23CSE111

OBJECT ORIENTED PROGRAMMING

LAB REPORT

Department of Computer Science Engineering

Amrita School of Computing

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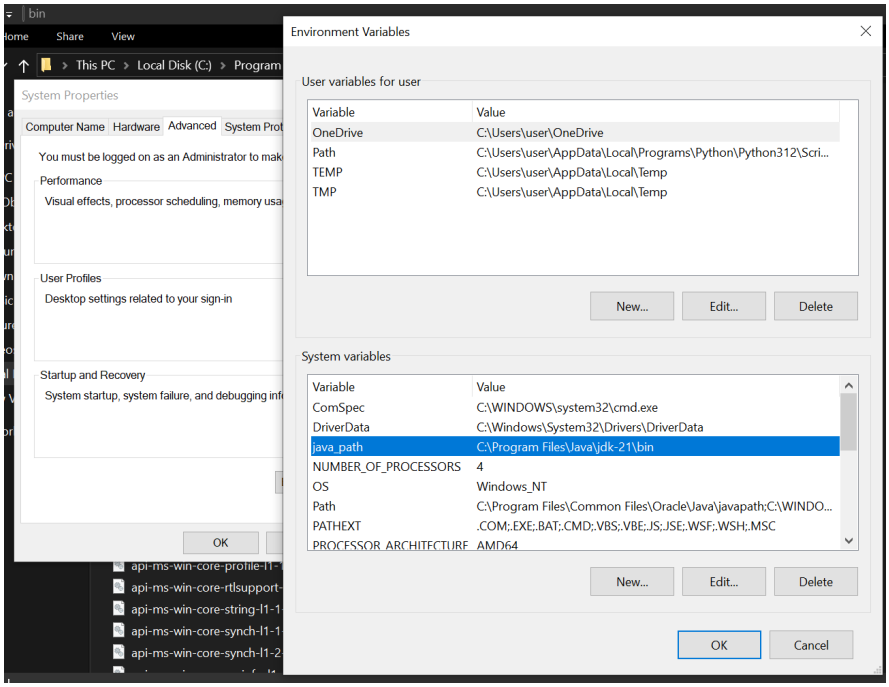
WEEK-1

1) Explain the process of Installing JDK (Java Development Kit)

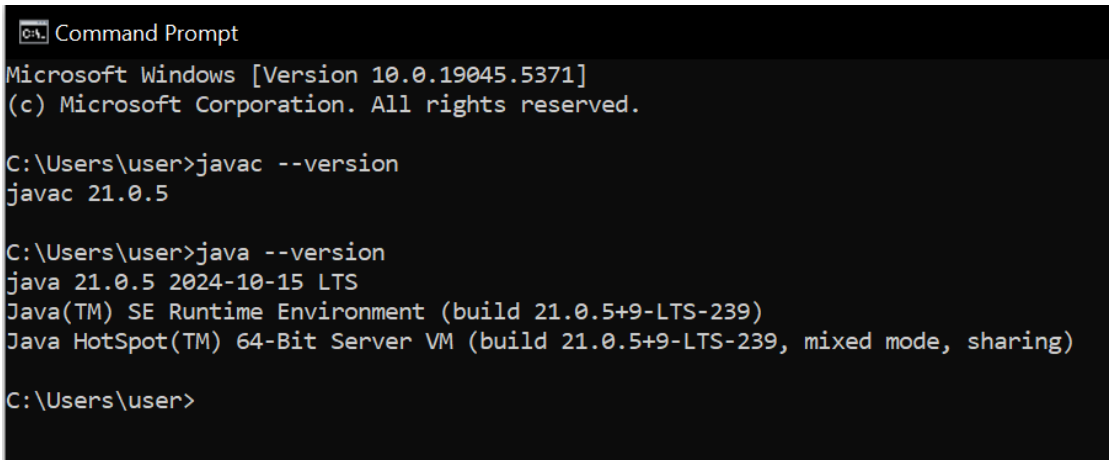
Installing of JDK (Java Development Kit):

