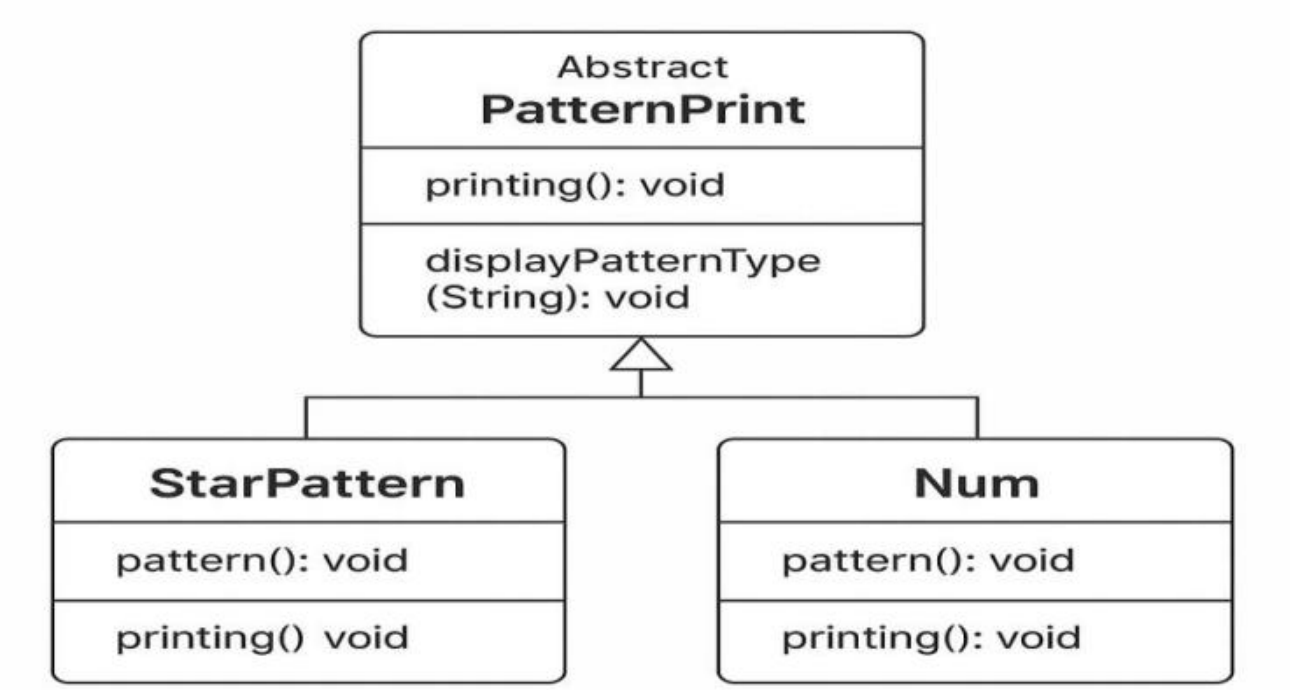
```
abstract void printing();
void displayPatternType(String type) {
System.out.println("Pattern Type: " + type);
}  }
class StarPattern extends PatternPrint {
void pattern() {
System.out.println("Generating Star Pattern:");
}
void printing() {
for (int i = 1; i <= 5; i++) {
for (int j = 1; j <= i; j++) {
System.out.print("* ");
}
System.out.println();
} } }
class num extends PatternPrint{
void pattern() {
System.out.println("Generating Numbers Pattern:");
}
void printing() {
int k=1;
for (int i = 1; i <= 5; i++) {
for (int j = 1; j <= i; j++) {
System.out.print(k+" ");
k++;
}
System.out.println();
} }}
public class PatternDemo {
public static void main(String[] args) {
System.out.println(“UMESHCHANDRAREDDY,AV.SC.U4CSE24037,CSE-A")
StarPattern sp = new StarPattern();
sp.displayPatternType("Star Triangle");
sp.pattern();
sp.printing();
num n = new num();
n.displayPatternType("Increasing Numer Triangle");
```

```
n.pattern();
n.printing();
} }
```

