**Intermediate Oops Assignment::**

[**Q1**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2149)**. Write a singleton class. Confirm that singleton class cannot be inherited.**

**Singleton Class:-**

The singleton design pattern is used to restrict the instantiation of a class and ensures that only one instance of the class exists in the JVM. In other words, a singleton class is a class that can have only one object (an instance of the class) at a time per JVM instance.

**Specifications :**

class SingletonInheritanceCheck{ }  
public class Assignment2Q1 {}

code:

class SingletonInheritanceCheck{

private static SingletonInheritanceCheck *X* = null;

private SingletonInheritanceCheck(){

System.out.println("HI, I am a statement inside the singleton class");

}

public static SingletonInheritanceCheck getInstance(){

if (*X*== null)

*X* = new SingletonInheritanceCheck();

return *X*;

}

}

public class Assignment2Q1 {

public static void main(String[] args) {

SingletonInheritanceCheck x = SingletonInheritanceCheck.*getInstance*();

*// Instantiating Singleton class with variable y*

SingletonInheritanceCheck y = SingletonInheritanceCheck.*getInstance*();

*// Instantiating Singleton class with variable z*

SingletonInheritanceCheck z = SingletonInheritanceCheck.*getInstance*();

*// Printing the hash code for above variable as*

*// declared*

System.out.println("Hashcode of x is "

+ x.hashCode());

System.out.println("Hashcode of y is "

+ y.hashCode());

System.out.println("Hashcode of z is "

+ z.hashCode());

*// Condition check*

if (x == y && y == z) {

*// Print statement*

System.out.println(

"Three objects point to the same memory location on the heap i.e, to the same object");

}

else {

*// Print statement*

System.out.println(

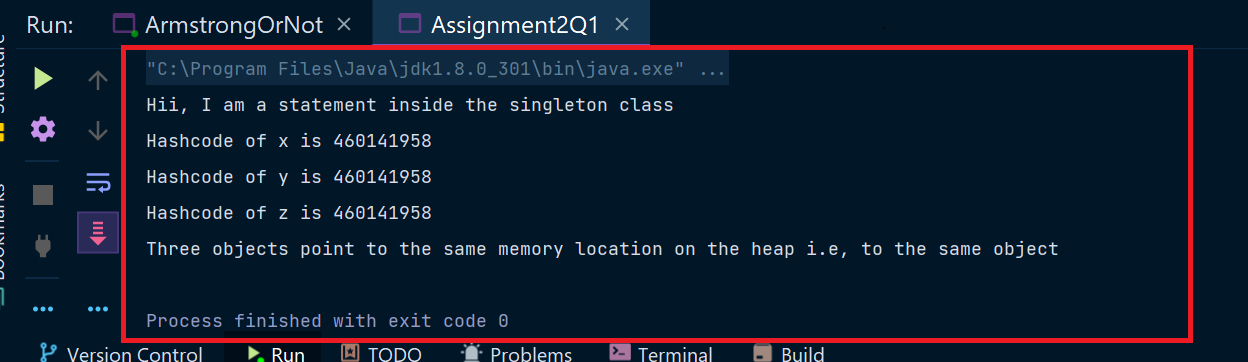
"Three objects DO NOT point to the same memory location on the heap");

}

}

}

Output::



[**Q2**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2260)**. Write a program that describes the hierarchy of an organization. Here we need to write 3 classes Employee, Manager & Labour where Manager & Labour are the sub classes of the Employee. Manager has incentive & Labour has over time. Add the functionality to calculate total salary of all the employees. Use polymorphism i.e. method overriding.**

