

Program 17 :

Aim: Create a Graphics package that has classes and interfaces for figures Rectangle, Triangle, Square and Circle. Test the package by finding the area of these figures.

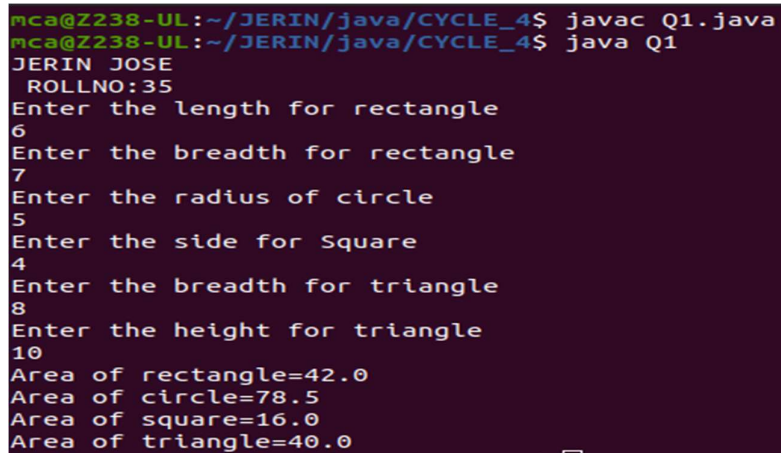
Source code:

```
import package_graphics.*;
import java.util.Scanner;
public class Q1
{
    public static void main(String []args)
    {
        package_graphics testObj = new package_graphics();
        int l,h,r,a,c,d;
        Scanner s=new Scanner(System.in);
        System.out.println("JERIN JOSE\n ROLLNO:35");
        System.out.println("Enter the length for rectangle");
        l=s.nextInt();
        System.out.println("Enter the breadth for rectangle");
        h=s.nextInt();
        System.out.println("Enter the radius of circle");
        r=s.nextInt();
        System.out.println("Enter the side for Square");
        a=s.nextInt();
        System.out.println("Enter the breadth for triangle");
        c=s.nextInt();
        System.out.println("Enter the height for triangle");
        d=s.nextInt();
        System.out.println("Area of rectangle="+testObj.recArea(l,h));
        System.out.println("Area of circle="+testObj.cirArea(r));
        System.out.println("Area of square="+testObj.squArea(a));
        System.out.println("Area of triangle="+testObj.triArea(c,d));
    }
}
```

package_graphics.java

```
package package_graphics;
interface interface_graphics
{
    public float recArea(int l, int h);
    public float cirArea(int r);
    public float squArea(int a);
    public float triArea(int l, int h);
}
public class package_graphics implements interface_graphics
{
}
```

```
public float recArea(int l, int h)
{
    return l*h;
}
public float cirArea(int r)
{
    return r*r*(float)3.14;
}
public float squArea(int a)
{
    return a*a;
}
public float triArea(int l, int h)
{
    return l*h*(float)(.5);
}
}
```

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q1.java
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q1
JERIN JOSE
ROLLNO:35
Enter the length for rectangle
6
Enter the breadth for rectangle
7
Enter the radius of circle
5
Enter the side for Square
4
Enter the breadth for triangle
8
Enter the height for triangle
10
Area of rectangle=42.0
Area of circle=78.5
Area of square=16.0
Area of triangle=40.0
```

Program 18 :

Aim: Create an Arithmetic package that has classes and interfaces for the 4 basic arithmetic operations. Test the package by implementing all operations on two given numbers

Source code:

```
import arithmetic.ArithmeticOperations;
import java.util.Scanner;
public class ArithmeticMain {
    public static void main(String[] args) {

        ArithmeticOperations operations = new ArithmeticOperations();
        Scanner scanner = new Scanner(System.in);
        System.out.print("JERIN JOSE\n ROLLNO:35\n");
        System.out.print("Enter the first number: ");
        double num1 = scanner.nextDouble();
        System.out.print("Enter the second number: ");
        double num2 = scanner.nextDouble();
        System.out.println("Addition: " + operations.add(num1, num2));
        System.out.println("Subtraction: " + operations.subtract(num1, num2));
        System.out.println("Multiplication: " + operations.multiply(num1, num2));
        System.out.println("Division: " + operations.divide(num1, num2));
    }
}
```

ArithmeticOperations.java

```
package arithmetic;
public class ArithmeticOperations implements Addition, Subtraction, Multiplication,
Division {

    public double add(double num1, double num2) {
        return num1 + num2;
    }

    public double subtract(double num1, double num2) {
        return num1 - num2;
    }

    public double multiply(double num1, double num2) {
        return num1 * num2;
    }

    public double divide(double num1, double num2) {
        if (num2 == 0) {
            throw new ArithmeticException("Division by zero error!");
        }
    }
}
```

```
return num1 / num2;  
}  
}
```

Addition.java

```
package arithmetic;  
public interface Addition {  
    public double add(double num1, double num2);  
}
```

Division.java

```
package arithmetic;  
public interface Division {  
    public double divide(double num1, double num2);  
}
```

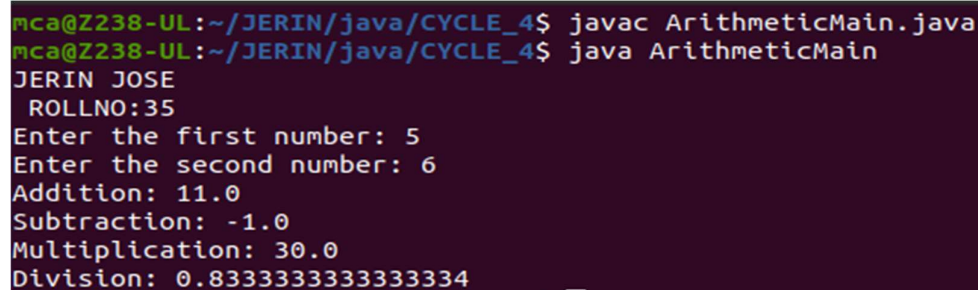
Multiplication.java

```
package arithmetic;  
public interface Multiplication {  
    public double multiply(double num1, double num2);  
}
```

Subtraction.java

```
package arithmetic;  
public interface Subtraction {  
    public double subtract(double num1, double num2);  
}
```

Output:



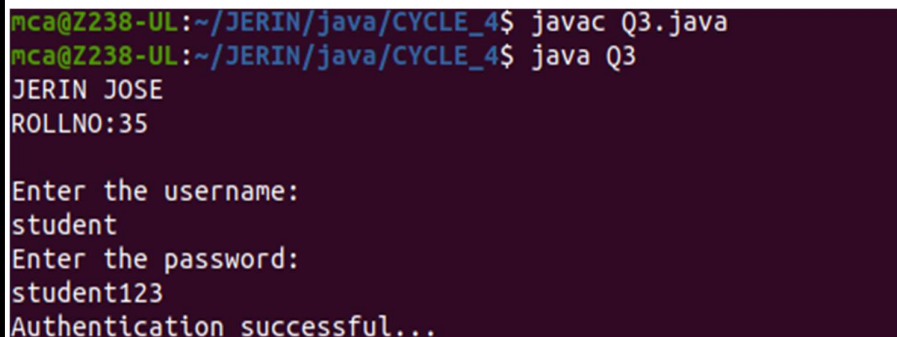
```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac ArithmeticMain.java  
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java ArithmeticMain  
JERIN JOSE  
ROLLNO:35  
Enter the first number: 5  
Enter the second number: 6  
Addition: 11.0  
Subtraction: -1.0  
Multiplication: 30.0  
Division: 0.8333333333333334
```

Program 19 :

Aim: Write a user defined exception class to authenticate the user name and password.

Source code:

```
import java.util.Scanner;
class authException extends Exception
{
    public authException(String s) {
        super(s);
    }
}
public class Q3 {
    public static void main(String[] args) {
        System.out.println("JERIN JOSE");
        System.out.println("ROLLNO:35");
        System.out.println();
        String username = "student";
        String passcode = "student123";
        String user_name,password;
        Scanner sc = new Scanner(System.in);
        try{
            System.out.println("Enter the username:");
            user_name = sc.nextLine();
            System.out.println("Enter the password:");
            password = sc.nextLine();
            if(username.equals(user_name) && passcode.equals(password)){
                System.out.println("Authentication successful...");
            }else
                throw new authException("Invalid user credentials");
        }catch(authException e){
            System.out.println("Exception caught "+e);
        }
    }
}
```

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q3.java
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q3
JERIN JOSE
ROLLNO:35

Enter the username:
student
Enter the password:
student123
Authentication successful...
```

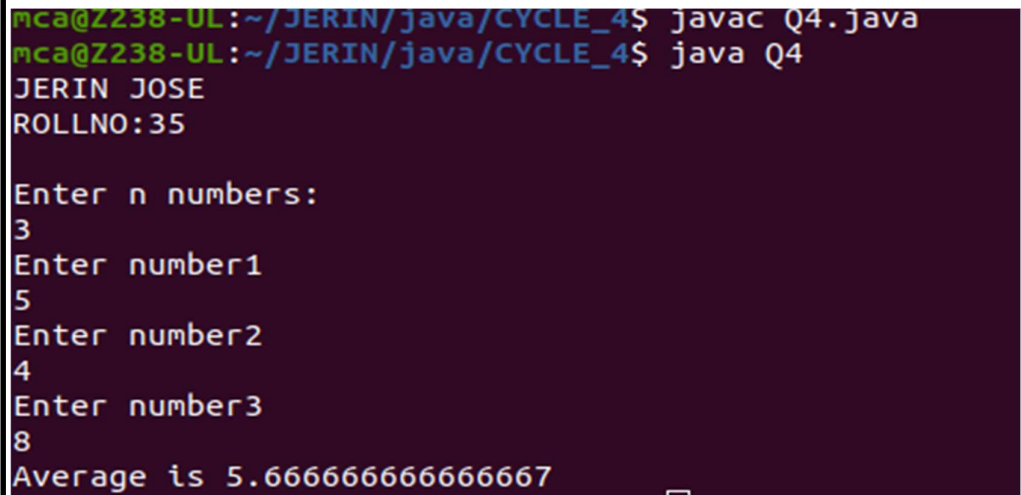
Program 20 :

Aim: Find the average of N positive integers, raising a user defined exception for each negative input.

Source code:

```
import java.util.Scanner;
class NegException extends Exception
{
    public NegException(String s)
    {
        super(s);
    }
}
public class Q4 {
    public static void main(String[] args)
    {
        System.out.println("JERIN JOSE");
        System.out.println("ROLLNO:35");
        System.out.println();
        int i;
        double sum=0,avg=0;
        Scanner sc=new Scanner(System.in);
        System.out.println("Enter n numbers:");
        int n=sc.nextInt();
        for(i=1;i<=n;i++)
        {
            try
            {
                System.out.println("Enter number"+i);
                int a=sc.nextInt();
                if(a<0)
                {
                    i--;
                    throw new NegException("Negative numbers not allowed, Try again");
                }
            }
            else
            {
                sum=sum+a;
            }
        }
        catch(NegException e)
        {
            System.out.println("NEGATIVE EXCEPTION OCCURED:"+e);
        }
    }
    avg=sum/n;
    System.out.println("Average is "+avg);
}
```

```
sc.close();  
}  
}
```

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q4.java  
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q4  
JERIN JOSE  
ROLLNO:35  
  
Enter n numbers:  
3  
Enter number1  
5  
Enter number2  
4  
Enter number3  
8  
Average is 5.666666666666667
```

Program 21 :

Aim: Program to remove all the elements from a linked list

Source code:

```
import java.util.*;
public class Q11 {
    public static void main(String[] args){
        System.out.println("JERIN JOSE");
        System.out.println("ROLL NO:35");
        System.out.println();
        LinkedList<String> L=new LinkedList<>();
        L.add("Gold");
        L.add("Silver");
        L.add("Bronze");
        L.add(0,"Olympics Medals");
        System.out.println(L);
        L.remove("Bronze");
        System.out.println(L);
        L.remove(2);
        System.out.println(L);
        L.removeLast();
        System.out.println(L);
        L.removeFirst();
        System.out.println(L);

    }
}
```

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q11.java
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q11
JERIN JOSE
ROLL NO:35

[Olympics Medals, Gold, Silver, Bronze]
[Olympics Medals, Gold, Silver]
[Olympics Medals, Gold]
[Olympics Medals]
[]
```


Program 22 :

Aim : Program to remove an object from the Stack when the position is passed as parameter

Source code:

```
import java.util.Stack;
public class Q12
{
    public static void removeElementAtPosition(Stack<String> stack, int position)
    {
        if (position >= 1 && position <= stack.size())
        {
            Stack<String> tempStack = new Stack<>();
            // Remove elements from the original stack until the desired position is reached
            for (int i = 1; i < position; i++)
            {
                tempStack.push(stack.pop());
            }
            // Remove the element at the desired position
            stack.pop();
            // Restore the remaining elements back to the original stack
            while (!tempStack.isEmpty())
            {
                stack.push(tempStack.pop());
            }
            System.out.println("Element at position " + position + " removed successfully.");
        } else
        {
            System.out.println("Invalid position. Please provide a valid position within the stack range.");
        }
    }
    public static void main(String[] args)
    {
        System.out.println("JERIN JOSE\n ROLL NO:35");
        System.out.println();
        Stack<String> stack = new Stack<>();
        stack.push("Element 1");
        stack.push("Element 2");
        stack.push("Element 3");
        stack.push("Element 4");
        stack.push("Element 5");
        int positionToRemove = 3;
        System.out.println("Before removal: " + stack);
        removeElementAtPosition(stack, positionToRemove);
        System.out.println("After removal: " + stack);
    }
}
```

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q12.java
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q12
JERIN JOSE
ROLL NO:35

Before removal: [Element 1, Element 2, Element 3, Element 4, Element 5]
Element at position 3 removed successfully.
After removal: [Element 1, Element 2, Element 4, Element 5]
```

Program 23 :

Aim : Write a Java program to compare two hash set

Source code:

```
import java.util.HashSet;
import java.util.Scanner;
import java.util.Set;
public class Q16
{
    public static void main(String[] args)
    {
        System.out.println("JERIN JOSE\n ROLLNO:35 \n 15-04-2024");
        System.out.println();
        Set<Integer> set1 = new HashSet<>();
        Set<Integer> set2 = new HashSet<>();
        Scanner scanner = new Scanner(System.in);
        // Input for Set 1
        System.out.print("Enter the number of elements in Set 1: ");
        int numElements1 = scanner.nextInt();
        System.out.println("Enter the elements for Set 1:");
        for (int i = 0; i < numElements1; i++)
        {
            int element = scanner.nextInt();
            set1.add(element);
        }
        // Input for Set 2
        System.out.print("Enter the number of elements in Set 2: ");
        int numElements2 = scanner.nextInt();
        System.out.println("Enter the elements for Set 2:");
        for (int i = 0; i < numElements2; i++)
        {
            int element = scanner.nextInt();
            set2.add(element);
        }
        // Comparison
        boolean isEqual = set1.equals(set2);
        // Output
        System.out.println("Set 1: " + set1);
        System.out.println("Set 2: " + set2);
        if (isEqual)
        {
            System.out.println("Set 1 and Set 2 are equal.");
        } else
        {
            System.out.println("Set 1 and Set 2 are not equal.");
        }
    }
}
```

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

Output:

```
mca@Z238-UL:~/JERIN/java/CYCLE_4$ javac Q16.java  
mca@Z238-UL:~/JERIN/java/CYCLE_4$ java Q16  
JERIN JOSE  
ROLLNO:35  
15-04-2024  
  
Enter the number of elements in Set 1: 5  
Enter the elements for Set 1:  
5  
6  
4  
2  
2  
Enter the number of elements in Set 2: 6  
Enter the elements for Set 2:  
7  
5  
8  
5  
9  
5  
Set 1: [2, 4, 5, 6]  
Set 2: [5, 7, 8, 9]  
Set 1 and Set 2 are not equal.
```