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.

Source code:

```
package graphics;
import java.util.Scanner;
public class driver {
   public static void main(String[] args) {
      Scanner sc = new Scanner(System.in);
      int choice;
        circle obj1 = new circle();
      rectangle obj2 = new rectangle();
      square obj3 = new square();
      triangle obj4 = new triangle();
System.out.println("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");

      while (true) {
System.out.println("Choose any:");
System.out.println("1) Circle");
System.out.println("2) Rectangle");
System.out.println("3) Square");
System.out.println("4) Triangle");
System.out.println("5) Exit");
         choice = sc.nextInt();

         switch (choice) {
     case 1:
               obj1.area();
               break;

          case 2:
               obj2.area();
               break;
            case 3:
               obj3.area();
               break;
            case 4:
               obj4.area();
               break;
            case 5:
System.out.println("Exiting...");
sc.close(); // Close the scanner
               return; // Exit the main method (and the program)
            default:
```

```
System.out.println("Invalid choice. Please choose again.");
                    break;
                }
            }
        }
    }
```

Output:

```
mca@HP-Z238:~/shijo jose/Java/cycle-4/2$ javac graphics/driver.java
mca@HP-Z238:~/shijo jose/Java/cycle-4/2$ java graphics/driver
Choose any:
1) Circle
2) Rectangle
3) Square
4) Triangle
5) Exit
1
Input radius of circle :
4
Area of the circle is : 50.26548245743669
Choose any:
1) Circle
2) Rectangle
3) Square
4) Triangle
5) Exit
2
Enter the length of the rectangle :
10
Enter the breath of the rectangle
10
Area of the rectangle = 100
Choose any:
1) Circle
2) Rectangle
3) Square
4) Triangle
5) Exit
3
Input side length of square :
5
Area of the square : 25.0
```

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

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.println("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");
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));
}
}
```

Arithemetic 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);
}
```

Substraction

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

Multiplication

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

Divison

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

Output:

```
mca@HP-Z238:~/shijo jose/Java/cycle-4/1$ javac ArithmeticMain.java
mca@HP-Z238:~/shijo jose/Java/cycle-4/1$ java ArithmeticMain
Enter the first number: 4
Enter the second number: 5
Addition: 9.0
Subtraction: -1.0
Multiplication: 20.0
Division: 0.8
mca@HP-Z238:~/shijo jose/Java/cycle-4/1$
```

19. Write a user defined exception class to authenticate the username and password.

Source code:

```
import java.util.Scanner;
class authException extends Exception
{
public authException(String s) {
super(s);
}
}
public class Arithme
{
public static void main(String[] args) {
System.out.println("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");
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@HP-Z238:~$ javac Q3.java
mca@HP-Z238:~$ java Q3
Name: Shijo jose
Reg. No: 23MCA051
Date: 15/04/2024

Enter the username:
student
Enter the password:
student123
Authentication successful...
mca@HP-Z238:~$
```

20. 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 Average {
public static void main(String[] args)
{
System.out.println("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");
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("NEGETIVE EXCEPTION OCCURED:"+e);
}
}
```

```
avg=sum/n;
System.out.println("Average is "+avg);
sc.close();
}
}
```

Output:

```
mca@HP-Z238:~$ javac Average.java
mca@HP-Z238:~$ java Average
Name : Shijo jose
Roll No : 23MCA051
Date : 15/04/2024
Program 20 : Find the average of N positive integers, raising a user defined exception for each negative input
Enter no. of numbers:
5
Enter number 1
5
Enter number 2
6
Enter number 3
7
Enter number 4
8
Enter number 5
9
Average is 7.0
mca@HP-Z238:~$
```

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

Source code:

```
import java.util.*;
public class Remove {
public static void main(String[] args){
System.out.println("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");
LinkedList<String> L=new LinkedList<>();
L.add("JAVA");
L.add("PYTHON");
L.add("CSS");
L.add(0,"PROGRAMING LANGUAGE");
System.out.println(L);
L.remove("CSS");
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@HP-Z238:~$ javac Q11.java
mca@HP-Z238:~$ java Q11
Name : Shijo jose
Roll No : 23MCA051
Date : 15/04/2024
Program 21 : Program to remove all the elements from a linked list
[PROGRAMING LANGUAGE, JAVA, PYTHON, CSS]
[PROGRAMING LANGUAGE, JAVA, PYTHON]
[PROGRAMING LANGUAGE, JAVA]
[PROGRAMING LANGUAGE]
[]
mca@HP-Z238:~$
```

22. 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 stack
range.");
}
}
public static void main(String[] args) {
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("Name: Shijo jose");
System.out.println("Reg. No: 23MCA051");
System.out.println("Date: 15/04/2024");
System.out.println("Before removal: " + stack);
removeElementAtPosition(stack, positionToRemove);
System.out.println("After removal: " + stack);
}
}
```

Output:

```
mca@HP-Z238:~$ javac Q12.java
mca@HP-Z238:~$ java Q12
Name : Shijo jose
Roll No : 23MCA051
Date : 15/04/2024
Program 22 : Program to remove an object from the Stack when the position is passed as parameter
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@HP-Z238:~$
```

23.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: Shijo jose");
System.out.println("Reg. No: 23MCA051");
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);
}
booleanisEqual = 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@HP-Z238:~$ java Q16
Name : Shijo jose
Roll No : 23MCA051
Date : 15/04/2024
Program 23 : Write a Java program to compare two hash set
Enter the number of elements in Set 1: 4
Enter the elements for Set 1:
1
2
3
4
Enter the number of elements in Set 2: 4
Enter the elements for Set 2:
5
6
7
8
Set 1: [1, 2, 3, 4]
Set 2: [5, 6, 7, 8]
Set 1 and Set 2 are not equal.
mca@HP-Z238:~$
```