**Description:-**

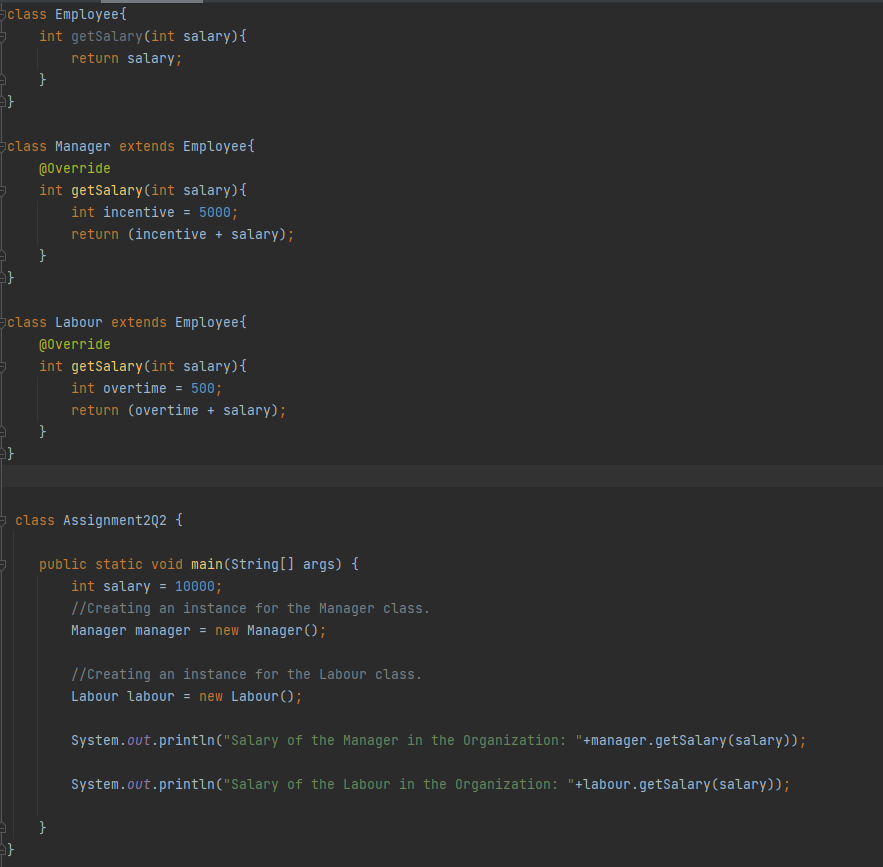
Write a program to claculate the total salaries given to all the employees by an organization. In this organization there are employees category under which Manager and Labour are working where manager will recieve incentive and labourer will receive overtime benifits.

**Specifications:**

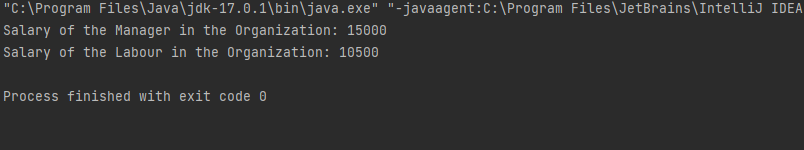
class Manager extends Assignment2Q2 {  
    @Override  
    public int getSalary(int salary) {  
        int incentive = 5000;  
    }  
}  
  
class Labour extends Assignment2Q2 {  
    @Override  
    public int getSalary(int salary) {  
        int overtime = 500;  
    }  
}

public class Assignment2Q2 {  
    int salary = 10000;  
    public int getSalary(int salary){}  
    public int totalEmployeesSalary(ArrayList<Integer> employeeSalaries){}  
    public static void main(String[] args) {}  
}

Code



Output



[**Q3**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2261)**. Write a program to consider saving & current account in the bank. Saving account holder has ‘Fixed Deposits’ whereas Current account holder has cash credit. Apply polymorphism to find out total cash in the bank.**

