Experiment 7

Q) Program on polymorphism

```
class Shape
{
   Shape(double b, int h)
   {
      double areaoftri;
      areaoftri = (b * h) / 2;
      System.out.println("Area of triangle: " + areaoftri);
   }

   Shape(int r)
   {
      double areaofcir;
      areaofcir = 3.14 * r * r;
      System.out.println("Area of circle: " + areaofcir);
   }

   Shape(double s)
   {
      double areaofsqu;
      areaofsqu = s * s;
      System.out.println("Area of square: " + areaofsqu);
   }

   Shape(int l, int w)
   {
      double areaofrect;
      areaofrect = l * w;
      System.out.println("Area of rectangle: " + areaofrect);
   }

   public static void main(String args[])
   {
      Shape a = new Shape(6, 6);
      Shape b = new Shape(3);
      Shape c = new Shape(9);
      Shape d = new Shape(9, 3);
   }
}
```

Output:

```
C:\Program Files\Java\jdk-22\bin>javac Shape.java
C:\Program Files\Java\jdk-22\bin>java Shape

Area of triangle: 18.0
Area of circle: 28.26
Area of square: 81.0
Area of rectangle: 27.0
C:\Program Files\Java\jdk-22\bin>
```

Q) Write a Java program to create a base class Bank with method with interest_rate(). Create two subclasses SBI and ICICI. Override the interest_rate() method to find out interest rate.

```
class Bank {
   int interestRate() {
      return 2;
   }
}

class SBI extends Bank {
   int interestRate() {
      return 8;
   }
}

class Icici extends Bank {
   int interestRate() {
      return 7;
   }
}

class Test {
   public static void main(String[] args) {
      Bank b = new Bank();
      SBI s = new SBI();
      Icici i = new Icici();
      System.out.println("Bank rate of interest is " + b.interestRate());
      System.out.println("SBI rate of interest is " + s.interestRate());
      System.out.println("ICICI rate of interest is " + i.interestRate());
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac Test.java
C:\Program Files\Java\jdk-22\bin>java Test

Bank rate of interest is 2
SBI rate of interest is 8
ICICI rate of interest is 7

C:\Program Files\Java\jdk-22\bin>
```

Q) Write a program to create your own exception (user-defined exception) to accept age from the user and throw an exception if the age is negative.

```
import java.util.Scanner;

public class Demo1
{
        static void checkAge()
          {
               int age;
               Scanner s = new Scanner(System.in);
               System.out.print("Enter the number you want to check:");
               age = s.nextInt();
               if (age < 0)
                     {
                              throw new ArithmeticException("Age cannot be Negative");
                      }
               else
                     {
                             System.out.println("Welcome");
                     }
            }
           public static void main(String[] args)
                     {
                            checkAge();
                     }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac Demo1.java
C:\Program Files\Java\jdk-22\bin>java Demo1
Enter the number you want to check: 8
Welcome

C:\Program Files\Java\jdk-22\bin>javac Demo1.java
C:\Program Files\Java\jdk-22\bin>java Demo1
Enter the number you want to check: -9
Exception in thread "main" java.lang.ArithmeticException: Age cannot be Negative
   at Demo1.checkAge(Demo1.java:9)
   at Demo1.main(Demo1.java:15)

C:\Program Files\Java\jdk-22\bin>
```

Q) Write a program to create your own exception (user-defined exception) to accept a number from the user and throw an exception if the number is not even.

