

# Lab Assignment 03



Inspiring Excellence

Course Code:	CSE111
Course Title:	Programming Language II
Topic:	Method Overloading, Constructor & Overloading
Number of Tasks:	12 (Classwork: 06, Homework: 06)

*[Submit all the Coding Tasks (Homework: Task 1 to 4) in the Google Form shared on buX before the next lab. Submit the Tracing Tasks (Homework: Task 5 to 6) handwritten to your Lab Instructors at the beginning of the lab]*

[You are not allowed to change the driver codes of any of the tasks]

# CLASSWORK

## Task 1

Design the **Shape** class with necessary properties to produce the given output for the provided driver code.

Driver Class	Output
<pre>public class ShapeTester{     public static void main(String args []){         Shape circle = new Shape();         Shape triangle = new Shape();         Shape rectangle = new Shape();          circle.setParameters("Circle", 5);         triangle.setParameters("Triangle", 4, 7);         rectangle.setParameters("Rectangle", 2.4, 4.4);          System.out.println(circle.details());         System.out.println("1-----");         System.out.println(triangle.details());         System.out.println("2-----");         System.out.println(rectangle.details());     } }</pre>	<pre>Shape Name: Circle Area: 78.54 1----- Shape Name: Triangle Area: 14.0 2----- Shape Name: Rectangle Area: 10.56</pre>

## Task 2

Design the **Student** class in such a way that it produces the following output.

Driver Code	Expected Output
<pre>public class StudentTester{     public static void main(String[] args){         Student s1 = new Student("Harry", "CSE");         System.out.println(s1.name);         s1.updateName("Harry Potter");         System.out.println(s1.name);         System.out.println(s1.prog);         s1.updateProgram("CS");         String var = s1.accessProgram();         System.out.println(var);     } }</pre>	<pre>Harry Harry Potter CSE CS</pre>

### Task 3

Design the **Shape2D** class in such a way that it produces the following output.

Driver Code	Expected Output
<pre>public class Shape2DTester {     public static void main(String[] args) {         Shape2D sq = new Shape2D();         System.out.println("-----1-----");         sq.area();         System.out.println("-----2-----");         Shape2D rectangle = new Shape2D(5, 6);         System.out.println("-----3-----");         rectangle.area();         System.out.println("-----4-----");         Shape2D tri1 = new Shape2D(5, 6, "Triangle");         System.out.println("-----5-----");         tri1.area();         System.out.println("-----6-----");         Shape2D tri2 = new Shape2D(5, 6, 7);         System.out.println("-----7-----");         tri2.area();     } }</pre>	<pre>A Square has been created with length: 5 -----1----- The area of the Square is: 25.0 -----2----- A Rectangle has been created with length: 5 and breadth: 6 -----3----- The area of the Rectangle is: 30.0 -----4----- A Triangle has been created with height: 5 and base: 6 -----5----- The area of the Triangle is: 15.0 -----6----- A Triangle has been created with the following sides: 5, 6, 7 -----7----- The area of the Triangle is: 14.69</pre>

### Task 4

Design the **Library** class with the necessary properties so that the given output is produced for the provided driver code.

Driver Code	Output
<pre>public class Tester5{     public static void main(String[] args) {         Library a1 = new Library(3);         System.out.println("1-----");         a1.addBook("Ice");         System.out.println("2-----");         a1.printDetail();         System.out.println("3-----");         a1.addBook("Emma");         a1.addBook("Wings");         a1.addBook("Next");         System.out.println("4-----");         a1.printDetail();         System.out.println("5-----");         Library a2 = new Library(4);         System.out.println("6-----");         a2.addBook("Onnobhubon");         a2.addBook("Ami");         System.out.println("7-----");         a2.printDetail();         System.out.println("8-----");         a2.addBook("Deyal");         a2.addBook("Himu");         a2.addBook("Megher Upor Bari");         System.out.println("9-----");         a2.printDetail();     } }</pre>	<pre>A library has been created with capacity 3 1----- Book 'Ice' added to the library 2----- Maximum Capacity: 3 Total Books: 1 Book list: Ice 3----- Book 'Emma' added to the library Book 'Wings' added to the library Exceeds maximum capacity. You can't add more than 3 books 4----- Maximum Capacity: 3 Total Books: 3 Book list: Ice Emma Wings 5----- A library has been created with capacity 4 6----- Book 'Onnobhubon' added to the library Book 'Ami' added to the library 7----- Maximum Capacity: 4 Total Books: 2 Book list: Onnobhubon Ami 8----- Book 'Deyal' added to the library Book 'Himu' added to the library Exceeds maximum capacity. You can't add more than 4 books 9----- Maximum Capacity: 4 Total Books: 4 Book list: Onnobhubon Ami Deyal Himu</pre>

## Task 5

Design the **TaxiLagbe** class with necessary properties to produce the given output for the provided driver code.