**Description:-**

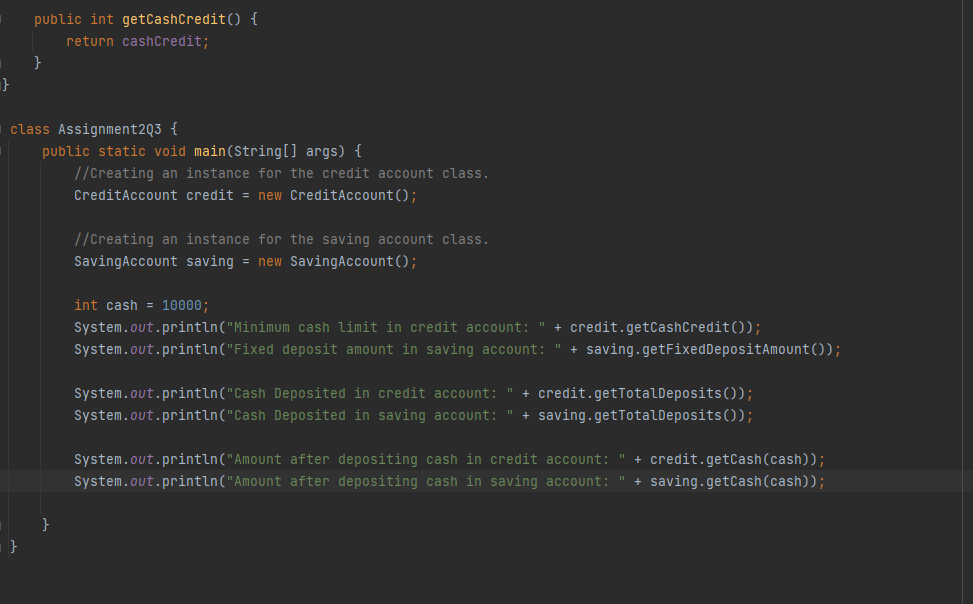
Write a program to claculate the total cash available in the bank. In this bank,bank will provide two types of accounts one is savings accounts and another is current account where current account has cash credits and savings account has fixed deposit options.

**Specifications:**

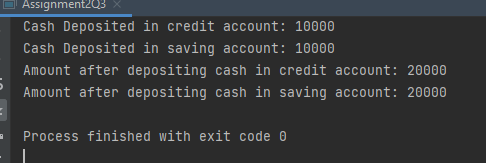
class CurrentAccount extends Assignment2Q3 {  
    int totalDeposits = 10000;  
    int creditLimit = 2000;  
    @Override  
    public int getCash() {}  
}  
class SavingsAccount extends Assignment2Q3 {  
    int totalDeposits = 10000;  
    int fixedDepositAmount = 5000;  
    @Override  
    public int getCash() {}  
}  
public class Assignment2Q3 {  
    public int totalCashInBank(ArrayList<Integer> cash){}  
    public int getCash(){}  
    public static void main(String[] args) {}  
}

code:





output:



**4. Test the following principles of an abstract class:**

**• If any class has any of its method abstract then you must declare entire class abstract.**

**• Abstract class cannot be instantiated.**

**• When we extend an abstract class, we must either override all the abstract methods in sub class or declare subclass as abstract.**

