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:

Area.java

```
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:Seekanth pradeep\n roll no: 52\n date:15-04-24");
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@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Area.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Area
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
Enter the length for rectangle
4
Enter the breadth for rectangle
5
Enter the radius of circle
3
Enter the side for Square
4
Enter the breadth for triangle
3
Enter the height for triangle
6
Area of rectangle=20.0
Area of circle=28.26
Area of square=16.0
Area of triangle=9.0
```

18. Create an Arithmetic package that has classes and interfaces for the 4 basicarithmetic 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) {
 System.out.println("name:Seekanth pradeep\n roll no: 52\n date:15-04-24");


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);
}
```

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);
}
```

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:

```
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ javac ArithmeticMain.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java ArithmeticMain
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
Enter the first number: 4
Enter the second number: 3
Addition: 7.0
Subtraction: 1.0
Multiplication: 12.0
Division: 1.3333333333333333
```

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 Q3
{
public static void main(String[] args) {
  System.out.println("name:Seekanth pradeep\n roll no: 52\n date:15-04-24");
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:~/sreekanth/javaMain/cycle4$ ^C
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Q3.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Q3
name:Seekanth pradeep
 roll no: 52
 date:8-04-24

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

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:Seekanth pradeep\n roll no: 52\n date:15-04-24");

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:

```
^Cmca@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Average.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Average
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
Program 20 : Find the average of N positive integers, raising a user defined exception for each negative input
Enter no. of numbers:
4
Enter number 1
2
Enter number 2
3
Enter number 3
5
Enter number 4
6
Average is 4.0
```

21. 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:Seekanth pradeep\n roll no: 52\n date:15-04-24");
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

```
Authentication successful...
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Q11.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Q11
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
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.

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:Seekanth pradeep\n roll no: 52\n date:15-04-24");
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:

```
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Q12.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Q12
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
Program 22 : Program to remove an object from the Stack when the position is pas
sed 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

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:Seekanth pradeep\n roll no: 52\n date:15-04-24");
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@HP-Z238:~/sreekanth/javaMain/cycle4$ javac Q16.java
mca@HP-Z238:~/sreekanth/javaMain/cycle4$ java Q16
name:Seekanth pradeep
 roll no: 52
 date:15-04-24
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:
3
4
5
6
Enter the number of elements in Set 2: 5
Enter the elements for Set 2:
21
2
4
7
8
Set 1: [3, 4, 5, 6]
Set 2: [2, 4, 21, 7, 8]
Set 1 and Set 2 are not equal.
```