### *Programs*

### **1) A scenario where ArithmeticException occurs**

CODE:-

**package** com.cts.Exception;

**public** **class** Test2 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

**try** {

**int** a = 50;

System.***out***.println(a/0);

}**catch**(ArithmeticException err) {

System.***out***.println(err);

}

}

}

OUTPUT:-

java.lang.ArithmeticException: / by zero

### **2) A scenario where NullPointerException occurs**

CODE:-

**package** com.cts.Exception;

**public** **class** Test3 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

**try** {

String s = **null**;

System.***out***.println(s.length());

}**catch**(NullPointerException err) {

System.***out***.println(err);

}

}

}

OUTPUT:-

java.lang.NullPointerException: Cannot invoke "String.length()" because "s" is null

### **3) A scenario where NumberFormatException occurs**

CODE:-

**package** com.cts.Exception;

**public** **class** Test4 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

**try** {

String s = "abc";

System.***out***.println(Integer.*parseInt*(s));

}**catch**(NumberFormatException err) {

System.***out***.println(err);

}

}

}

OUTPUT:-

java.lang.NumberFormatException: For input string: "abc"

### **4) A scenario where ArrayIndexOutOfBoundsException occurs**

CODE:-

**package** com.cts.Exception;

**public** **class** Test6 {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

**try** {

**int**[] arr = **new** **int**[5];

arr[10] = 50;

System.***out***.println(arr[10]);

}**catch**(ArrayIndexOutOfBoundsException err) {

System.***out***.println(err);

}

}

}

OUTPUT:-

java.lang.ArrayIndexOutOfBoundsException: Index 10 out of bounds for length 5

**5) Exception code - 1.**

CODE:-

**package com.cts.Exception;**

**import java.util.InputMismatchException;**

**import java.util.Scanner;**

**public class Test1 {**

**public static void main(String[] args){**

**Scanner s = new Scanner(System.in);**

**try {**

**System.out.println("Enter a:");**

**int a = s.nextInt();**

**System.out.println("Enter b:");**

**int b = s.nextInt();**

**System.out.println(a/b);**

**}catch(ArithmeticException | InputMismatchException err){**

**// System.out.println("Not valid input check b");**

**System.out.println(err);**

**}**

**System.out.println("Code is working fine");**

**s.close();**

**}**

**}**

OUTPUT:-

Enter a:

10

Enter b:

0

java.lang.ArithmeticException: / by zero

Code is working fine

**6)Exception code - 2.**

CODE:-

**package** com.cts.Exception;

**import** java.util.Scanner;

**public** **class** Test5 **extends** Exception {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner s = **new** Scanner(System.***in***);

String pass = "";

**while** (pass.length() != 10) {

System.***out***.println("Enter a password with 10 characters: ");

pass = s.nextLine();

**try** {

**if** (pass.length() != 10) {

**throw** **new** Test5();

}

System.***out***.println("Your password " + pass + " is correct");

} **catch** (Test5 err) {

System.***out***.println("Invalid Password");

}

}

s.close();

}

}

OUTPUT:-

Enter a password with 10 characters:

Manipa1234

Your password manipal234 is correct

**7)Exception code - 3.**

CODE:-

**package** com.cts.Exception;

**import** java.util.Scanner;

**class** ValidateAge **extends** Exception{

**public** ValidateAge(String str) {

**super**(str);

}

}

**public** **class** CustomException {

**static** **void** validate(**int** age)**throws** ValidateAge {

**if**(age < 18) {

**throw** **new** ValidateAge("You cant drink");

}**else** {

System.***out***.println("You can drink");

}

}

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner s = **new** Scanner(System.***in***);

**int** age = s.nextInt();

//Using try and catch

**try** {

*validate*(age);

}**catch**(ValidateAge err) {

System.***out***.println("Exception occurede: " +err);

}

// validate(age); //using throws and import throws

s.close();

}

}

OUTPUT:-

17

Exception occurede: com.cts.Exception.ValidateAge: You cant drink

**Abstraction and Interface**

**8) Abstraction example code - 1.**

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CODE:-

**package** com.cts.Abstract;

**abstract** **class** Tea{

**abstract** **void** benefit();

**void** flavour() {

System.***out***.println("Both are Tea flavour");

}

}

**class** LemonTea **extends** Tea{

@Override

**void** benefit() {

// **TODO** Auto-generated method stub

System.***out***.println("It benefits your health");

}

}

**class** GreenTea **extends** Tea{

@Override

**void** benefit() {

// **TODO** Auto-generated method stub

System.***out***.println("It benefits your heart");

}

}

**public** **class** TestTea {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Tea t1 = **new** LemonTea();

t1.benefit();

t1.flavour();

Tea t2 = **new** GreenTea();

t2.benefit();

t2.flavour();

}

}

OUTPUT:-

It benefits your health

Both are Tea flavour

It benefits your heart

Both are Tea flavour

**9) Abstraction example code -2.**

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CODE:-

**package** com.cts.Abstract;

**abstract** **class** Car{

**abstract** **void** riding();

**abstract** **void** speed();

}

**class** Alto **extends** Car{

@Override

**void** riding() {

// **TODO** Auto-generated method stub

System.***out***.println("Its not good for long ride");