1. **Download JDK:**
    - Go to the Oracle JDK download page in your web browser and click on JDK-21 version which is Long term support (LTS) version.
    - Click on the download link for your operating system (Windows, macOS, or Linux).
2. **Install JDK:**
    - Once downloaded, run the installer.
    - Follow the instructions and keep clicking "Next" until it's done.
3. **Set Environment Variables (Windows):**
    - Open file explorer, then right click on This PC next select on properties then it will take you to the settings app then click on advanced system settings and then
      click on **Environment Variables**.
    - Click **New** under **System Variables**:
        - **Set Variable name as:** java_home
        - **Variable value:** The folder address where JDK is installed (like C:\Program Files\Java\jdk-21\bin)
    - Find Path under **System Variables**, click **Edit**, and add the path of the jdk-21(C:\Program Files\Java\jdk-21\bin)
    -



Checking of JDK Version:

1. **Open Command Prompt:**
   - Press win+R, type cmd, and press Enter.
2. **Check Version:**
   - Type java --version and press Enter.
   - Type javac --version and press Enter.



Program-1:

AIM: Write a Java program to print the message "Welcome to Java Programming.

Print helloworld:-

```
public class helloworld {
  public static void main(String[] args) {
   System.out.println("Hello World");
  }
}
```

Output:

```
m.akshaya@Akshaya-MacBook-Air MyProjects % javac Helloworld.java
m.akshaya@Akshaya-MacBook-Air MyProjects % java Helloworld
Hello World
m.akshaya@Akshaya-MacBook-Air MyProjects %
```

ERRORS: None found

Program-2:

AIM: Write a Java Program that prints Name, Roll No, Section of a student.

STUDENT DETAILS:

```
public class studentinformation {
  public static void main(String [] args) {
    System.out.println("NAME:M.AKSHAYA");
    System.out.println("Section:C");
   System.out.println("Roll no:AV.SC.U4CSE24218");
  }
}
```

OUTPUT:

```
m.akshaya@Akshaya-MacBook-Air MyProjects % javac Studentinformation.java
m.akshaya@Akshaya-MacBook-Air MyProjects % java Studentinformation
NAME:M.AKSHAYA
Section:C
Roll no:AV.SC.U4CSE24218
m.akshaya@Akshaya-MacBook-Air MyProjects %
```

IMPORTANT POINTS:

1. When printing the statements, everything should be inside double quotes.

ERROR TABLE:

Code Error	Code rectification
1) writing small “S”in place of”S” In system.out.println() 2)not giving strings to the name and scetion	1) code is rectified by keeping capital “S” 2) Giving strings to name and section

WEEK-2:

Program-1:

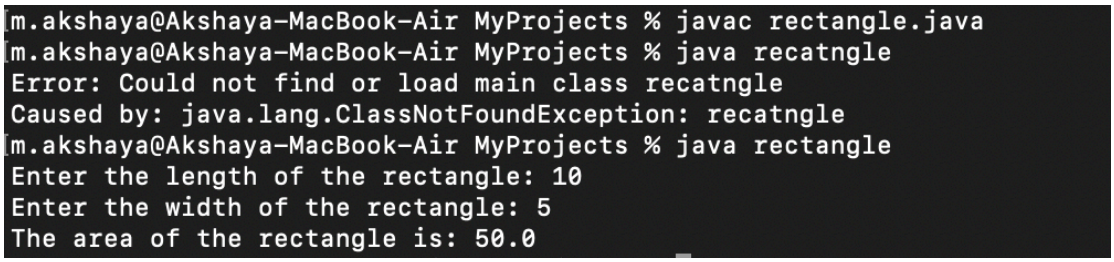
AIM: Write a java program to Calculate area of rectangle.