OUTPUT:

```
UMESH CHANDRA REDDY,AV.SC.U4CSE24037,CSE A
Pattern Type: Star Triangle
Generating Star Pattern:
*
* *
* * *
* * * *
* * * * *
Pattern Type: Increasing Numer Triangle
Generating Numbers Pattern:
1
2 3
4 5 6
7 8 9 10
11 12 13 14 15
```

CLASS DIAGRAM:-



ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

WEEK-8

1) Write a java program creating an interface Shape with the get perimeter method create 3 classes rectangle,triangle and circle that implements the shape interface ,implement the getperimeter method for each of the three classes

Code :

```
interface Shape {
abstract double getPerimeter();
}
class Rectangler implements Shape{
double length;
double breadth;
double perimeter;
Rectangler(double length , double breadth){
this.length = length;
this.breadth=breadth;
}
public double getPerimeter(){
perimeter = 2*(length*breadth);
return perimeter;
} }
class Circlec implements Shape{
double radius;
final static double pi = 3.14;
double perimeter;
Circlec(double radius){
this.radius = radius;
}
public double getPerimeter(){
perimeter = 2*pi*radius*radius;
return perimeter;
} }
class Trianglet implements Shape{
double side1;
double side2;
double side3;
Trianglet(double side1,double side2,double side3){
```

```
this.side1 = side1;
this.side2=side2;
this.side3=side3;
}
public double getPerimeter(){
return (side1+side2+side3);
} }
class per{
public static void main(String[] args){
Rectangler r = new Rectangler(2.0,4.0);
Circlec c = new Circlec(6.0);
Trianglet t = new Trianglet(3.0,4.0,5.0);
System.out.println(r.getPerimeter());
System.out.println(c.getPerimeter());
System.out.println(t.getPerimeter());
} }
```

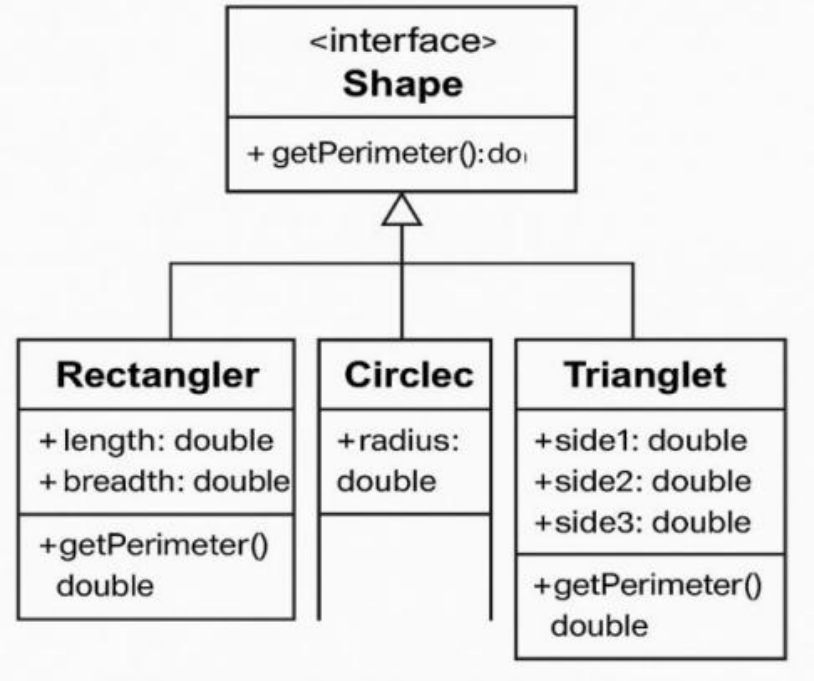
OUTPUT:-

```
36.0
401.92
13.0
PS D:\java\programmes.java>
```

ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



2) write a java program to create an interface playable with a method play() that takes no arguments and
returns void create three classes football,volleyball and basketball that implements the playable and override
the play method to play the respective sports
Code :

```
interface Playable {
public void play();
}
class Football implements Playable{
public void play(){
System.out.println("Kicking the ball and scoring goals is invloved in Football");
} }
class Volleyball implements Playable{
public void play(){
System.out.println("Serving , spiking and blocking is involved in Volleyball ");
} }
class BasketBall implements Playable{
public void play(){
System.out.println("Dribblin, shooting and dunking is involved in Basketball");
```

```
} }
class Main18{
public static void main(String[] args){
Football f = new Football();Volleyball v = new Volleyball();
BasketBall b = new BasketBall();
f.play();
v.play();
b.play();
} }
```

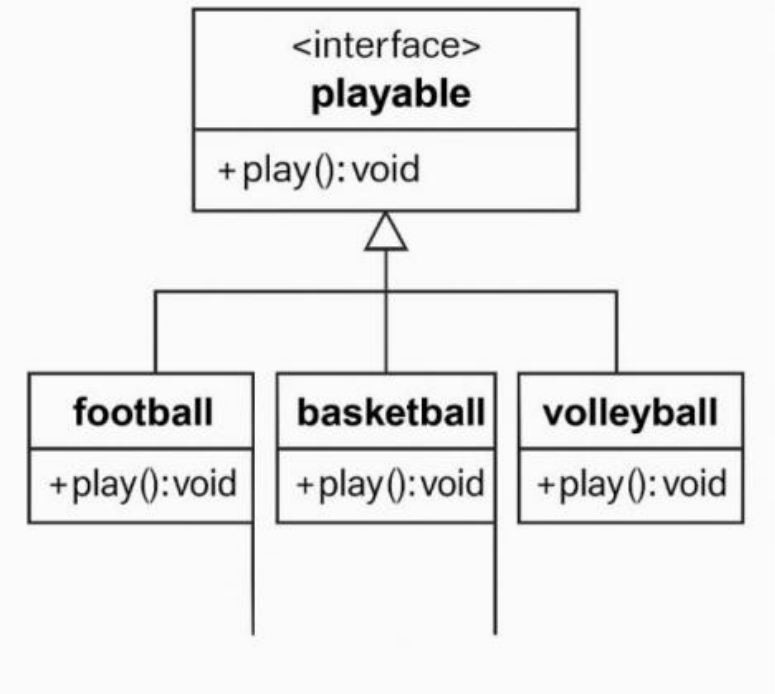
Output :

```
C:\Users\umesh\Desktop\Gaurav>java Main18
 hitting sixes are ivovled in cricket
Serving , spiking and blocking is involved in Volleyball
Dribblin, shooting and dunking is involved in Basketball
```

ERRORS:-

S.No.	Expected Error	Reason
1	Creation of main class	We must create a class to use the main method and must save the name of the file with that name
2	}	Ending the class and main method is required

CLass diagram:-

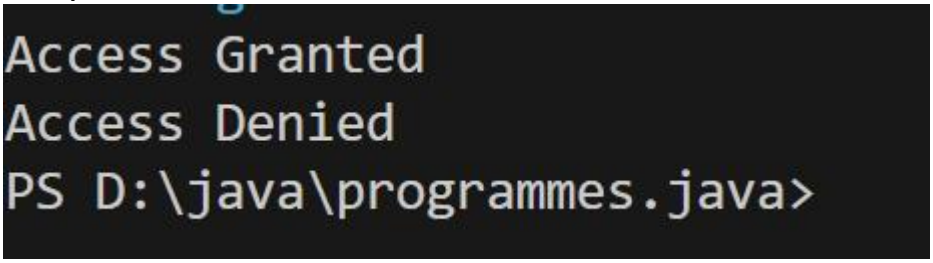


3) write a java program to implement a login system using interfaces

Code :

```
interface Studentlogin {
abstract String login(String id , String password);
}
class Verify implements Studentlogin{
String id;
String password;
public String login(String id, String password){
this.id = id ;
this.password=password;
if(id.equals("24037") && password.equals("umesh")){
return "Access Granted";
}
else{
return "Access Denied";
} } }
class Logindetails{
public static void main(String [] args){
Verify o = new Verify();
String result = o.login("24037"," umesh");
String results = o.login("2145" , " dog");
System.out.println(result);
System.out.println(results);
} }
```

