Data Structures and Algorithms Laboratory		
Laboratory 1: Review of Object-Oriented Programming with Java	**School of Information Technology**	
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Date: 20 Jan 2023	**Due date: on the LMS**	

Objective

- To review fundamental object-oriented programming. Note that the red boxes indicate the inputs.
- Upload your completed ***pdf format*** to LMS system.
  File name: DSA_lab01_[yourID]_[yourSec].pdf
  Due date: 1 week after assigned date.

Exercise 1: (in-class) The below program creates 3 instances of class: "**Student"** in array and print out all students first name. Complete the missing codes of class: "**Student"** and "**Classroom**"

Sample result after running program

```
Enter score for Student 1: 9
Enter score for Student 2: 7

---Summary---
John: 9 points
Michael: 7 point
Max score = 9 points
```

```
// Student Class
public class Student {

	private int ID;
	private String firstName;
	private String lastName;
	private int score;

	public Student(int id, String firstname, String lastname){
		ID = id;
		firstName = firstname;
		lastName = lastname;
	}

	public int getId() {
		return ID;
	}

	public String getFirstName() {
		return firstName;
	}
```

```
	public String getLastName() {
		return lastName;
	}

	public void setScore(int s){
		score = s;


	}
	public int getScore(){
		return score;


	}
}
```

```
// Classroom class
import java.util.Scanner;

public class Classroom {

	public static void main(String[] args) {
		//Variables
		Student students[] = new Student[2];
		int score, max;

		students[0] = new Student(54100001,"John","Nuvo");
		students[1] = new Student(54100003,"Michael","Paang");

		//Input
		Scanner keyboard = new Scanner(System.in);

		System.out.print("Enter score for Student 1: ");
		score = keyboard.nextInt();
		students[0].setScore(score);

		System.out.print("Enter score for Student 2: ");
		score = keyboard.nextInt();
		students[1].setScore(score);
		//Process
		if(students[0].getScore()>students[1].getScore()){
			max=students[0].getScore;
		}else{
			max=students[1].getScore;
		}
		//Output
		System.out.println("\n---Summary---");

		for(int i=0;i < students.Length;i++){
			System.out.println(students[i].getfirstName()+ ": "
+students[i].getScore()+" points");
		}

		System.out.println("Max score = "+max+" points");
	}
}
```

Exercise 2: (Homework) Complete missing codes to simulate a shopping system. Assume there are only three shopping items. The red boxes indicate the inputs.

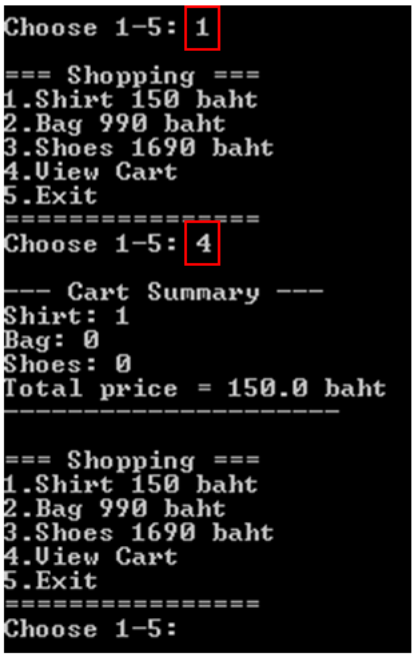
The initial interface of the program is:

```
=== Shopping ===
1.Shirt 150 baht
2.Bag 990 baht
3.Shoes 1690 baht
4.View Cart
5.Exit
================
Choose 1-5:
```

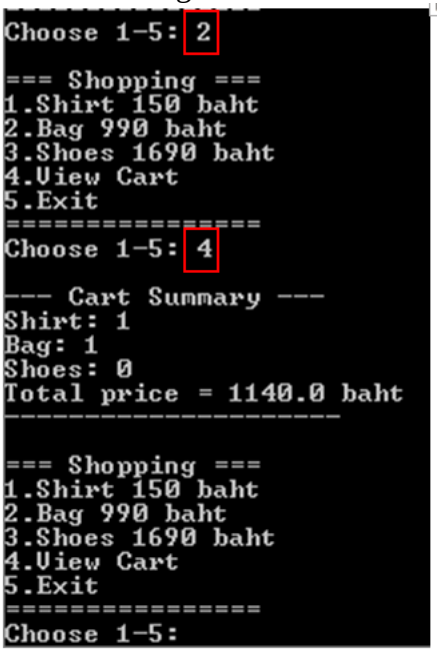
If we try to view the cart, there will be nothing.

```
Choose 1-5: 4

--- Cart Summary ---
Shirt: 0
Bag: 0
Shoes: 0
Total price = 0.0 baht
---------------------

=== Shopping ===
1.Shirt 150 baht
2.Bag 990 baht
3.Shoes 1690 baht
4.View Cart
5.Exit
================
Choose 1-5:
```