CODE:

```
import.java.util.scanner;
Public class rectangle{
    Public static void main(String[]args){
        Scanner scanner=new Scanner(system.in);
        System.out.println(“enter length”);
        Double length=scanner.new double();
        System.out.println(“enter the width”)
       Double width=scanner.new double();
       Double area=length*width
       System.out.println(“area”+area);
```

```
        scanner.close();
    }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification
1. While using for iteration, not giving the conditions correctly. 2. Declaring the data type as double instead of int. 3. Writing small	1. We should give iterative statements correctly. 2. We should give the data type as int for integers.

IMPORTANT POINTS:

1.Area of a rectangle is area = l*b, where
L = length of a side of the rectangle,
B= breadth of a side of the rectangle.
2.Here, we must be sure that all the expressions/conditions inside for the for loop must be given correctly

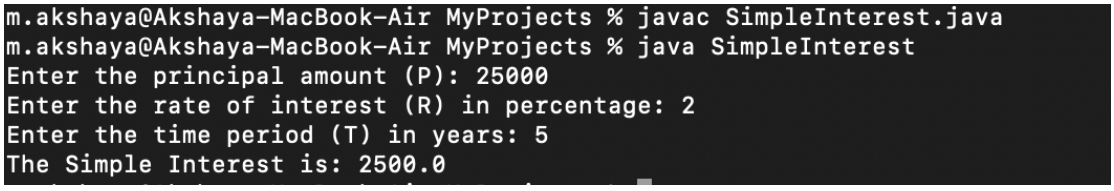
Program-2:

AIM: Write a java program to Calculate the simple interest by input given by the user.

CODE:

```
Import java.util.Scanner;
  public class SimpleInterest {
    public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      System.out.print("Enter the principal amount (P): ");
      double principal = scanner.nextDouble();
      System.out.print("Enter the rate of interest (R) in
percentage: ");
      double rate = scanner.nextDouble();
      System.out.print("Enter the time period (T) in years: ");
      double time = scanner.nextDouble();
     double simpleInterest = (principal * rate * time) / 100;
     System.out.println("The Simple Interest is: " +
simpleInterest);
     scanner.close();
   }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification

1. Giving space between next and Double. 2. Not giving parenthesis after closing the input.	1. Should not give space between next and Double. 2. We must put parenthesis after closing the input.

IMPORTANT POINTS:

1.Simple interest formula is: (p*t*r)/100, where:
P: Principal amount
R: Rate of interest
T: Time period
2.The data type double indicates the floating points in the integers.
3.The line “import java.util.Scanner” indicates:
Import: tells the java compiler that we want to use a specific class or package in your code.
Java.util : This is the package that contains utility classes for Java programming, including the “Scanner” class.
Scanner: this is the class that allows you to read input from the keyboard.

Program-3:

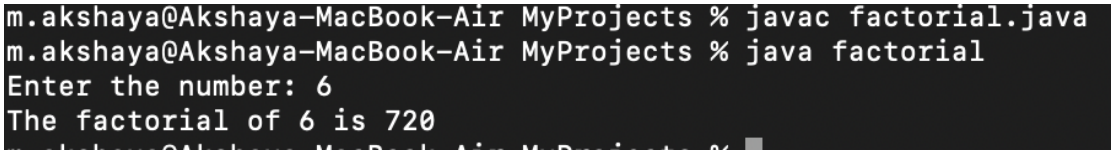
AIM: Write a java program to calculate the Factorial of N(given by the user).