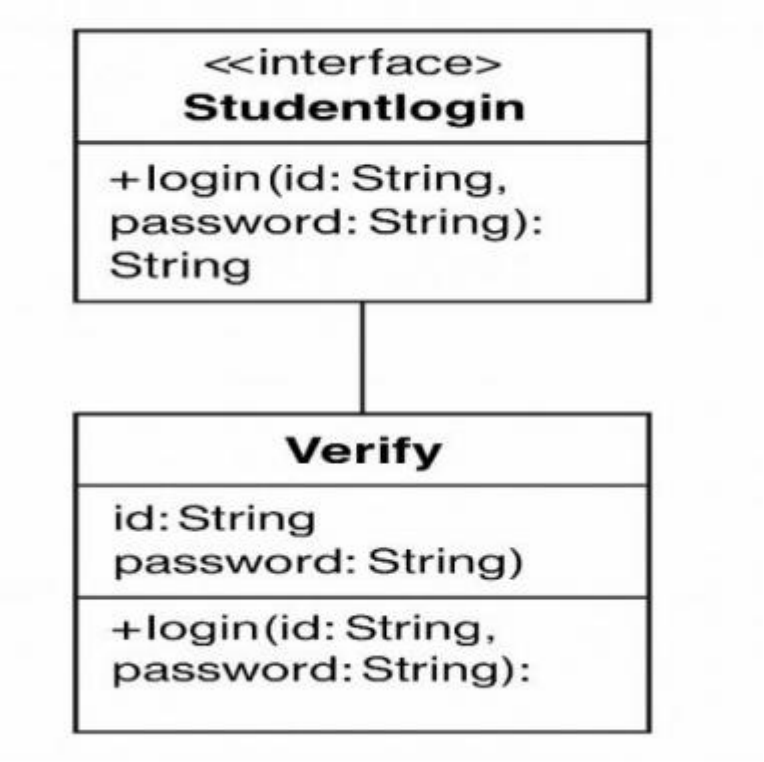
Output :



ERRORS:-

S.No.	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



WEEK-9

1) Write a java program to create a method that takes integer as a parameter and throws an exception if the number is even.

CODE:

```
public class check{
public static void checkNumber(int number) throws Exception {
System.out.println("C,Umesh Chandra Reddy,av.sc.u4cse24037,CSEA");
if (number % 2 == 0) {
throw new Exception("Even number is not allowed: " + number);
} else {
System.out.println("Valid output number: " + number);
} }
public static void main(String[] args) {
try {
checkNumber(2);
} catch (Exception e) {
System.out.println("Exception caught: " + e.getMessage());
}
} }
```

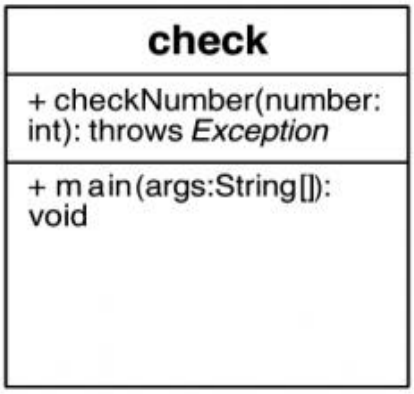
OUTPUT:

```
C,Umesh Chandra Reddy,av.sc.u4cse24037,CSEA
Exception caught: Even number is not allowed: 6
```

ERRORS:-

S.no	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



2) Write a java program to create a method that reads a file and throws an exception if the file is not found

CODE:

```
import java.io.*;
class file{
public static void findfile() throws IOException{
System.out.println("C,Umesh Chandra Reddy,av.sc.u4cse24037,CSEA");
File newfile=new File("test.txt");
FileInputStream stream = new FileInputStream(newfile);
}
public static void main(String args[]){
try{
findfile();
}
catch(IOException e){
System.out.println(e);
}
 } }
```