**• Abstract class cannot be private.**

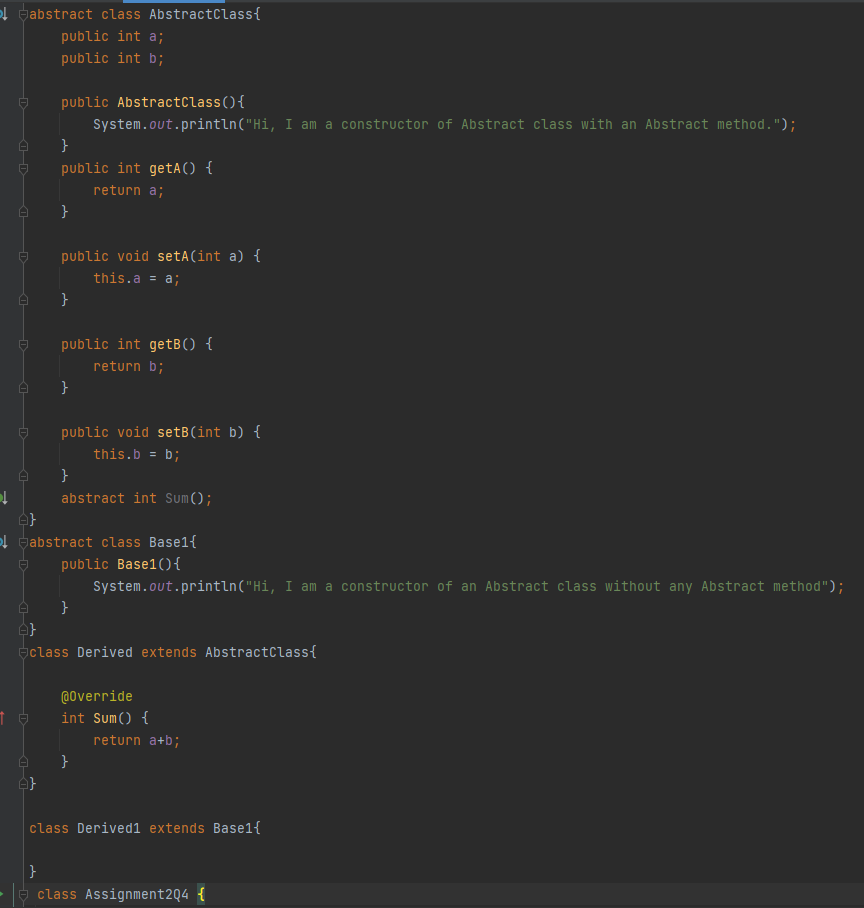
**• Abstract class cannot be final.**

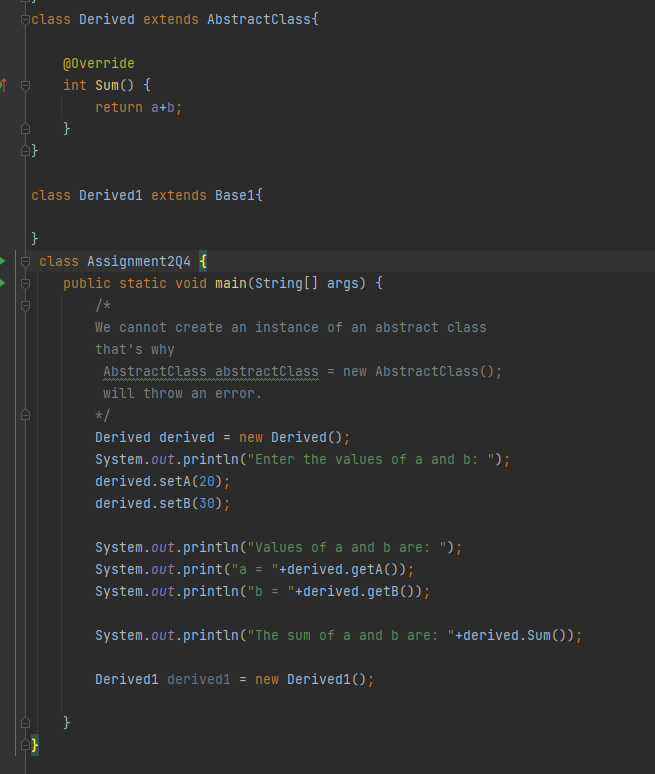
**• You can declare a class abstract without having any abstract method.**

**Description:-**

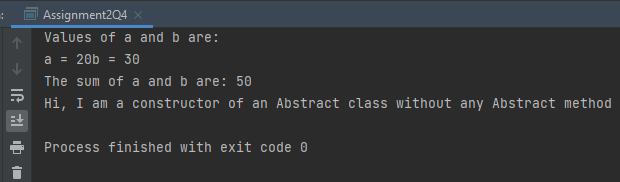
Write a program in such a way that all the conditions above for abstract class should satisfy.