CODE:

```
import java.util.Scanner;
 public class factorial {
   public static void main(String[] args) {
      Scanner scanner = new Scanner(System.in);
      System.out.print("Enter the number: ");
      int number = scanner.nextInt();
      long factorial = 1;
```

```
        if (number < 0) {
            System.out.println("No Factorial For Negative
Numbers.");
        } else {
            for (int i = 1; i <= number; i++) {
                factorial *=i;
            }
            System.out.println("The factorial of " + number + " is " +
factorial);
        }
        scanner.close();
    }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification
3. While using for iteration, not giving the conditions correctly. 4. Declaring the data type as double instead of int.	3. We should give iterative statements correctly. 4. We should give the data type as int for integers.

IMPORTANT POINTS:

1.While the for loop the data inside the parenthesis indicates the Initial expression
Test expression and
Update expression.
2.Here “factorial*=I” means factorial = factorial*I.

3.Here we are using the data type “int” just to calculate the integer values and it doesn’t support floating points.

Program-4:

AIM: Write a java program to find the Fibonacci series (all inputs taken from the user).

CODE:

```
public class FibonacciSeries {
   public static void main(String[] args) {
      int n = 10;
      int firstTerm = 0, secondTerm = 1;
      System.out.println("Fibonacci Series up to " + n + "
terms:");
         for (int i = 1; i <= n; ++i) {
         System.out.print(firstTerm + ", ");
         int nextTerm = firstTerm + secondTerm;
         firstTerm = secondTerm;
         secondTerm = nextTerm;
      }
   }
}
```

OUTPUT:

```
m.akshaya@Akshaya-MacBook-Air MyProjects % touch fibonacci.java
m.akshaya@Akshaya-MacBook-Air MyProjects % javac fibonacci.java
m.akshaya@Akshaya-MacBook-Air MyProjects % java fibonacci
Fibonacci Series up to 10 terms:
0, 1, 1, 2, 3, 5, 8, 13, 21, 34, %
```

ERROR TABLE:

Code Error	Code rectification

1. Giving space between next and Double. 2. Not giving parenthesis after closing the input.	1. Should not give space between next and Double. 2. We must put parenthesis after closing the input.

IMPORTANT POINTS:

1.In the Fibonacci sequence, the sum value is given to the second variable, and the value of the second variable is given to the first variable.
2.This process is repeated a certain number of times until the conditions are met.

Program-5:

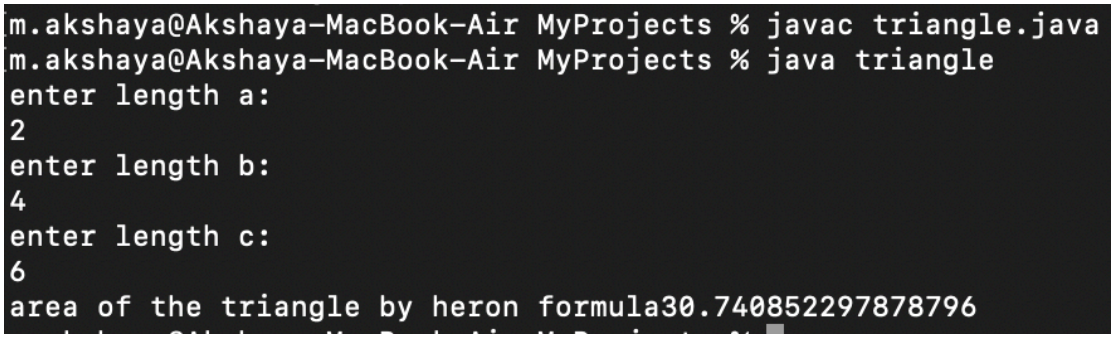
AIM: Write a java program to find the area of triangle using herons formula.

CODE:

```
import java.util.Scanner;
public class triangle{
  public static void main(String[] args){
    Scanner scanner=new Scanner(System.in);
    System.out.println("enter length a:");
    Double a = scanner.nextDouble();
    System.out.println("enter length b:");
    Double b = scanner.nextDouble();
    System.out.println("enter length c:");
    Double c = scanner.nextDouble();
    Double s= (a+b+c/2);
    Double area= Math.sqrt(s*(s-a)*(s-b)*(s-c));
    System.out.println("area of the triangle by heron formula"+
area);
    scanner.close();
```

```
 }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification
1. While printing the variable not giving + sign. 2. Not closing the scanner.	1. We should give correct indentation. 2. Closing the scanner is must.