}

@Override

**void** speed() {

// **TODO** Auto-generated method stub

System.***out***.println("Average speed");

}

}

**class** I10 **extends** Car{

@Override

**void** riding() {

// **TODO** Auto-generated method stub

System.***out***.println("Its good for long ride");

}

@Override

**void** speed() {

// **TODO** Auto-generated method stub

System.***out***.println("Good speed");

}

}

**public** **class** TestCar {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Car c1 = **new** Alto();

c1.riding();

c1.speed();

Car c2 = **new** I10();

c2.riding();

c2.speed();

}

}

OUTPUT:-

Its not good for long ride

Average speed

Its good for long ride

Good speed

**10) Abstraction example code -3.**

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CODE:-

**package** com.cts.Abstract;

**abstract** **class** Sim{

**abstract** **void** datapack();

**abstract** **void** calling();

}

**class** Jio **extends** Sim{

@Override

**void** datapack() {

// **TODO** Auto-generated method stub

System.***out***.println("Affordable datapack");

}

@Override

**void** calling() {

// **TODO** Auto-generated method stub

System.***out***.println("Calling facility is good");

}

}

**class** Airtel **extends** Sim{

@Override

**void** datapack() {

// **TODO** Auto-generated method stub

System.***out***.println("Airtel data pack is affordable");

}

@Override

**void** calling() {

// **TODO** Auto-generated method stub

System.***out***.println("Airtel calling facility is also good");

}

}

**public** **class** Mobile {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Sim jio = **new** Jio();

jio.calling();

jio.datapack();

Sim airtel = **new** Airtel();

airtel.calling();

airtel.datapack();

}

}

OUTPUT:-

Calling facility is good

Affordable datapack

Airtel calling facility is also good

Airtel data pack is affordable

**11) Abstraction example code -4.**

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CODE:-

**package** com.cts.Abstract;

**import** java.util.Scanner;

**abstract** **class** Shape{

**abstract** **double** area();

}

**class** Circle **extends** Shape{

**double** radius;

Circle(**double** r){

radius = r;

}

@Override

**double** area() {

// **TODO** Auto-generated method stub

**return** Math.***PI*** \* radius \* radius;

}

}

**class** Rectangle **extends** Shape{

**double** length,bredth;

Rectangle(**double** l, **double** b){

length = l;

bredth = b;

}

@Override

**double** area() {

// **TODO** Auto-generated method stub

**return** length\*bredth;

}

}

**class** Square **extends** Shape{

**double** side;

Square(**double** si){

side = si;

}

@Override

**double** area() {

// **TODO** Auto-generated method stub

**return** side\*side;

}

}

**public** **class** TestArea {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner s = **new** Scanner(System.***in***);

System.***out***.println("Enter your radius:");

**double** radius = s.nextDouble();

Circle c = **new** Circle(radius);

System.***out***.println("Circle's area is: "+ c.area());

System.***out***.println("Enter your length and bredth:");

**double** length = s.nextDouble();

**double** bredth = s.nextDouble();

Rectangle r = **new** Rectangle(length,breath);

System.***out***.println("Rectangle's area is: "+r.area());

System.***out***.println("Enter your length:");

**double** side = s.nextDouble();

Square sqr = **new** Square(side);

System.***out***.println("Square's area is: "+sqr.area());

s.close();

}

}

OUTPUT:-

Enter your radius:

10

Circle's area is: 314.1592653589793

Enter your length and breath:

25

15

Rectangle's area is: 375.0

Enter your length:

23

Square's area is: 529.0

**12) Abstraction example code -5.**

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CODE:-

**package** com.cts.Abstract;

**abstract** **class** Coffee{

**abstract** **void** taste();

}

**class** ColdCoffee **extends** Coffee{

@Override

**void** taste() {

// **TODO** Auto-generated method stub

System.***out***.println("Cold coffee tastes good");

}

}

**class** HotCoffee **extends** Coffee{

@Override

**void** taste() {

// **TODO** Auto-generated method stub

System.***out***.println("Hot coffee also tastes good");

}

}

**public** **class** TestCoffee {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Coffee c1 = **new** ColdCoffee();

c1.taste();

Coffee c2 = **new** HotCoffee();

c2.taste();

}

}

OUTPUT:-

Cold coffee tastes good

Hot coffee also tastes good

**13) Interface example code - 1.**

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CODE:-

**package** com.cts.Interface;

**interface** Tea{

**void** benefit();

**default** **void** flavour() {

System.***out***.println("Both are Tea flavour");

}

**static** **void** Price() {

System.***out***.println("Both are at same price");

}

}

**class** LemonTea **implements** Tea{

@Override

**public** **void** benefit() {

// **TODO** Auto-generated method stub

System.***out***.println("It benefits your health");

}

}

**class** GreenTea **implements** Tea{

@Override

**public** **void** benefit() {

// **TODO** Auto-generated method stub

System.***out***.println("It benefits your heart");