Driver Code	Output
<pre>public class TaxiTester{     public static void main(String[] args) {         TaxiLagbe taxi1 = new TaxiLagbe("1010-01","Dhaka");         System.out.println("1-----");         taxi1.printDetails();         System.out.println("2-----");         taxi1.addPassenger("Wilson", 105);         System.out.println("3-----");         taxi1.printDetails();         System.out.println("4-----");         taxi1.addPassenger("Walker", 100, "Wood", 200);         System.out.println("5-----");         taxi1.printDetails();         System.out.println("6-----");         taxi1.addPassenger("Karen", 200);         taxi1.addPassenger("Donald", 130);         System.out.println("7-----");         taxi1.printDetails();         System.out.println("8-----");         TaxiLagbe taxi2 = new TaxiLagbe("1010-02");         System.out.println("9-----");         taxi2.addPassenger("Don", 115, "Parker", 215);         System.out.println("10-----");         taxi2.printDetails();     } }</pre>	<pre>A new taxi has been created 1----- Taxi number: 1010-01 This taxi can cover Dhaka area Total Passenger: 0 Passenger List: Total collected fare: 0 Taka 2----- Dear Wilson! Welcome to TaxiLagbe 3----- Taxi number: 1010-01 This taxi can cover Dhaka area Total Passenger: 1 Passenger List: Wilson Total collected fare: 105 Taka 4----- Dear Walker! Welcome to TaxiLagbe Dear Wood! Welcome to TaxiLagbe 5----- Taxi number: 1010-01 This taxi can cover Dhaka area Total Passenger: 3 Passenger List: Wilson Walker Wood Total collected fare: 405 Taka 6----- Dear Karen! Welcome to TaxiLagbe Taxi Full! No more passengers can be added 7----- Taxi number: 1010-01 This taxi can cover Dhaka area Total Passenger: 4 Passenger List: Wilson Walker Wood Karen Total collected fare: 605 Taka 8----- A new taxi has been created 9----- Dear Don! Welcome to TaxiLagbe Dear Parker! Welcome to TaxiLagbe 10----- Taxi number: 1010-02 This taxi can cover Khulna area</pre>

	Total Passenger: 2 Passenger List: Don Parker Total collected fare: 330 Taka
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### Task 6

1	<code>public class A{</code>
2	<code>    public int temp = 3, sum = 9, y = 4, x = 0;</code>
3	<code>    public A(){</code>
4	<code>        int sum = 7;</code>
5	<code>        y = temp - 5;</code>
6	<code>        sum = temp + 2;</code>
7	<code>        temp -= 2;</code>
8	<code>        this.x = sum + temp + y;</code>
9	<code>    }</code>
10	<code>    public A(int y, int temp){</code>
11	<code>        y = temp - 1 + x;</code>
12	<code>        sum = temp + 2 -x;</code>
13	<code>        temp-=2;</code>
14	<code>    }</code>
15	<code>    public void methodB(int m, int [] n){</code>
16	<code>        int x = 0;</code>
17	<code>        y = y + m + this.methodB(x,m) ;</code>
18	<code>        x = this.x + 2 + (++n[0]) ;</code>
19	<code>        sum = sum + x + y;</code>
20	<code>        n[0] = sum + 2;</code>
21	<code>        System.out.println(n[0] + " " + y+ " " + sum) ;</code>
22	<code>    }</code>
23	<code>    public int methodB(int m, int n){</code>
24	<code>        int [] y = {10};</code>
25	<code>        this.y = y[0] + this.y + m;</code>
26	<code>        x = this.y + 2 + temp - n;</code>
27	<code>        sum = x + y[0] + this.sum;</code>
28	<code>        System.out.println(y[0]+ " "+ temp + " " + sum) ;</code>
29	<code>        return y[0];</code>
30	<code>    }</code>
31	<code>}</code>

Driver Code		Output		
<pre>public class Tester9 {     public static void main(String args[]){         int[] x = {35};         A a1 = new A();         A a2 = new A(-5,-7);         a1.methodB(1, x);         a2.methodB(1, x);     } }</pre>				

# HOMEWORK

## Task 1

Design the **Toy** class in such a way that it produces the following output

Driver Code	Expected Output
<pre>public class ToyTester{     public static void main(String[] args){         Toy t1 = new Toy("Car", 230);         System.out.println("1=====");         t1.updatePrice(250);         System.out.println("2=====");         System.out.println(t1.name);         t1.showPrice();         System.out.println("3=====");         Toy t2 = new Toy("Robot", 450);         System.out.println("4=====");         t2.updateName("Autobot");         System.out.println("5=====");         System.out.println(t2.name);         t2.showPrice();     } }</pre>	<pre>A new toy has been made! 1===== 2===== Car price: 250 Taka 3===== A new toy has been made! 4===== Changing old name: Robot new name: Autobot 5===== Autobot price: 450 Taka</pre>

## Task 2

Complete the following **Cart** class to generate the given output from the tester code:

- A cart will have a cart number which will be assigned in *create\_cart()* method.
- Each cart can hold up to 3 items (at max).
- Each cart must have two arrays to store items and their respective prices.
- The items inside a cart will be added in *addItem()* method only if the cart items do not exceed 3.
- The *giveDiscount()* method saves the discount given to that cart object and updates the price accordingly.