Code:





Output::



[**Q5**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2163)**. Write the classes Line, Rectangle, Cube etc. & make the Shape as their base class. Add an abstract draw() method in the class Shape & draw all shapes.**

**Description:-**

Write a java class named Shape which has abstract draw() and also classes Line, Rectangle, Cube etc. extends Shape to implement the draw method.

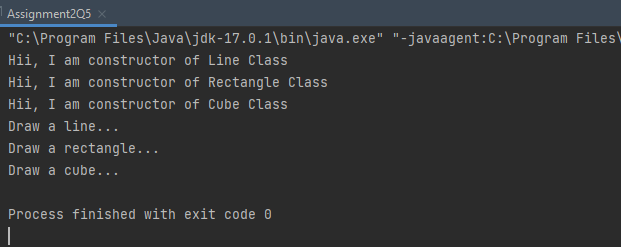
**Specifications:-**

class Rectangle5 extends Shape5 {  
    @Override  
    public String draw() {}  
}  
  
class Line5 extends Shape5{  
    @Override  
    public String draw() {}  
}  
  
class Cube5 extends Shape5 {  
    @Override  
    public String draw() {}  
}  
abstract class Shape5 {  
    abstract public String draw();  
}  
public class Assignment2Q5{  
    public static void main(String[] args) {}  
}

code::

abstract class Shape{  
 abstract public String draw();  
}  
  
class Line extends Shape{  
  
 Line(){  
 System.*out*.println("Hii, I am constructor of Line Class");  
 }  
 @Override  
 public String draw() {  
 return "Draw a line...";  
 }  
}  
  
class Rectangle extends Shape{  
 Rectangle(){  
 System.*out*.println("Hii, I am constructor of Rectangle Class");  
 }  
 @Override  
 public String draw() {  
 return "Draw a rectangle...";  
 }  
}  
  
class Cube extends Shape{  
 Cube(){  
 System.*out*.println("Hii, I am constructor of Cube Class");  
 }  
 @Override  
 public String draw() {  
 return "Draw a cube...";  
 }  
}  
class Assignment2Q5 {  
 public static void main(String[] args) {  
 //Instance of line class has been instantiated.  
 Line line = new Line();  
 //Instance of rectangle class has been instantiated.  
 Rectangle rectangle = new Rectangle();  
 //Instance of cube class has been instantiated.  
 Cube cube = new Cube();  
  
 System.*out*.println(line.draw());  
 System.*out*.println(rectangle.draw());  
 System.*out*.println(cube.draw());  
 }  
}

output::



[**Q6**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2145)**. Write an abstract class ‘Persistence’ along with two sub classes ‘FilePersistence’ & ‘DatabasePersistence’. The base class with have an abstract method persist() which will be overridden by its sub classes. Write a client who gets the Persistence object at runtime & invokes persist() method on it without knowing whether data is being saved in File or in Database.**

**Description:-**

Write a program having an abstract class "Persistence" which have two child classes "FilePersistence","DatabasePersistence".The base class will have a persist() method and it is overridden by sub classes.wite a seperate class of client which will get persistence object and invoke persist method on it.(Polymorphism)

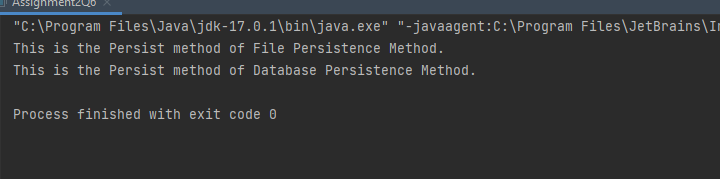
**Specifications:**

abstract class Persistence {  
    abstract public String persist();  
}  
class FilePersistence extends Persistence{  
    @Override  
    public String persist() {}  
}  
class DatabasePersistence extends Persistence{  
    @Override  
    public String persist() {}  
}  
  