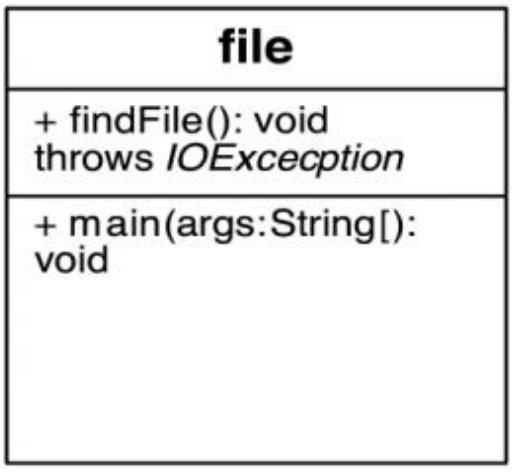
OUTPUT:

```
C,Umesh Chandra Reddy,av.sc.u4cse24037,CSEA
java.io.FileNotFoundException: test.txt (The system cannot find the file specified)
```

ERRORS:-

S.no	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



3)Write a java program to handle arithmetic exception using try catch and finally

CODE:

```
public class finallyc {
   public static void main(String[] args) {
System.out.println("C.Umesh Chandra Reddy,AV.SC.U4CSE24037,CSE-A");
       int a = 10;
       int b = 0; // Intentional zero to cause division by zero error
       int result;
       try {
          result = a / b; // This will throw ArithmeticException
          System.out.println("Result: " + result);
       } catch (ArithmeticException e) {
          System.out.println("Exception caught: Division by zero is not allowed.");
       } finally {
          System.out.println("Finally block executed: Cleanup or closing resources can
be done here.");
       }
       System.out.println("Program continues after try-catch-finally block.");
   }}
```

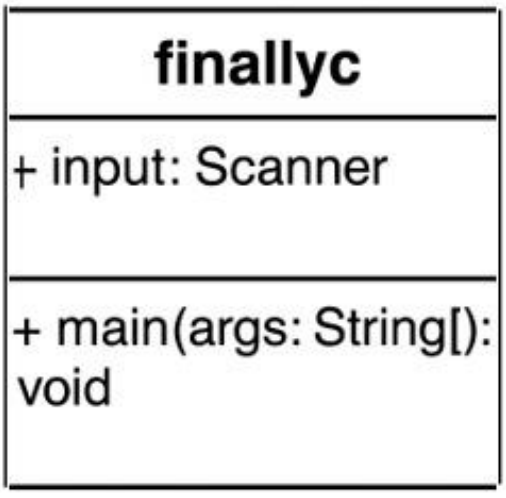
OUTPUT:

```
C.Umesh Chandra Reddy,AV.SC.U4CSE24037,CSE-A
Exception caught: Division by zero is not allowed.
Finally block executed: Cleanup or closing resources can be done here.
Program continues after try-catch-finally block.
```

ERRORS:-

S.no	Expected Error	Reason
1	Setting the parameters inside the constructor	We cannot pass the values inside constructor without setting them first
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



