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.

Code :

```
import package_graphics.*;
import java.util.Scanner;
public class Q1
{
public static void main(String []args)
{
System.out.println("Name : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 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_graphics testObj = new package_graphics();
int l,h,r,a,c,d;
Scanner s=new Scanner(System.in);
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(folder):
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 :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
Date : 15/04/2024
Program 17 : Create a Graphics package that has classes and inte
rfaces for figures Rectangle, Triangle, Square and Circle. Test
the package by finding the area of these figures
Enter the length for rectangle :
12
Enter the breadth for rectangle :
14
Enter the radius of circle :
5
Enter the side for Square :
4
Enter the breadth for triangle :
6
Enter the height for triangle :
9
Area of rectangle = 168.0
Area of circle = 78.5
Area of square = 16.0
Area of triangle = 27.0
```

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.

Code :

```
import arithmetic.ArithmeticOperations;
import java.util.Scanner;
public class ArithmeticMain {
public static void main(String[] args) {
System.out.println("Name : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 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 ");
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(folder)

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 {
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;
}
}
```

Output :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
Date : 15/04/2024
Program 18 : Create an Arithmetic package that has classes and
interfaces for the 4 basic arithmetic operations. Test the pack
age by implementing all operations on two given numbers
Enter the first number: 29
Enter the second number: 25
Addition : 54.0
Subtraction : 4.0
Multiplication : 725.0
Division : 1.16
```

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

Code :

```
import java.util.Scanner;
class authException extends Exception
{
public authException(String s)
{
super(s);
}
}
public class Userauthentication
{
public static void main(String[] args)
{
String username = "SJCET";
String passcode = "SJCET2024";
String user_name,password;
Scanner sc = new Scanner(System.in);
try
{
System.out.println("Name : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 19 : Write a user defined exception class to
authenticate the user name and password.");
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 :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
Date : 15/04/2024
Program 19 : Write a user defined exception class to authenticate the
user name and password.
Enter the username:
SJCET
Enter the password:
SJCET123
Exception caught authException: Invalid user credentials
user name and password.
Enter the username:
SJCET
Enter the password:
SJCET2024
Authentication successful...
```

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

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 : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 20 : Find the average of N positive integers,
raising a user defined exception for each negative input");
int i;
double sum=0,avg=0;
Scanner sc=new Scanner(System.in);
System.out.println("Enter no. of 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 :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
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
4
Enter number 3
3
Enter number 4
8
Enter number 5
2
Average is 4.4
```

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

Code :

```
import java.util.*;
public class Q11 {
public static void main(String[] args){
System.out.println("Name : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 21 : Program to remove all the elements from a
linked list");
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 :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
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]
[]
```

22. Program to remove an object from the Stack when the position is passed as parameter

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 : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 22 : Program to remove an object from the
Stack when the position is passed as parameter");
System.out.println("Before removal: " + stack);
removeElementAtPosition(stack, positionToRemove);
System.out.println("After removal: " + stack);
}
}
```

Output :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
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]
```

23. Write a Java program to compare two hash set

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 : TOBIN K TOMY\nRoll No : 23MCA059\nDate :
15/04/2024");
System.out.println("Program 23 : Write a Java program to compare two hash
set");

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 :

```
Name : TOBIN K TOMY
Roll No : 23MCA059
Date : 15/04/2024
Program 23 : Write a Java program to compare two hash set
Enter the number of elements in Set 1: 3
Enter the elements for Set 1:
12
13
14
Enter the number of elements in Set 2: 3
Enter the elements for Set 2:
23
24
25
Set 1: [12, 13, 14]
Set 2: [23, 24, 25]
Set 1 and Set 2 are not equal.
```