public class Assignment2Q6 {  
    public static void main(String[] args) {}  
}

code::

class ArmstrongOrNot {  
 static boolean armstrongCheck(int num) {  
  
 int new\_num = num;  
 int ans = 0, d;  
 while (new\_num != 0) {  
 d = new\_num % 10;  
 ans += d \* d \* d;  
 new\_num /= 10;  
 }  
  
 if(ans==num) {  
 return true;  
 }  
 else {  
 return false;  
 }  
  
 }}  
abstract class Persistence{  
 abstract public String Persist();  
}  
  
class FilePersistence extends Persistence{  
 @Override  
 public String Persist() {  
 return "This is the Persist method of File Persistence Method.";  
 }  
}  
  
class DatabasePersistence extends Persistence{  
 @Override  
 public String Persist() {  
 return "This is the Persist method of Database Persistence Method.";  
 }  
}  
class Assignment2Q6 {  
 public static void main(String[] args) {  
 //Creating an instance of File Persistence class.  
 FilePersistence filePersistence = new FilePersistence();  
  
 System.*out*.println(filePersistence.Persist());  
  
 //Creating an instance of Database Persistence class.  
 DatabasePersistence databasePersistence = new DatabasePersistence();  
 System.*out*.println(databasePersistence.Persist());  
 }  
}

output::



7

**Maximum number of files**: 200  
**Type of work**: Individual work

[**Q7**](https://adapt.in.capgemini.com/mod/vpl/view.php?id=2169)**. Develop an application for Dessert shop. The application should allow owner to add items like Candy, Cookie or Ice Cream in the shop storage. Also customers should be able to place an order.**

**DessertItem is an abstract class having an abstract method getCost(). Every dessert item has tax associated. Candy item is sold in dollar currency, Cookie in Euro currency & Ice Cream in Rupees currency. The sub classes are supposed to override these methods. When we run the application, it should ask us our role i.e. owner or customer. If role is owner, we should be able to add dessert items in our storage. If role is customer, then we should be able to place an order. The currency conversion rates are:**

**1 dollar = 60 rupees.**

**1 euro = 70 rupees.**

**Specifications:-**

abstract class DesertItem {

    abstract public int getCost();  
}  
class Candy extends DesertItem {  
    public int addCandies(int candies){}  
}  
class Cookie extends DesertItem {  
    public int addCookies(int candies){}  
}  
class IceCream extends DesertItem {  
    public int addIceCreams(int candies){}  
}  
public class Assignment2Q7 {  
    public static void main(String[] args) {}  
    private void selectRoles(){}  
    private void roles(String role){}  
    private void addItems() {}  
    private void addItemsOperation(int choice) {}  
    private void placeOrder() {}  
    private void placeOrderOperation(int choice) {}  
}

code::

import java.util.Scanner;  
  
abstract class DesertItem{  
 abstract public int getCost();  
  
}  
  
class Candy extends DesertItem{  
 public int cash;  
 int addCandy;  
 Candy(){  
 addCandy = 0;  
 }  
 public void setAddCandy(int candy){  
 this.addCandy += candy;  
 }  
 public int getAddCandy() {  
 return addCandy;  
 }  
 public void setCash(int cash) {  
 this.cash = cash;  
 }  
  
 @Override  
 public int getCost() {  
 return cash\*addCandy\*60;  
 }  
  
 public void Order(int order){  
 addCandy -= order;  
 }  
  
 public int TotalAmount(int order){  
 return cash\*order\*60;  
 }  
}  
  
class Cookie extends DesertItem{  
  
 int addCookie;  
 public int cash;  
 public Cookie() {  
 this.addCookie = 0;  
 }  
  
 public int getAddCookie() {  
 return addCookie;  
 }  
  
 public void setAddCookie(int addCookie) {  
 this.addCookie += addCookie;  
 }  
  
 public void setCash(int cash){  
 this.cash = cash;  
 }  
 @Override  
 public int getCost() {  
 return cash\*addCookie\*70;  
 }  
  