4) write a java program to simulate a universityy system using inner classes

✓ Create an outer class named University with a variable UniversityName

✓ Inside it define two non-static in classes

1. Department-With variable like deptName and deptCode and a method to display department details.

2. Student-Variable like stdName and stdCode and a method to display Student details.

3. Create an object for each class and call their methods to display their details and with the university name.

CODE:-

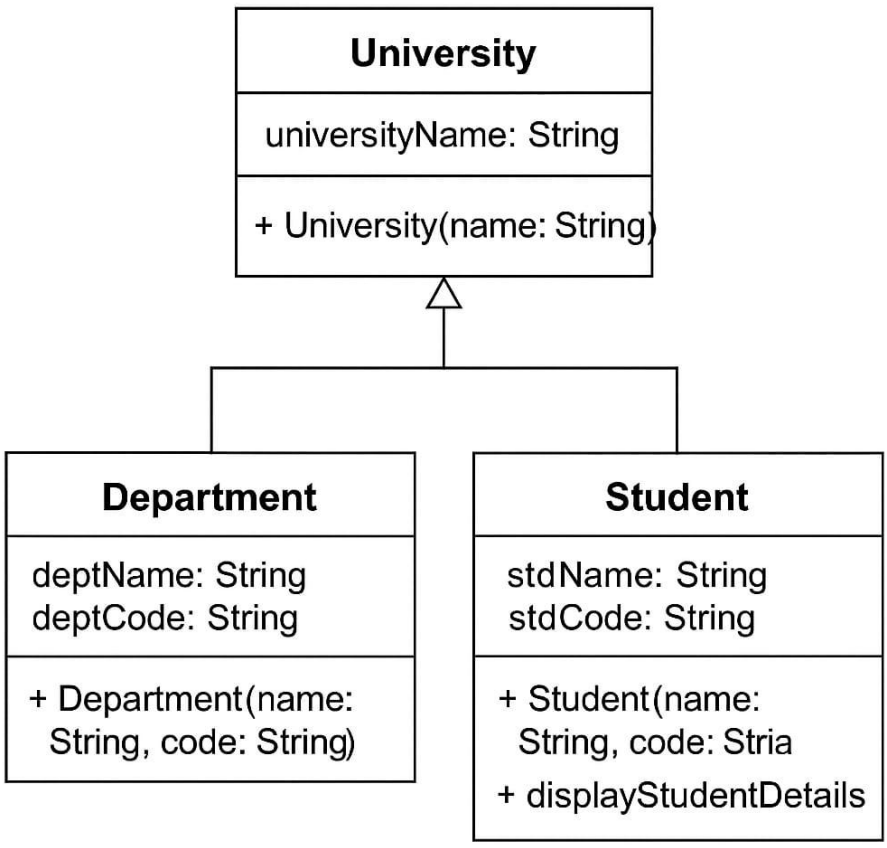
```
public class University {
   String universityName;
      public University(String name) {
      this.universityName = name;
   }
       class Department {
      String deptName;
      String deptCode;
            Department(String name, String code) {
         this.deptName = name;
         this.deptCode = code;
      }
      void displayDepartmentDetails() {
         System.out.println("University: " + universityName);
         System.out.println("Department Name: " + deptName);
         System.out.println("Department Code: " + deptCode);
      }
   }
   class Student {
      String stdName;
      String stdCode;
      // Constructor
      Student(String name, String code) {
         this.stdName = name;
         this.stdCode = code;
      }
      void displayStudentDetails() {
         System.out.println("University: " + universityName);
         System.out.println("Student Name: " + stdName);
         System.out.println("Student Code: " + stdCode);
      }
   }
   public static void main(String[] args) {
```

```
        University uni = new University("AMRITA VISHWA VIDYAPEETAM UNIVERSITY");
University.Department dept = uni.new Department("Computer Science", "CS101");
        University.Student student = uni.new Student("C.UMESH CHANDTRA REDDY",
"CSE24037");
        System.out.println("--- Department Details ---");
        dept.displayDepartmentDetails();
        System.out.println("\n--- Student Details ---");
        student.displayStudentDetails();
    }
}
```

OUTPUT:-

```
--- Department Details ---
University: AMRITA VISHWA VIDYAPEETAM UNIVERSITY
Department Name: Computer Science
Department Code: CS101

--- Student Details ---
University: AMRITA VISHWA VIDYAPEETAM UNIVERSITY
Student Name: C.UMESH CHANDTRA REDDY
Student Code: CSE24037
```

CLASS DIAGRAM:-



WEEK-10

1) Write a java program to generate a password for a student using his/her initials and age. The password displayed should the string consists of first character of first name, middle name, last name with age.