IMPORTANT POINTS:

1.Here, we're finding the area of a triangle using heron's formula.
2.Heron's formula for finding a triangle is:
S = (a +b +c)/2
Where S is the semi-perimeter of the triangle.
Now the area formula is:
Area = sqrt(s*(s-a)*(s-b)*(s-c)).

Program-6:

I) AIM: Write a java program to Convert temperature celsius into farenheit.

CODE:

```
import java.util.Scanner;
  public class celsiustofarenheit {
    public static void main(String[] args) {
       Scanner scanner = new Scanner(System.in);
       System.out.print("Enter temperature in Celsius: ");
       float celsius = scanner.nextFloat();
       float farenheit = (celsius * 9 / 5) + 32;
       System.out.println(celsius + "°C is equal to " + farenheit
+"°F");
       scanner.close();
    }
}
```

OUTPUT:

```
m.akshaya@Akshaya-MacBook-Air MyProjects % javac celsiustofarenheit.java
m.akshaya@Akshaya-MacBook-Air MyProjects % java celsiustofarenheit
Enter temperature in Celsius: 49
49.0°C is equal to 120.2°F
```

ERROR TABLE:

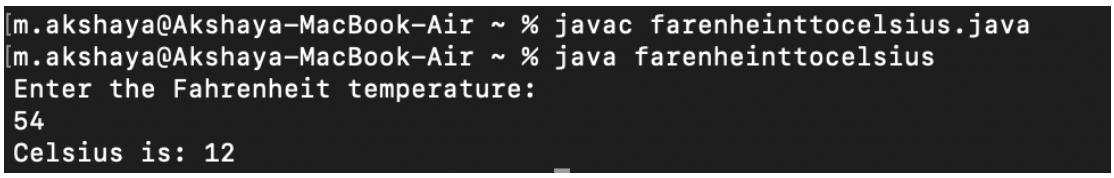
Code Error	Code rectification
1. While printing the variable not giving + sign. 2. Not closing the scanner.	1. We should give correct indentation. 2. Closing the scanner is must.

II) AIM: Write a java program to Convert temperature Fahrenheit to celsius

CODE:

```
import java.util.Scanner;

public class fahrenheittocelsius {
   public static void main(String[] args) {
      int C, F;
      Scanner num = new Scanner(System.in);

      System.out.println("Enter the Fahrenheit temperature: ");
      F = num.nextInt();

      C = (F - 32) * 5 / 9;
      System.out.println("Celsius is: " + C);

      num.close(); // Close the Scanner to avoid resource leak
   }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification
1. While printing the variable not giving + sign. 2. Not closing the scanner.	1. We should give correct indentation. 2. Closing the scanner is must.

IMPORTANT POINTS:

1.The formula to convert a Fahrenheit to Celsius is
Celsius = (Fahrenheit-32)*5/9
2.The formula to convert a Celsius to Fahrenheit is
Fahrenheit = (Celsius*9/5)+32.
3.The line “Scanner input = new Scanner(System.in),” tends to create a new Scanner object named “input” that reads input from the standard input stream (System.in), like keyboard.

WEEK -3:

1.AIM: To create java program with following instructions :
1.Create a class with name Car
2.Create four attributes named car_color,car_brand, fuel_type, mileage
3.Create these methods named start(),stop(),service()
4.Create the objects named car, car1,car2

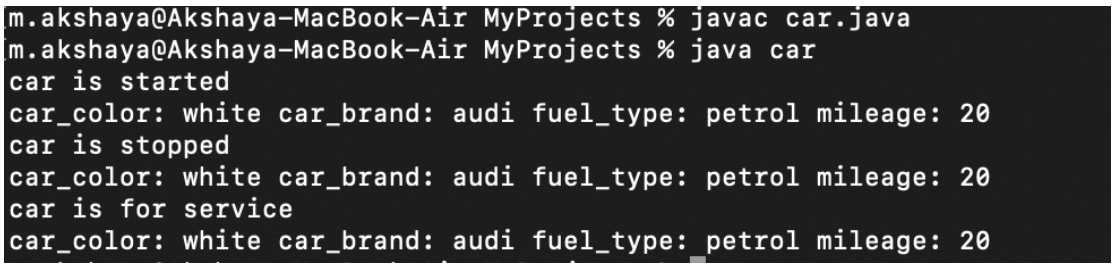
CODE:

```
public class Car {
   private String car_color;
   private String car_brand;
   private String fuel_type;
   private String mileage;

   public void start() {
      System.out.println("car is started");
   }
```

```
    public void stop() {
        System.out.println("car is stopped");
    }

    public void service() {
        System.out.println("car is for service");
    }

    public static void main(String args[]) {
        Car car = new Car();
        car.car_color = "white";
        car.car_brand = "audi";
        car.fuel_type = "petrol";
        car.mileage = "20";
        car.start();
        System.out.println("car_color: " + car.car_color + "
car_brand: " + car.car_brand + " fuel_type: " + car.fuel_type + "
mileage: " + car.mileage);
        Car car1 = new Car();
        car1.car_color = "white";
        car1.car_brand = "audi";
        car1.fuel_type = "petrol";
        car1.mileage = "20";
        car1.stop();
        System.out.println("car_color: " + car1.car_color + "
car_brand: " + car1.car_brand + " fuel_type: " + car1.fuel_type
+ " mileage: " + car1.mileage);
        Car car2 = new Car();
        car2.car_color = "white";
        car2.car_brand = "audi";
        car2.fuel_type = "petrol";
        car2.mileage = "20";
        car2.service();
```

```
        System.out.println("car_color: " + car2.car_color + "
car_brand: " + car2.car_brand + " fuel_type: " + car2.fuel_type
+ " mileage: " + car2.mileage);
    }
}
```

OUTPUT:



2.AIM: To create a class BankAccount with methods deposit() and withdraw() . create two subclasses savings account and checking account override the withdraw () method in each subclass to impose different withdrawal limits and fees.

PROGRAM:

```
  import java.util.Scanner;

public class BankAccount {
    private double balance;
        public BankAccount(double initialBalance) {
        this.balance = initialBalance;
    }
   public void deposit(double amount) {
        balance += amount;
        System.out.println("Deposited: " + amount);
    }
```

```
    public void withdraw(double amount) {
        if (balance >= amount) {
            balance -= amount;
            System.out.println("Withdrawn: " + amount);
        } else {
            System.out.println("Insufficient balance.");
        }
    }
    public double getBalance() {
        return balance;
    }
    public static void main(String[] args) {
        Scanner scanner = new Scanner(System.in);

        System.out.print("Enter initial balance: ");
        double initialBalance = scanner.nextDouble();
        BankAccount account = new BankAccount(initialBalance);

        System.out.print("Enter deposit amount: ");
        double depositAmount = scanner.nextDouble();
        account.deposit(depositAmount);

        System.out.print("Enter withdrawal amount: ");
        double withdrawalAmount = scanner.nextDouble();
        account.withdraw(withdrawalAmount);

        System.out.println("Current balance: " +
account.getBalance());

        scanner.close();
    }
}
```

OUTPUT:

```
m.akshaya@Akshaya-MacBook-Air MyProjects4 % javac BankAccount.java
m.akshaya@Akshaya-MacBook-Air MyProjects4 % java BankAccount
Enter initial balance: 100000
Enter deposit amount: 50,000
Deposited: 50000.0
Enter withdrawal amount: 90,000
Withdrawn: 90000.0
Current balance: 60000.0
```

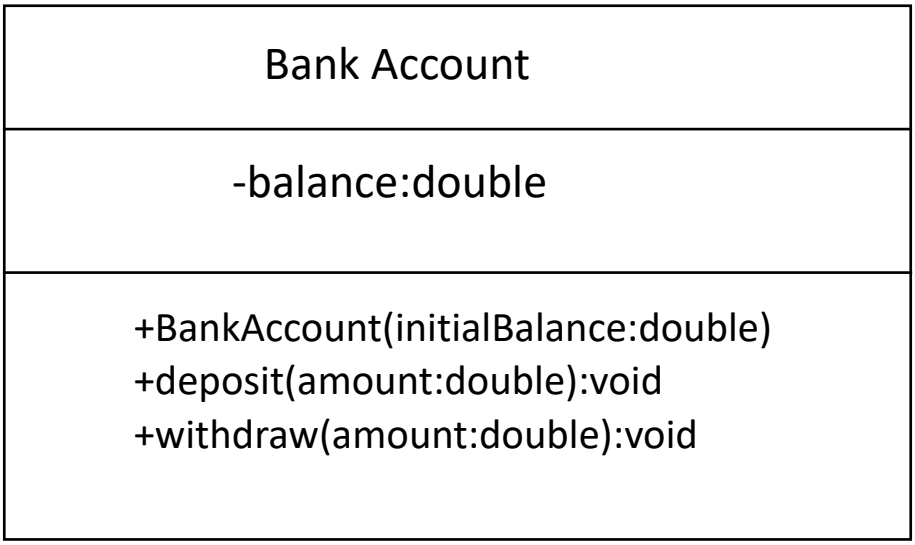
ERROR TABLE:

Code Error	Code rectification
1. Not putting the semi-colon; after calling the function. 2. After Withdrawal,deposit not giving the parenthesis ( ).	1. Put the semi-colon after the writing the code. 2. After every method, put the parenthesis ( ).

IMPORTANT POINTS:

1. The condition inside the if statement must be correct.
2. It explains that if the withdrawal money is less than the money in the bank account, then we can withdraw the amount.

CLASS DIAGRAM:



WEEK -4

PROGRAM – 1:

AIM: Write a java program with class named “book”, the class should contain various attributes such as title, author, year of publication it should also contain a constructor with parameters which initializes, title, author, and year of publication.
Create a method which displays the details of the book and display the details of two books.

CODE:

```
 public class Book{
  String title;
String author;
int year_of_publication;
 public Book (String title, String author, int year_of_publication)
{
 this.title = title;
 this.author = author;
 this.year_of_publication = year_of_publication;
}
public void displayDetails() {
System.out.println(this.title);
System.out.println(this.author);
System.out.println(this. year_of_publication);
System.out.println();
  }
}
public class Main {
 public static void main(String[]args) {
 Book book1 =new Book ( "the first frost"," Sang Yan", 1997);
Book book2 =new Book ("hidden love", " Sang xi" , 2007);
System.out.println("Book1 details: ");
```

```
book1.displayDetails();
System.out.println("Book2 details: ");
book2.displayDetails();
 }
}
```

OUTPUT:

```
m.akshaya@Akshaya-MacBook-Air ~ % javac Main.java
m.akshaya@Akshaya-MacBook-Air ~ % java Main
Book1 details:
Title: The First Frost
Author: Sang Yan
Year of Publication: 1997