 public void Order(int order){  
 addCookie -= order;  
 }  
  
 public int TotalAmount(int order){  
 return cash\*order\*70;  
 }  
}  
  
class IceCream extends DesertItem{  
  
 int addIceCream;  
 public int cash;  
 public IceCream() {  
 addIceCream = 0;  
 }  
  
 public void setCash(int cash) {  
 this.cash = cash;  
 }  
  
 public int getAddIceCream() {  
 return addIceCream;  
 }  
  
 public void setAddIceCream(int addIceCream) {  
 this.addIceCream += addIceCream;  
 }  
  
 @Override  
 public int getCost() {  
 return cash\*addIceCream;  
 }  
 public void Order(int order){  
 addIceCream -= order;  
 }  
  
 public int TotalAmount(int order){  
 return cash\*order;  
 }  
}  
public class Assignment2Q7 {  
 public static void main(String[] args) {  
  
 Scanner sc = new Scanner(System.in);  
 int choice;  
  
 Candy candy = new Candy();  
 Cookie cookie = new Cookie();  
 IceCream iceCream = new IceCream();  
  
 do {  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* SELECT ROLE \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* 1) OWNER \*\*\t\t");  
 System.out.println("\t\t\*\* 2) CUSTOMER \*\*\t\t");  
 System.out.println("\t\t\*\* 3) EXIT \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 choice = sc.nextInt();  
 switch (choice) {  
 case 1:  
 int desertitem;  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* ADD DESERTS \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* 1) ADD CANDY \*\*\t\t");  
 System.out.println("\t\t\*\* 2) ADD COOKIE \*\*\t\t");  
 System.out.println("\t\t\*\* 3) ADD ICE CREAM \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 desertitem = sc.nextInt();  
 if (desertitem == 1) {  
 int m;  
 do {  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t 1. ENTER THE NUMBER OF CANDIES ");  
 System.out.println("\t\t 2. DISPLAY THE NUMBER OF CANDIES ");  
 System.out.println("\t\t 3. ENTER THE PRICE OF CANDIES ");  
 System.out.println("\t\t 4. DISPLAY THE PRICE OF CANDIES ");  
 System.out.println("\t\t 5. GO BACK");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 m = sc.nextInt();  
 if (m == 1) {  
 int candies;  
 System.out.print("\t\tENTER THE NUMBER OF CANDIES: ");  
 candies = sc.nextInt();  
 candy.setAddCandy(candies);  
 } else if (m == 2) {  
 System.out.println("\t\tNUMBER OF CANDIES = " + candy.getAddCandy());  
 } else if (m == 3) {  
 int price;  
 System.out.print("\t\tENTER THE PRICE OF CANDIES (in Dollars): ");  
 price = sc.nextInt();  
 candy.setCash(price);  
 } else if(m==4){  
 System.out.println("\t\tPRICE OF CANDIES (in Rupees) = " + candy.getCost());  
 }  
 else{  
 break;  
 }  
 }while (m!=5);  
  
 } else if (desertitem == 2) {  
 int m;  
 do {  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t 1. ENTER THE NUMBER OF COOKIES ");  
 System.out.println("\t\t 2. DISPLAY THE NUMBER OF COOKIES ");  
 System.out.println("\t\t 3. ENTER THE PRICE OF COOKIES ");  
 System.out.println("\t\t 4. DISPLAY THE PRICE OF COOKIES ");  
 System.out.println("\t\t 5. GO BACK");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 m = sc.nextInt();  
 if (m == 1) {  
 int cookies;  
 System.out.print("\t\tENTER THE NUMBER OF COOKIES: ");  
 cookies = sc.nextInt();  
 cookie.setAddCookie(cookies);  
 } else if (m == 2) {  
 System.out.println("\t\tNUMBER OF COOKIES = " + cookie.getAddCookie());  
 } else if (m == 3) {  
 int price;  
 System.out.print("\t\tENTER THE PRICE OF COOKIES (in Euros): ");  
 price = sc.nextInt();  
 cookie.setCash(price);  
 } else if(m==4){  
 System.out.println("\t\tPRICE OF COOKIES (in Rupees) = " + cookie.getCost());  
 }  
 else{  
 break;  
 }  
 }while (m!=5);  
  