}

}

**public** **class** TestTea {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Tea t1 = **new** LemonTea();

t1.benefit();

t1.flavour();

Tea t2 = **new** GreenTea();

t2.benefit();

t2.flavour();

Tea.*Price*();

}

}

OUTPUT:-

It benefits your health

Both are Tea flavour

It benefits your heart

Both are Tea flavour

Both are at same price

**14) Interface example code - 2.**

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CODE:-

**package** com.cts.Interface;

**interface** Car{

**void** riding();

**void** speed();

}

**class** Alto **implements** Car{

@Override

**public** **void** riding() {

// **TODO** Auto-generated method stub

System.***out***.println("Its not good for long ride");

}

@Override

**public** **void** speed() {

// **TODO** Auto-generated method stub

System.***out***.println("Average speed");

}

}

**class** I10 **implements** Car{

@Override

**public** **void** riding() {

// **TODO** Auto-generated method stub

System.***out***.println("Its good for long ride");

}

@Override

**public** **void** speed() {

// **TODO** Auto-generated method stub

System.***out***.println("Good speed");

}

}

**public** **class** TestCar {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Car c1 = **new** Alto();

c1.riding();

c1.speed();

Car c2 = **new** I10();

c2.riding();

c2.speed();

}

}

OUTPUT:-

Its not good for long ride

Average speed

Its good for long ride

Good speed

**15) Interface example code - 3.**

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CODE:-

**package** com.cts.Interface;

**interface** Sim{

**abstract** **void** datapack();

**abstract** **void** calling();

}

**class** Jio **implements** Sim{

@Override

**public** **void** datapack() {

// **TODO** Auto-generated method stub

System.***out***.println("Affordable datapack");

}

@Override

**public** **void** calling() {

// **TODO** Auto-generated method stub

System.***out***.println("Calling facility is good");

}

}

**class** Airtel **implements** Sim{

@Override

**public** **void** datapack() {

// **TODO** Auto-generated method stub

System.***out***.println("Airtel data pack is affordable");

}

@Override

**public** **void** calling() {

// **TODO** Auto-generated method stub

System.***out***.println("Airtel calling facility is also good");

}

}

**public** **class** Mobile {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Sim jio = **new** Jio();

jio.calling();

jio.datapack();

Sim airtel = **new** Airtel();

airtel.calling();

airtel.datapack();

}

}

OUTPUT:-

Calling facility is good

Affordable datapack

Airtel calling facility is also good

Airtel data pack is affordable

**16) Interface example code - 4.**

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CODE:-

**package** com.cts.Interface;

**import** java.util.Scanner;

**interface** Shape{

**double** area();

}

**class** Circle **implements** Shape{

**double** radius;

Circle(**double** r){

radius = r;

}

@Override

**public** **double** area() {

// **TODO** Auto-generated method stub

**return** Math.***PI*** \* radius \* radius;

}

}

**class** Rectangle **implements** Shape{

**double** length,bredth;

Rectangle(**double** l, **double** b){

length = l;

bredth = b;

}

@Override

**public** **double** area() {

// **TODO** Auto-generated method stub

**return** length\*bredth;

}

}

**class** Square **implements** Shape{

**double** side;

Square(**double** si){

side = si;

}

@Override

**public** **double** area() {

// **TODO** Auto-generated method stub

**return** side\*side;

}

}

**public** **class** TestArea {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Scanner s = **new** Scanner(System.***in***);

System.***out***.println("Enter your radius:");

**double** radius = s.nextDouble();

Circle c = **new** Circle(radius);

System.***out***.println("Circle's area is: "+ c.area());

System.***out***.println("Enter your length and bredth:");

**double** length = s.nextDouble();

**double** bredth = s.nextDouble();

Rectangle r = **new** Rectangle(length,bredth);

System.***out***.println("Rectangle's area is: "+r.area());

System.***out***.println("Enter your length:");

**double** side = s.nextDouble();

Square sqr = **new** Square(side);

System.***out***.println("Square's area is: "+sqr.area());

s.close();

}

}

OUTPUT:-

Enter your radius:

24

Circle's area is: 1809.5573684677208

Enter your length and breath:

2

35

Rectangle's area is: 70.0

Enter your length:

34

Square's area is: 1156.0

**17) Interface example code - 5.**

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CODE:-

**package** com.cts.Interface;

**interface** Coffee{

**void** taste();

}

**class** ColdCoffee **implements** Coffee{

@Override

**public** **void** taste() {

// **TODO** Auto-generated method stub

System.***out***.println("Cold coffee tastes good");

}

}

**class** HotCoffee **implements** Coffee{

@Override

**public** **void** taste() {

// **TODO** Auto-generated method stub

System.***out***.println("Hot coffee also tastes good");

}

}

**public** **class** TestCoffee {

**public** **static** **void** main(String[] args) {

// **TODO** Auto-generated method stub

Coffee c1 = **new** ColdCoffee();

c1.taste();

Coffee c2 = **new** HotCoffee();

c2.taste();

}

}

OUTPUT:-

Cold coffee tastes good

Hot coffee also tastes good