Then choose to by a shirt and see the updated cart.



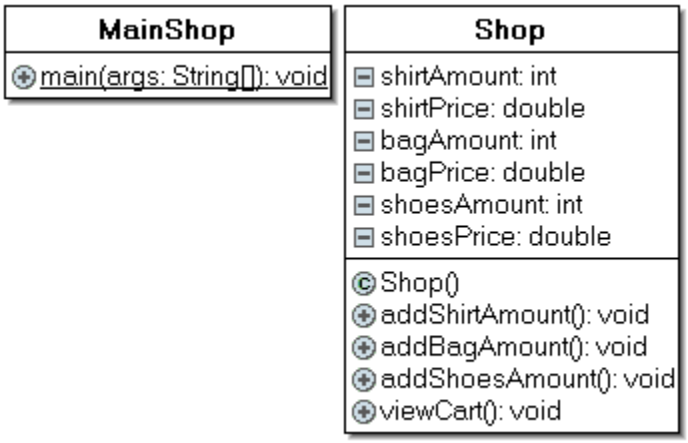
Next add a bag and view the cart again.



Finally select shoes and observe the cart.

```
Choose 1-5: 3

=== Shopping ===
1.Shirt 150 baht
2.Bag 990 baht
3.Shoes 1690 baht
4.View Cart
5.Exit
================
Choose 1-5: 4

--- Cart Summary ---
Shirt: 1
Bag: 1
Shoes: 1
Total price = 2830.0 baht
----------------------

=== Shopping ===
1.Shirt 150 baht
2.Bag 990 baht
3.Shoes 1690 baht
4.View Cart
5.Exit
================
Choose 1-5:
```

A class diagram is as follows.



```
// Shop class
public class Shop {
	private int shirtAmount;
	private double shirtPrice;
	private int bagAmount;
	private double bagPrice;
	private int shoesAmount;
	private double shoesPrice;

	public Shop() {
	    shirtAmount = 0;
	    shirtPrice = 150.0;
	    bagAmount = 0;
	    bagPrice = 990;
	    shoesAmount = 0;
	    shoesPrice = 1690;
	}

	public void addShirtAmount() {
		shirtAmount++;
	}
	public void addBagAmount() {
		bagAmount++;
	}
	public void addShoesAmount() {
		shoesAmount++;
	}
	public void viewCart() {
		System.out.println("--- Cart Summary ---");
		System.out.println("Shirt: "+ shirtAmount);
		System.out.println("Bag: "+ bagAmount);
		System.out.println("Shoes: "+ shoesAmount);
		System.out.println("Total price = "+
((shirtAmount*shirtPrice)+(bagAmount*bagPrice)+(shoesAmount*shoesPrice
)) + " baht");
		System.out.println("--------------------");
	}

}
```

```
// MainShop class
import java.util.Scanner;

public class MainShop {

	public static void main(String[] args) {
		// TODO Auto-generated method stub
		Shop shop = new shop();
		while(true) {
		int menu;
		System.out.println("===Shopping===");
		System.out.println("1.Shirt 150 baht");
		System.out.println("2.Bag 990 baht");
		System.out.println("3.Shoes 1690 baht");
```

```
            System.out.println("4.view Cart");
            System.out.println("5.Exit");
            System.out.println("==============");

            Scanner keyboard = new Scanner(System.in);

            System.out.print("Choose 1-5: ");
            menu = keyboard.nextInt();

            if(menu==4) {
                  shop.viewCart();
            }else if(menu==1) {
                  shop.addShirtAmount();

            }else if(menu==2) {
                  Shop.addBagAmount();

            }else if(menu==3) {
                  Shop.addShoesAmount();

            }else{
                  System.exit(0);
            }


            }
      }

}
```