 } else {  
 int m;  
 do{  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t 1. ENTER THE NUMBER OF ICE CREAM ");  
 System.out.println("\t\t 2. DISPLAY THE NUMBER OF ICE CREAM ");  
 System.out.println("\t\t 3. ENTER THE PRICE OF ICE CREAM ");  
 System.out.println("\t\t 4. DISPLAY THE PRICE OF ICE CREAM ");  
 System.out.println("\t\t 5. GO BACK");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 m = sc.nextInt();  
 if (m == 1) {  
 int icecreams;  
 System.out.print("\t\tENTER THE NUMBER OF ICE CREAM: ");  
 icecreams = sc.nextInt();  
 iceCream.setAddIceCream(icecreams);  
 } else if (m == 2) {  
 System.out.println("\t\tNUMBER OF ICE CREAM = " + iceCream.getAddIceCream());  
 } else if (m == 3) {  
 int price;  
 System.out.print("\t\tENTER THE PRICE OF ICE CREAM (in Rupees): ");  
 price = sc.nextInt();  
 iceCream.setCash(price);  
 } else if(m==4){  
 System.out.println("\t\tPRICE OF ICE CREAM (in Rupees) = " + iceCream.getCost());  
 }  
 else{  
 break;  
 }  
 }while(m!=5);  
  
 }  
 break;  
 case 2:  
 int order;  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* SELECT DESERT \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.println("\t\t\*\* 1) CANDY \*\*\t\t");  
 System.out.println("\t\t\*\* 2) COOKIE \*\*\t\t");  
 System.out.println("\t\t\*\* 3) ICE CREAM \*\*\t\t");  
 System.out.println("\t\t\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\t\t");  
 System.out.print("\t\tENTER YOUR CHOICE: ");  
 order = sc.nextInt();  
 if(order == 1){  
 int qty;  
 System.out.print("\t\t ENTER THE QUANTITY YOU WANT TO PURCHASE: ");  
 qty = sc.nextInt();  
 candy.Order(qty);  
 System.out.println("\t\t ORDER RECEIPT: ");  
 System.out.println("\t\t QUANTITY ORDER = "+qty);  
 System.out.println("\t\t TOTAL AMOUNT (in Rupees) = "+candy.TotalAmount(qty));  
 }  
 else if(order==2){  
 int qty;  
 System.out.print("\t\t ENTER THE QUANTITY YOU WANT TO PURCHASE: ");  
 qty = sc.nextInt();  
 cookie.Order(qty);  
 System.out.println("\t\t ORDER RECEIPT: ");  
 System.out.println("\t\t QUANTITY ORDER = "+qty);  
 System.out.println("\t\t TOTAL AMOUNT (in Rupees) = "+cookie.TotalAmount(qty));  
 }  
 else{  
 int qty;  
 System.out.print("\t\t ENTER THE QUANTITY YOU WANT TO PURCHASE: ");  
 qty = sc.nextInt();  
 iceCream.Order(qty);  
 System.out.println("\t\t ORDER RECEIPT: ");  
 System.out.println("\t\t QUANTITY ORDER = "+qty);  
 System.out.println("\t\t TOTAL AMOUNT (in Rupees) = "+iceCream.TotalAmount(qty));  
 }  
 break;  
 case 3:  
 System.*exit*(0);  
 break;  
 default:  
 System.out.println("\t\t PLEASE ENTER THE CORRECT CHOICE!!!");  
  
 }  
 }while (choice != 3) ;  
  
 }  
}

output::

