

**17. 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.**

**Package**

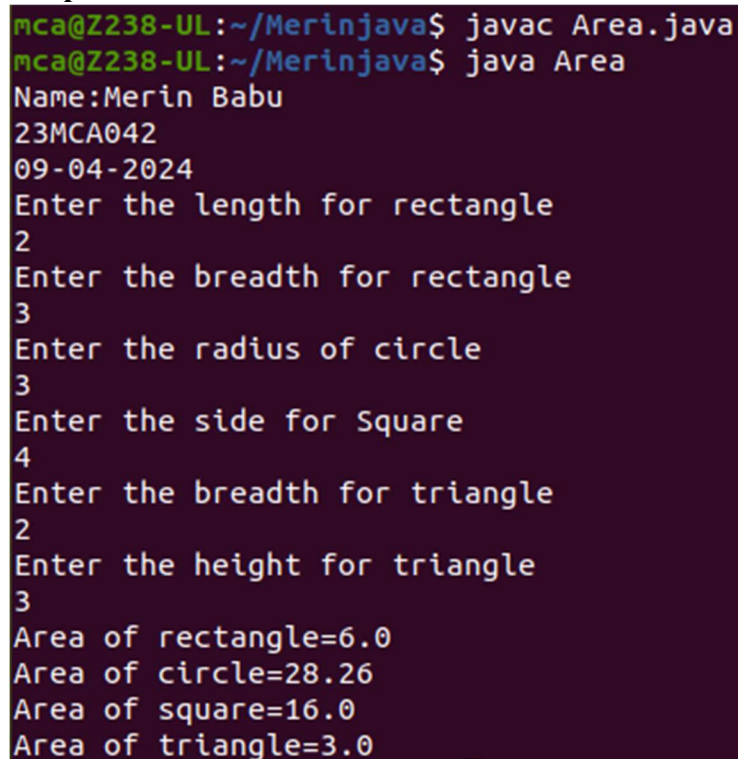
```
package package_graphics;
interface interface_graphics
{
    public float recArea(int l, int h);
    public float cirArea(int r);
    public float squArea(int a);
    public float triArea(int l, int h);
}
public class package_graphics implements interface_graphics
{
    public float recArea(int l,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

**Area**

```
import package_graphics.*;
import java.util.Scanner;
public class Area
{

    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:Merin Babu\n23MCA042\n09-04-2024"");
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));
}
}
```

**Output:**

```
mca@Z238-UL:~/Merinjava$ javac Area.java
mca@Z238-UL:~/Merinjava$ java Area
Name:Merin Babu
23MCA042
09-04-2024
Enter the length for rectangle
2
Enter the breadth for rectangle
3
Enter the radius of circle
3
Enter the side for Square
4
Enter the breadth for triangle
2
Enter the height for triangle
3
Area of rectangle=6.0
Area of circle=28.26
Area of square=16.0
Area of triangle=3.0
```

**18. 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.**

### Arithmetic

```
import arithmetic.ArithmeticOperations;
import java.util.Scanner;
public class ArithmeticMain {
public static void main(String[] args) {
System.out.println("Name:Merin Babu\n23MCA042\n09-04-2024");

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));
}
}
```

### Arithmetic Operations

```
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**

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

**Division**

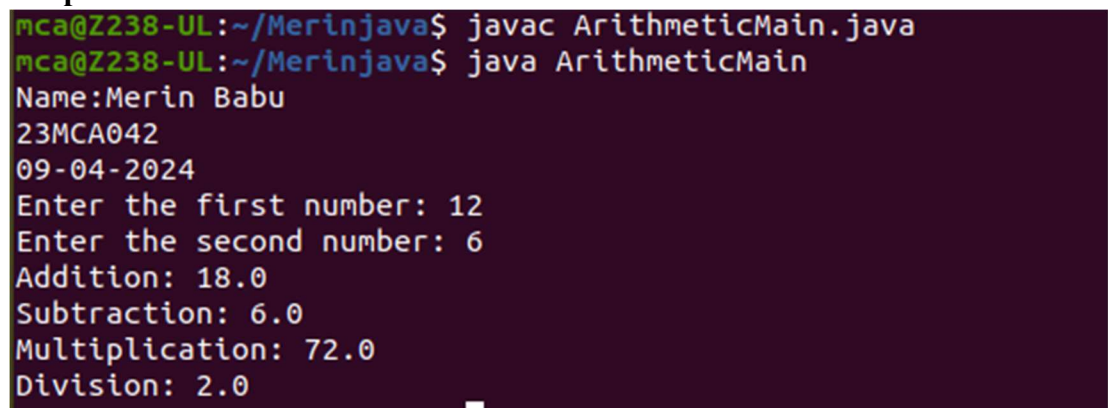
```
package arithmetic;  
public interface Division {  
    public double divide(double num1, double num2);  
}
```