Book2 details:
Title: Hidden Love
Author: Sang Xi
Year of Publication: 2007
```

ERROR TABLE:

Code Error	Code rectification
1. Not defining the function in a file. 2. Two public class files should not be saved in the same file.	1. To call the method we must define a function in a file. 2. Two public class files should be saved in different files.

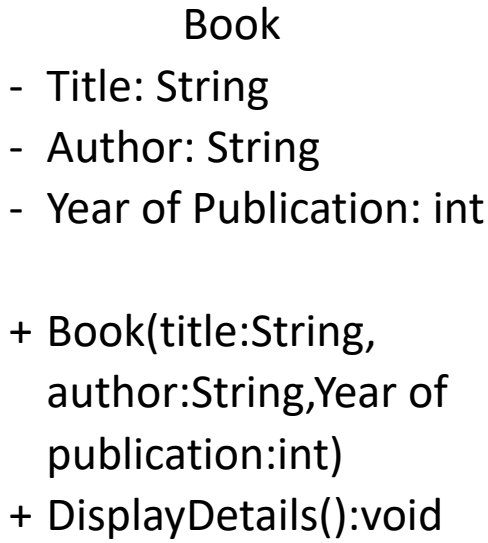
NEGATIVE CASE:

```
m.akshaya@Akshaya-MacBook-Air ~ % javac Book.java
Book.java:17: error: class Main is public, should be declared in a file named Ma
in.java
public class Main {
       ^
1 error
```

IMPORTANT POINTS:

1. While defining two classes for a code, we must be sure that we save both the classes in separate files.
2. While defining a method we should also define a function to call that method.

CLASS DIAGRAM:



PROGRAM – 2:

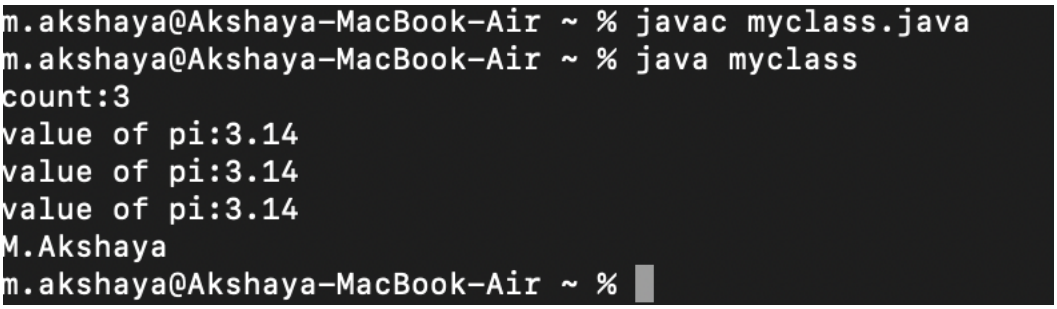
AIM: Create a java Program with class named myclass with static variable count of int type, initialized to zero and a constant variable “pi” of type double initialized to 3.14 as attributes of the class, ow define a constructor for “myclass” that increments the count variable each time an object of my class is created (count++), finally print the final values of count and pi variables create three objects.

CODE:

```
public class myclass {
  Static int count = 0;
```

```
   Final double pi=3.14;
public myclass () {
count++;
}
public static void main (String[]args) {
 My class obj1 =new myclass();
My class obj2 =new myclass();
My class obj3 =new myclass();

 System.out.println("count:" + count);
 System.out.println("value of pi:" + obj1.pi);
System.out.println("value of pi:" + obj2.pi);
System.out.println("value of pi:" + obj3.pi);
System.out.println("M.Akshaya");
  }
}
```

OUTPUT:



ERROR TABLE:

Code Error	Code rectification

1. Not Putting the semi-colon after calling a function, 2. Not giving the indentation properly.	1. Put the semi-colon after calling a function. 2. All the indentation must be correct to run the code correct.

NEGATIVE CASE:

```
11 errors
m.akshaya@Akshaya-MacBook-Air ~ % javac myclass.java
myclass.java:2: error: <identifier> expected
   Static int count = 0;
         ^
myclass.java:3: error: <identifier> expected
   Final double pi=3.14;
        ^
2 errors
```

IMPORTANT POINTS:

1. We must declare the initial value of the variable before declaring the final one.
2. Here the main objective is to increase the count according to the number of objects we make, i.e the count increases when the no.of objects are increasing.

CLASS DIAGRAM: