

**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.

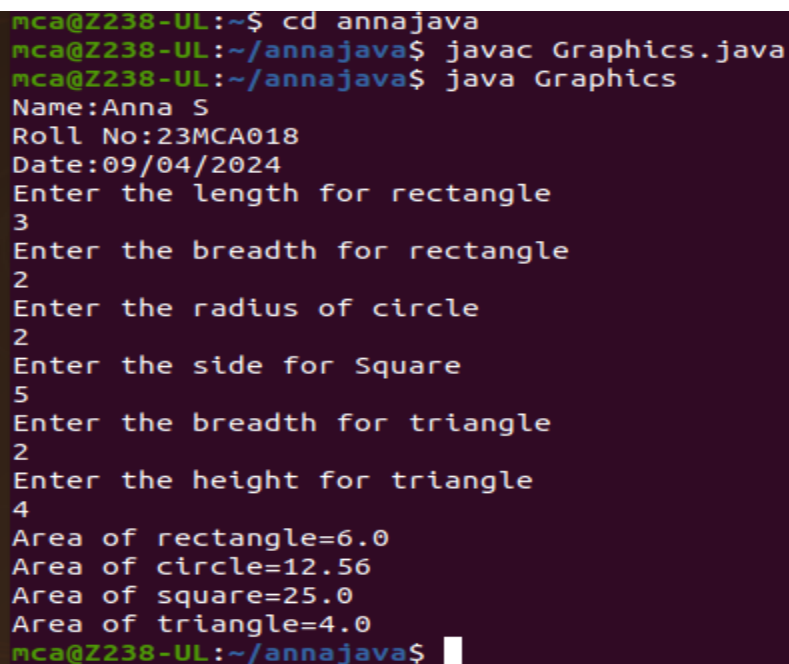
**Source code:**

```
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("Name: Anna S");
        System.out.println("Roll No: 18");
        System.out.println("Date: 09/04/2024");
        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:~$ cd annajava
mca@Z238-UL:~/annajava$ javac Graphics.java
mca@Z238-UL:~/annajava$ java Graphics
Name:Anna S
Roll No:23MCA018
Date:09/04/2024
Enter the length for rectangle
3
Enter the breadth for rectangle
2
Enter the radius of circle
2
Enter the side for Square
5
Enter the breadth for triangle
2
Enter the height for triangle
4
Area of rectangle=6.0
Area of circle=12.56
Area of square=25.0
Area of triangle=4.0
mca@Z238-UL:~/annajava$
```

## 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:

#### ArithmeticMain.java

```
import arithmetic.ArithmeticOperations;
import java.util.Scanner;
public class ArithmeticMain {
    public static void main(String[] args) {
        System.out.println("Name:Anna S");
        System.out.println("Roll No:23mca018");
        System.out.println("Date:11/04/2024");
        ArithmeticOperations operations = new ArithmeticOperations();
        Scanner scanner = new Scanner(System.in);
        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));
    }
}
```

#### Addition.java

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

#### Subtraction.java

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

#### Multiplication.java

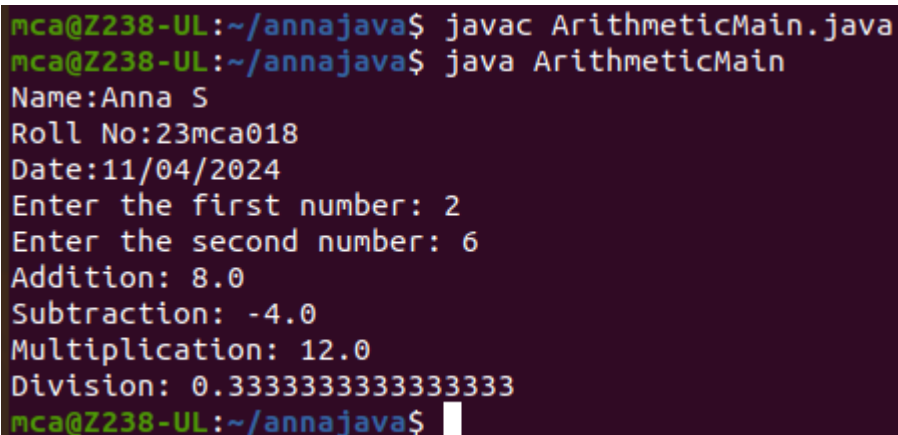
```
package arithmetic;
public interface Multiplication {
    public double multiply(double num1, double num2);
}
```

**Division.java**

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

**ArithmeticOperations.java**

```
package arithmetic;
public class ArithmeticOperations implements Addition, Subtraction, Multiplication, Division {
    @Override
    public double add(double num1, double num2) {
        return num1 + num2;
    }
    @Override
    public double subtract(double num1, double num2) {
        return num1 - num2;
    }
    @Override
    public double multiply(double num1, double num2) {
        return num1 * num2;
    }
    @Override
    public double divide(double num1, double num2) {
        if (num2 == 0) {
            throw new ArithmeticException("Division by zero error!");
        }
        return num1 / num2;
    }
}
```

**Output:**

```
mca@Z238-UL:~/annajava$ javac ArithmeticMain.java
mca@Z238-UL:~/annajava$ java ArithmeticMain
Name:Anna S
Roll No:23mca018
Date:11/04/2024
Enter the first number: 2
Enter the second number: 6
Addition: 8.0
Subtraction: -4.0
Multiplication: 12.0
Division: 0.3333333333333333
mca@Z238-UL:~/annajava$
```

**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("Name:Anna S");
        System.out.println("Roll No:23mca018");
        System.out.println("Date:15/04/2024");
        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:~$ cd annajava
mca@Z238-UL:~/annajava$ javac Q3.java
mca@Z238-UL:~/annajava$ java Q3
Name:Anna S
Roll No:23mca018
Date:15/04/2024
Enter the username:
anna
Enter the password:
anna123
Exception caught authException: Invalid user credentials
mca@Z238-UL:~/annajava$
```

**Program:20**

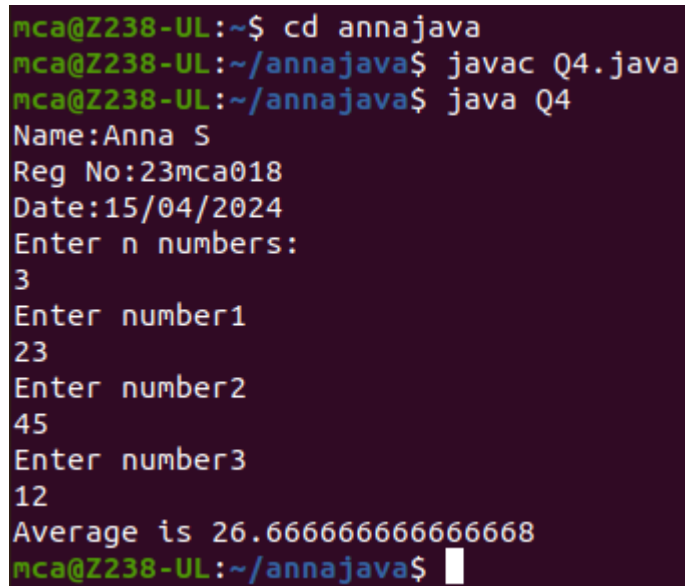
**Aim:** Find the average of N positive integers, raising a user defined exception for each negative input.

**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("Name:Anna S");
        System.out.println("Reg No:23mca018");
        System.out.println("Date:15/04/202");

        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:~$ cd annajava
mca@Z238-UL:~/annajava$ javac Q4.java
mca@Z238-UL:~/annajava$ java Q4
Name:Anna S
Reg No:23mca018
Date:15/04/2024
Enter n numbers:
3
Enter number1
23
Enter number2
45
Enter number3
12
Average is 26.666666666666668
mca@Z238-UL:~/annajava$
```



## 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("Name:Anna S");
        System.out.println("Roll No:23mca018");
        System.out.println("Date:15/04/2024");
        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:~/annajava$ javac Q11.java
mca@Z238-UL:~/annajava$ java Q11
Name:Anna S
Roll No:23mca018
Date:15/04/2024
[Olympics Medals, Gold, Silver, Bronze]
[Olympics Medals, Gold, Silver]
[Olympics Medals, Gold]
[Olympics Medals]
[]
mca@Z238-UL:~/annajava$
```

**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<>();
            for (int i = 1; i < position; i++) {
                tempStack.push(stack.pop());
            }
            stack.pop();
            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 stackrange.");
        }
    }
    public static void main(String[] args) {
        System.out.println("Name:Anna S");
        System.out.println("Roll No:23mca018");
        System.out.println("Date:15/04/2024");
        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:~/annajava$ javac Q12.java
mca@Z238-UL:~/annajava$ java Q12
Name:Anna S
Roll No:23mca018
Date:15/04/2024
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]
mca@Z238-UL:~/annajava$
```

**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("Name: Anna S");
        System.out.println("Roll No:23mca018");
        System.out.println("Date:15/04/2024");
        Set<Integer> set1 = new HashSet<>();
        Set<Integer> set2 = new HashSet<>();
        Scanner scanner = new Scanner(System.in);
        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);
        }
        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);
        }
        boolean isEqual = set1.equals(set2);
        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:~/annajava$ javac Q16.java
mca@Z238-UL:~/annajava$ java Q16
Name: Anna S
Roll No:23mca018
Date:15/04/2024
Enter the number of elements in Set 1: 3
Enter the elements for Set 1:
10
20
30
Enter the number of elements in Set 2: 3
Enter the elements for Set 2:
40
50
60
Set 1: [20, 10, 30]
Set 2: [50, 40, 60]
Set 1 and Set 2 are not equal.
mca@Z238-UL:~/annajava$
```