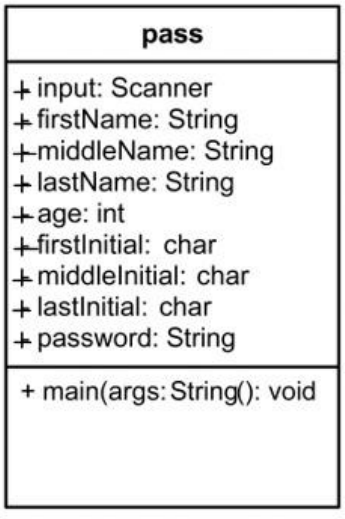
CODE:

```
import java.util.Scanner;
public class pass{
public static void main(String args[]) {
Scanner input = new Scanner(System.in);
System.out.print("Enter First Name: ");
String firstName = input.nextLine();
System.out.print("Enter Middle Name: ");
String middleName = input.nextLine();
System.out.print("Enter Last Name: ");
String lastName = input.nextLine();
System.out.print("Enter Age: ");
int age = input.nextInt();
char firstInitial = firstName.charAt(0);
char middleInitial = middleName.charAt(0);
char lastInitial = lastName.charAt(0);
String password = "" + firstInitial + middleInitial + lastInitial + age;
System.out.println("Generated Password: " + password);
input.close();
} }
```

OUTPUT:

```
Enter First Name: umesh
Enter Middle Name: chandra reddy
Enter Last Name: chintakunta
Enter Age: 19
Generated Password: ucc19
```

CLASS DIAGRAM:-



ERRORS:-

S.No.	Expected Error	Reason
1	Creation of main class	We must create a class to use the main method and must save the name of the file with that name
2	}	Ending the class and main method is required

2) Design and implement a java program that will do the following operations to the string “welcome! You are practicing strings concept”.
-convert all alphabets to capital letters and print the result
-convert all alphabets to lower-case letters and print out the result
-print out the length of string
-print out the index of concept

CODE:-

```
public class StringOperations {
   public static void main(String[] args) {
       String text = "welcome! You are practicing strings concept";
       String upper = text.toUpperCase();
      System.out.println("Uppercase: " + upper);
       String lower = text.toLowerCase();
      System.out.println("Lowercase: " + lower);
       int length = text.length();
      System.out.println("Length of string: " + length);
      int index = text.indexOf("concept");
      System.out.println("Index of 'concept': " + index);
   }}
```

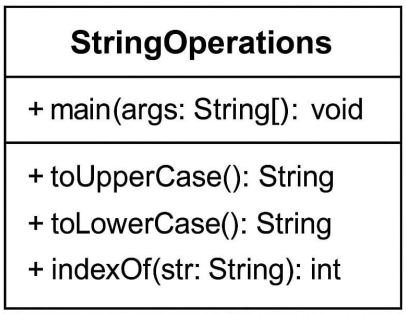
OUTPUT:-

```
C.Umesh Chandra Reddy,AV.SC.U4.CSE24307,CSE-A
Uppercase: WELCOME! YOU ARE PRACTICING STRINGS CONCEPT
Lowercase: welcome! you are practicing strings concept
Length of string: 43
Index of 'concept': 36
```

ERRORS:-

Sl. No.	Possible Error	Cause
1	String text = welcome! You are practicing...;	Missing quotes around string
2	System.out.println(...)	Typo: println instead of println

CLASS DIAGRAM:-



3) Implement a java program using below array methods.
-sorting the elements(numbers and strings) of an array
-convert the array elements into string
-fill the part of an array
-copy the elements of one array into another

CODE:-

```
import java.util.Arrays;
public class ArrayMethodsDemo {
   public static void main(String[] args) {
System.out.println("C.Umesh Chandra Reddy,AV.SC.U4.CSE24307,CSE-A");
      // 1. Sorting arrays
      int[] numbers = {5, 3, 8, 1, 2};
      String[] names = {"navya", "bhavana", "pranathi", "rishitha"};
      Arrays.sort(numbers);
      Arrays.sort(names);
      System.out.println("Sorted Numbers: " + Arrays.toString(numbers));
      System.out.println("Sorted Names: " + Arrays.toString(names));
      // 2. Convert array to string
      String numberStr = Arrays.toString(numbers);
      String nameStr = Arrays.toString(names);
      System.out.println("Number Array as String: " + numberStr);
      System.out.println("Name Array as String: " + nameStr);
```

```
    // 3. Fill part of an array
    int[] filledArray = new int[10];
    Arrays.fill(filledArray, 3, 7, 99); // fill indices 3 to 6 with 99
    System.out.println("Partially Filled Array: " + Arrays.toString(filledArray));
    // 4. Copy array elements
    int[] copiedArray = Arrays.copyOf(numbers, numbers.length);
    System.out.println("Copied Array: " + Arrays.toString(copiedArray));
  }}
```

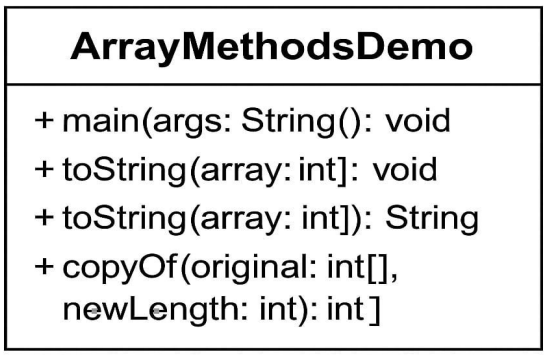
OUTPUT:-

```
C.Umesh Chandra Reddy,AV.SC.U4.CSE24307,CSE-A
Sorted Numbers: [1, 2, 3, 5, 8]
Sorted Names: [bhavana, navya, pranathi, rishitha]
Number Array as String: [1, 2, 3, 5, 8]
Name Array as String: [bhavana, navya, pranathi, rishitha]
Partially Filled Array: [0, 0, 0, 99, 99, 99, 99, 0, 0, 0]
Copied Array: [1, 2, 3, 5, 8]
```

ERRORS:-

S.No.	Expected Error	Reason
1	Creation of main class	We must create a class to use the main method and must save the name of the file with that name
2	}	Ending the class and main method is required

CLASS DIAGRAM:-



4) Implement a java program using the below array list methods
-insert an element at a particular index in the array list
-modify an element in the array list
-access an element from the array list
-remove an element from array list
-clear the elements from the array list

CODE:-

```
import java.util.ArrayList;
public class ArrayListDemo {
   public static void main(String[] args) {
System.out.println("C.Umesh Chandra Reddy,AV.SC.U4.CSE24307,CSE-A");
       // Create an ArrayList of Strings
       ArrayList<String> names = new ArrayList<>();
   // Insert elements into the ArrayList
       names.add("Navya");
       names.add("Bhavana");
       names.add("Pranathi");
  System.out.println("Original List: " + names);
   // Insert an element at a particular index
       names.add(1, "rishitha");  // Insert "David" at index 1
       System.out.println("After inserting at index 1: " + names);
  // Modify an element in the ArrayList
       names.set(2, "Afshan");  // Replace element at index 2 with "Eve"
       System.out.println("After modifying index 2: " + names);
  // Access an element from the ArrayList
       String element = names.get(3);  // Get element at index 3
       System.out.println("Element at index 3: " + element);
 // Remove an element from the ArrayList
       names.remove(0);  // Remove element at index 0
       System.out.println("After removing element at index 0: " + names);
  // Clear all elements from the ArrayList
       names.clear();
       System.out.println("After clearing all elements: " + names);
   }}
```

OUTPUT:-

```
C.Umesh Chandra Reddy,AV.SC.U4.CSE24307,CSE-A
Original List: [Navya, Bhavana, Pranathi]
After inserting at index 1: [Navya, rishitha, Bhavana, Pranathi]
After modifying index 2: [Navya, rishitha, Afshan, Pranathi]
Element at index 3: Pranathi
After removing element at index 0: [rishitha, Afshan, Pranathi]
After clearing all elements: []
```

ERRORS:-

S.No.	Expected Error	Reason
1	Creation of main class	We must create a class to use the main method and must save the name of the file with that name
2	}	Ending the class and main method is required

CLASS DIAGRAM:-