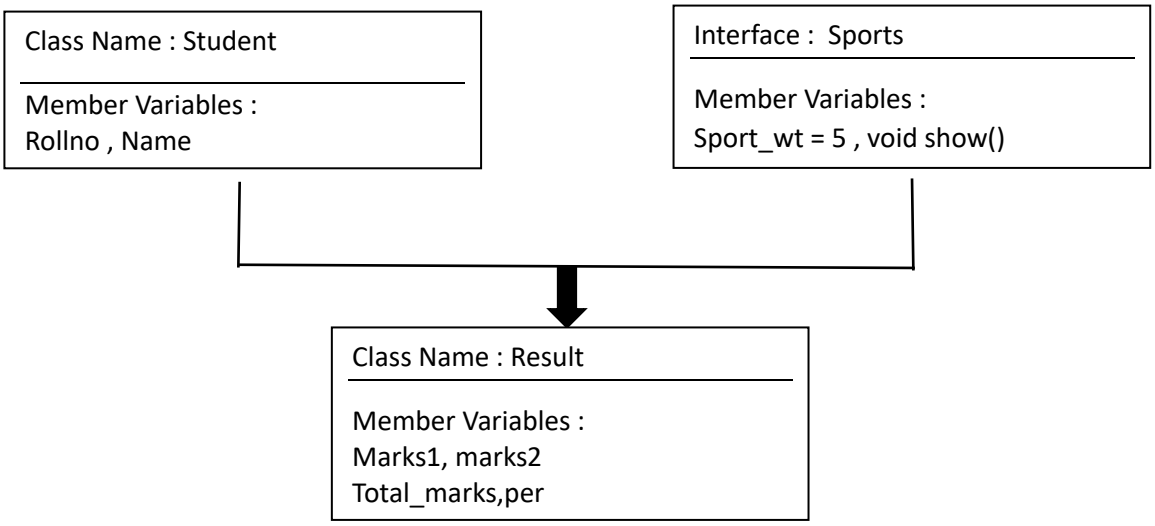
```
import java.util.Scanner;

public class Main
{
	static void checkEvenNumber()
		{
			int n;
			Scanner s = new Scanner(System.in);
			System.out.print("Enter the number you want to check: ");
			n = s.nextInt();
			if (n % 2 == 0)
			{
				throw new ArithmeticException("Even number");
			}
			else
			{
				System.out.println("Odd number");
			 }
		}

	public static void main(String[] args)
	{
		checkEvenNumber();
	 }
}
```

Output :

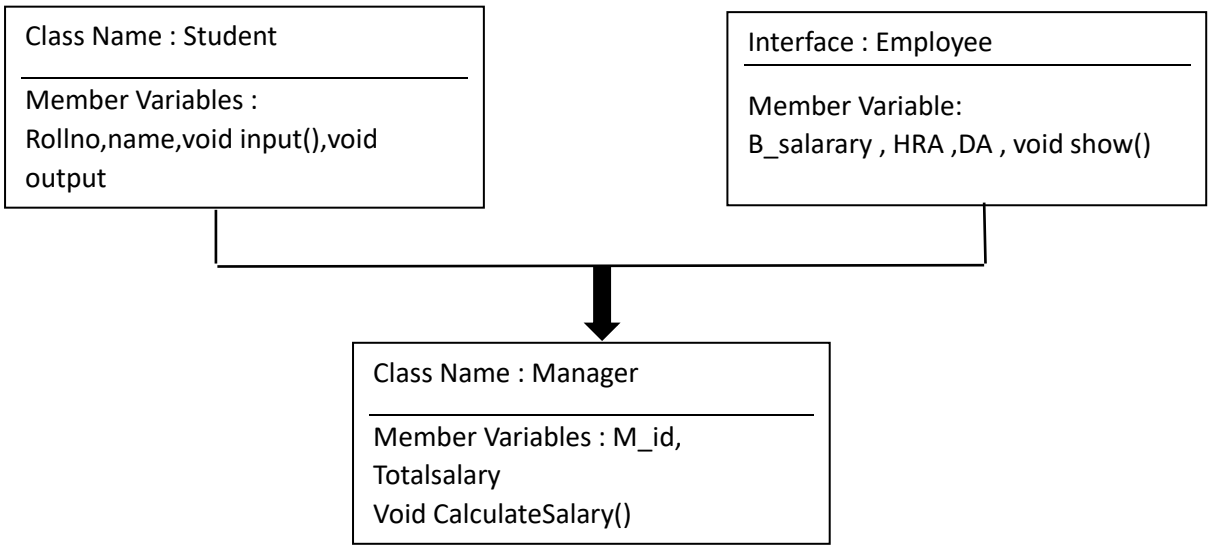
```
C:\Program Files\Java\jdk-22\bin>javac Main.java
C:\Program Files\Java\jdk-22\bin>java Main
Enter the number you want to check: 11
Odd number

C:\Program Files\Java\jdk-22\bin>javac Main.java
C:\Program Files\Java\jdk-22\bin>java Main
Enter the number you want to check: 8
Exception in thread "main" java.lang.ArithmeticException: Even number
   at Main.checkEvenNumber(Main.java:9)
   at Main.main(Main.java:15)

C:\Program Files\Java\jdk-22\bin>
```

Experiment 8

1) Write a program to implement following Inheritance : Assume suitable methods.



2) Write a program to implement following Inheritance : Assume suitable methods.



1) Write a program to implement following inheritance .

```
import java.util.*;
class Student {
   int rollno;
   String name;
   Student(int a, String b) {
      rollno = a;
      name = b;
   }
}
interface Sports {
   final int sport_wt = 3;
   void show();
}
class Result extends Student implements Sports {
   int mark1, mark2;
   double per;
   Result(int a, String b, int c, int d) {
      super(a, b);
      mark1 = c;
      mark2 = d;
   }

   void Calpercentage() {
      per = (mark1 + mark2) * 100 / 200;
   }

   public void show() {
      System.out.println("Name: " + name);
      System.out.println("Roll No: " + rollno);
      System.out.println("Percentage: " + per);
      System.out.println("Sports Weight: " + sport_wt);
   }
}
class Main {
   public static void main(String[] args) {
      // TODO: Auto-generated method stub
      Result ob = new Result(19, "Jay", 92, 96);
      ob.Calpercentage();
      ob.show();
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac Main.java
C:\Program Files\Java\jdk-22\bin>java Main
Name: Jay
Roll No: 15
Percentage: 92.0
Sports Weight: 3

C:\Program Files\Java\jdk-22\bin>
```

2) Write a program to implement following inheritance .

```
import java.util.Scanner;

class Student {
   protected int rollNo;
   protected String name;

   void input() {
      Scanner sc = new Scanner(System.in);
      System.out.print("Enter the Name: ");
      name = sc.next();
      System.out.print("Enter the Roll no.: ");
      rollNo = sc.nextInt();
   }

   void output() {
      System.out.println("\nName: " + name);
      System.out.println("\nRoll No: " + rollNo);
   }
}

interface Employee {
   double B_SALARY = 45000; // Base salary
   double HRA = 10000; // House Rent Allowance
   double DA = 4200; // Dearness Allowance

   void show();
}

class Manager extends Student implements Employee {
   int M_id = 8989;
   double totalSalary;

   void calculateSalary() {
      totalSalary = B_SALARY + HRA + DA;
   }

   public void show() {
      System.out.println("\nManager ID: " + M_id);
      System.out.println("\nTotal Salary: " + totalSalary);
   }
}

class Main {
   public static void main(String[] args) {
      Manager m = new Manager();
      m.input();
      m.output();
      m.calculateSalary();
      m.show();
   }
```

}

Output :

```
C:\Program Files\Java\jdk-22\bin>javac Main.java
C:\Program Files\Java\jdk-22\bin>java Main
Enter the Name: Sujay
Enter the Roll no.: 8

Name: Sujay

Roll No: 8

Manager ID: 5284

Total Salary: 59200.0

C:\Program Files\Java\jdk-22\bin>
```

Experiment 9

1) Write a program to create own exception to accept no from user and throw an exception if the number is not even.

```
import java.util.*;

class NotEvenException extends Exception
{
   NotEvenException()
   {
      System.out.println("Number is not Even");
   }
}

class CheckEvenNumber
{
   public static void main(String[] args)
   {
      int number;
      Scanner sc = new Scanner(System.in);

      try
      {
         System.out.println("Enter any Number:");
         number = sc.nextInt();

         if (number % 2 != 0)
         {
            throw new NotEvenException();
         }
         else
         {
            System.out.println("Number is Even");
         }
      }
      catch (Exception e)
      {
         System.out.println(e);
      }
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac CheckEvenNumber.java
C:\Program Files\Java\jdk-22\bin>java CheckEvenNumber
Enter any Number:
9
Number is not Even
C:\Program Files\Java\jdk-22\bin>
```

2) Write a program to create own exception to accept no from user and throw an exception if the number is not even.

```
import java.util.*;
class NotPrimeException extends Exception
{
   NotPrimeException()
   {
      System.out.println("Number is not Prime");
   }
}

class CheckPrimeNumber
{
   public static void main(String[] args)
   {
      int number;
      Scanner sc = new Scanner(System.in);
      try
      {
         System.out.println("Enter any Number:");
         number = sc.nextInt();
         if (number <= 1 || !isPrime(number))
         {
            throw new NotPrimeException();
         }
         else
         {
            System.out.println("Number is Prime");
         }
      }
      catch (Exception e)
      {
         System.out.println(e);
      }
   }
   public static boolean isPrime(int num)
   {
      for (int i = 2; i <= num / 2; i++)  // Checking up to num/2
      {
         if (num % i == 0)
            return false;
      }
      return true;
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac CheckPrimeNumber.java
C:\Program Files\Java\jdk-22\bin>java CheckPrimeNumber
Enter any Number:
12
Number is not Prime
C:\Program Files\Java\jdk-22\bin>
```

3) Write a program to create own exception to accept age from user and throw an exception if the age is negative.

```
import java.util.*;

class NegativeAgeException extends Exception
{
   NegativeAgeException()
   {
      System.out.println("Age cannot be negative");
   }
}

class CheckAge
{
   public static void main(String[] args)
   {
      int age;
      Scanner sc = new Scanner(System.in);

      try
      {
         System.out.println("Enter your age:");
         age = sc.nextInt();

         if (age < 0)
         {
            throw new NegativeAgeException();
         }
         else
         {
            System.out.println("Your age is: " + age);
         }
      }
      catch (Exception e)
      {
         System.out.println(e);
      }
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac CheckAge.java
C:\Program Files\Java\jdk-22\bin>java CheckAge
Enter your age:
-7
Age cannot be negative

C:\Program Files\Java\jdk-22\bin>
```

4) Write a program to create own exception to accept string from user and throw an exception if the string is not starting with character ‘s’.

```
import java.util.*;

class StringDoesNotStartWithSException extends Exception
{
   StringDoesNotStartWithSException()
   {
      System.out.println("String does not start with 'S' or 's'");
   }
}

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

      try
      {
         System.out.println("Enter a string:");
         inputString = sc.nextLine();

         if (inputString.isEmpty() || inputString.startsWith("S") || inputString.startsWith("s"))
         {
            System.out.println("String starts with 'S' or 's'");
         }
         else
         {
            throw new StringDoesNotStartWithSException();
         }
      }
      catch (Exception e)
      {
         System.out.println(e);
      }
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac CheckString.java
C:\Program Files\Java\jdk-22\bin>java CheckString

Enter a string:
nutan
String does not start with 'S' or 's'

C:\Program Files\Java\jdk-22\bin>
```

5) Write a program to create own exception to accept password from user and throw an "Authentication Failure" exception if the password is incorrect.

```
import java.util.*;

class AuthenticationFailureException extends Exception
{
   AuthenticationFailureException()
   {
      System.out.println("Authentication Failure: Incorrect Password!");
   }
}

class CheckPassword
{
   public static void main(String[] args)
   {
      int correctPassword =254784;  // Predefined correct password
      int inputPassword;
      Scanner sc = new Scanner(System.in);

      try
      {
         System.out.println("Enter Password:");
         inputPassword = sc.nextInt();

         if (inputPassword == correctPassword)
         {
            System.out.println("Authentication Successful");
         }
         else
         {
            throw new AuthenticationFailureException();
         }
      }
      catch (Exception e)
      {
         System.out.println(e);
      }
   }
}
```

Output :

```
C:\Program Files\Java\jdk-22\bin>javac CheckPassword.java
C:\Program Files\Java\jdk-22\bin>java CheckPassword

Enter Password:
154958
Authentication Failure: Incorrect Password!

C:\Program Files\Java\jdk-22\bin>
```

Experiment 10

Write a java program that calculate area of circle using creating and accessing paclage.

a) Creation of a simple package

```
package create;
public class circle
{
        public int radius=6;
        public double calarea()
                {
                        Return 3.14* radius * radius;
                }
}
```

b) Accessing a package

```
package access;
import create.*;
public class Area
{
        public static void main(String [] args)
        {
                Circle  c  = new circle();
                Double area = c.calarea();
                System.out.println("Area of circle is :" +area);
        }
}
```

Output :

Area of circle is : 113.04