**Multiplication**

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

**Subtraction**

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

**Output:**

```
mca@Z238-UL:~/Merinjava$ javac ArithmeticMain.java  
mca@Z238-UL:~/Merinjava$ java ArithmeticMain  
Name:Merin Babu  
23MCA042  
09-04-2024  
Enter the first number: 12  
Enter the second number: 6  
Addition: 18.0  
Subtraction: 6.0  
Multiplication: 72.0  
Division: 2.0
```

**19. Write a user defined exception class to authenticate the user name and password.****Program:**

```
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:Merin Babu\n23MCA042\n09-04-2024");
        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:~/Merinjava$ javac Authentication.java
mca@Z238-UL:~/Merinjava$ java Authentication
Name:Merin Babu
23MCA042
09-04-2024

Enter the username:
merinbabu042
Enter the password:
12345678
Exception caught authException: Invalid user credentials
```

**20.Find the average of N positive integers, raising a user defined exception for each negative Input.**

**Program:**

```
import java.util.Scanner;
class NegException extends Exception
{
public NegException(String s)
{
super(s);
}
}
public class Npos {
public static void main(String[] args)
{
System.out.println("Merin Babu\n23MCA042 \n16-04-24\n");
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:**

```
merin@Z238-UL:~/Merinjava$ javac Npos.java  
merin@Z238-UL:~/Merinjava$ java Npos  
Merin Babu  
23MCA042  
16-04-24  
  
Enter n numbers:  
3  
Enter number1  
12  
Enter number2  
34  
Enter number3  
55  
Average is 33.666666666666664
```



**21.Program to remove all the elements from a linked list.****Program:**

```
import java.util.*;
public class Remove{
public static void main(String[] args){
System.out.println("Merin Babu\n23MCA042 \n16-04-24\n");
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);
}
}
```

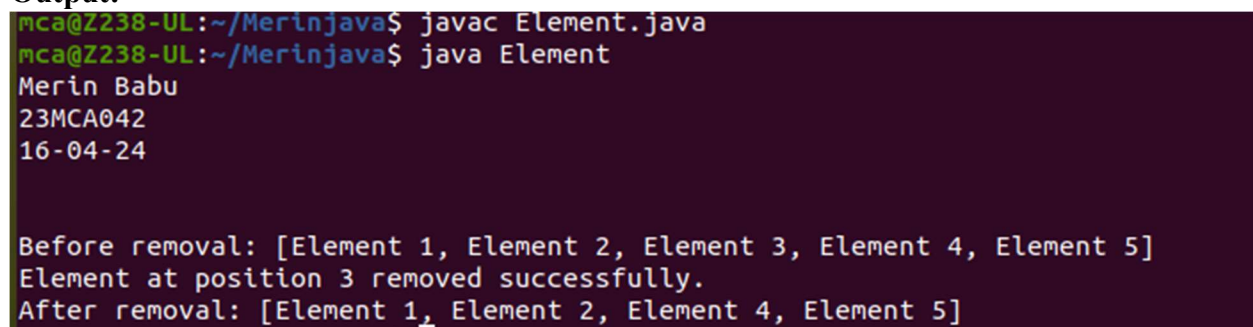
**Output:**

```
mca@Z238-UL:~/Merinjava$ javac Remove.java
mca@Z238-UL:~/Merinjava$ java Remove
Merin Babu
23MCA042
16-04-24

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

**22.Program to remove an object from the Stack when the position is passed as Parameter.****Program:**

```
import java.util.Stack;
public class Element{
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 stack range");}}
public static void main(String[] args) {
System.out.println("Merin Babu\n23MCA042 \n16-04-24\n");
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:~/Merinjava$ javac Element.java
mca@Z238-UL:~/Merinjava$ java Element
Merin Babu
23MCA042
16-04-24

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]
```

**23. Write a Java program to compare two hash set.****Program:**

```
import java.util.HashSet;
import java.util.Scanner;
import java.util.Set;
public class Hash{
public static void main(String[] args) {
System.out.println("Merin Babu\n23MCA042 \n16-04-24\n");
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:~/Merinjava$ javac Hash.java
mca@Z238-UL:~/Merinjava$ java Hash
Merin Babu
23MCA042
16-04-24

Enter the number of elements in Set 1: 2
Enter the elements for Set 1:
2
1
Enter the number of elements in Set 2: 3
Enter the elements for Set 2:
5
4
3
Set 1: [1, 2]
Set 2: [3, 4, 5]
Set 1 and Set 2 are not equal.
```