Driver Code	Output
<pre> public class CartTester{     public static void main(String [] args){         Cart c1 = new Cart ();         Cart c2 = new Cart ();         Cart c3 = new Cart ();          c1.create_cart(1);         c2.create_cart(2);         c3.create_cart(3);         System.out.println("====1====");         c1.addItem("Table", 3900.5);         c1.addItem("Chair", 1400.76);         c1.addItem(5400.87, "Television");         c1.addItem(5000.0, "Refrigerator");          System.out.println("====2====");         c2.addItem("Stove", 439.90);          System.out.println("====3====");         c3.addItem("Chair", 1400.5);         c3.addItem(3400.0, "Chair");          System.out.println("====4====");         c1.cartDetails();          System.out.println("====5====");         c2.cartDetails();          System.out.println("====6====");         c3.cartDetails();         c1.giveDiscount(10);          System.out.println("====7====");         c1.cartDetails();     } } </pre>	<pre> ====1==== Table added to cart 1. You have 1 item(s) in your cart now. Chair added to cart 1. You have 2 item(s) in your cart now. Television added to cart 1. You have 3 item(s) in your cart now. You already have 3 items on your cart ====2==== Stove added to cart 2. You have 1 item(s) in your cart now. ====3==== Chair added to cart 3. You have 1 item(s) in your cart now. Chair added to cart 3. You have 2 item(s) in your cart now. ====4==== Your cart(c1) : Table - 3900.5 Chair - 1400.76 Television - 5400.87 Discount Applied: 0.0% Total price: 10702.130000000001 ====5==== Your cart(c2) : Stove - 439.9 Discount Applied: 0.0% Total price: 439.9 ====6==== Your cart(c3) : Chair - 1400.5 Chair - 3400.0 Discount Applied: 0.0% Total price: 4800.5 ====7==== Your cart(c1) : Table - 3900.5 Chair - 1400.76 Television - 5400.87 Discount Applied: 10.0% Total price: 9631.917000000001 </pre>

### Task 3

Design the **Reader** class in such a way so that the following code provides the expected output.

- A reader will have a name, capacity to read and an array of books they are reading.
- The initial capacity of a reader will be 2. The initial name will be “New user”.

Driver Code	Expected Output
<pre>public class Reader_tester {     public static void main(String[] args){          System.out.println("1 =====");         Reader r1 = new Reader("Messi");         Reader r2 = new Reader("Ronaldo", 3);         System.out.println("2 =====");         r1.readerInfo();         System.out.println("3 =====");         r2.addBook("Java");         r2.addBook("Python");         r2.addBook("C++");         r2.readerInfo();         System.out.println("4 =====");         r1.addBook("C#");         r1.addBook("Rust");         r1.addBook("GoLang");         System.out.println("5 =====");         r2.addBook("Python");         System.out.println("6 =====");         r1.readerInfo();         System.out.println("7 =====");         r1.updateCapacity(3);         System.out.println("8 =====");         r1.addBook("GoLang");         System.out.println("9 =====");         r1.readerInfo();      } }</pre>	<pre>1 ===== A new reader is created! A new reader is created! 2 ===== Name: Messi Capacity: 2 Books: No books added yet 3 ===== Name: Ronaldo Capacity: 3 Books: Book 1: Java Book 2: Python Book 3: C++ 4 ===== No more capacity 5 ===== No more capacity 6 ===== Name: Messi Capacity: 2 Books: Book 1: C# Book 2: Rust 7 ===== Capacity has changed to 3 8 ===== 9 ===== Name: Messi Capacity: 3 Books: Book 1: C# Book 2: Rust Book 3: GoLang</pre>

## Task 4

You are building a tracker system that will keep track of a person's income and expenses.

- When the ***createTracker()*** method is invoked it sets the balance to 1.0 taka.
- The ***info()*** method **returns** a String with the trackers information.
- If the total balance becomes 0 after the ***expense()*** method is called it prints "You're broke!". Again if the available balance is less than the expense it prints "Not enough balance.". Otherwise the method prints "Balance updated" after updating the balance.
- The last expense and income history can be seen by using the ***history()*** method.

Driver Code	Output
<pre>public class Tester4{     public static void main(String[] args) {         MoneyTracker tr1 = new MoneyTracker();         System.out.println(tr1.info());         tr1.createTracker("John");         System.out.println("1 =====");         System.out.println(tr1.info());         System.out.println("2 =====");         tr1.income(1000);         System.out.println(tr1.info());         System.out.println("3 =====");         tr1.expense(800);         tr1.expense(100);         System.out.println(tr1.info());         System.out.println("4 =====");         tr1.showHistory();         System.out.println("5 =====");         tr1.expense(101);         System.out.println("6 =====");         tr1.expense(200);         System.out.println("7 =====");         tr1.income(200);         tr1.showHistory();         System.out.println("8 =====");     } }</pre>	<pre>A new money tracker has been launched. Name: null Current Balance: 0.0 1 ===== Name: John Current Balance: 1.0 2 ===== Balance Updated! Name: John Current Balance: 1001.0 3 ===== Balance Updated. Balance Updated. Name: John Current Balance: 101.0 4 ===== Last added: 1000.0 Last spent: 100.0 5 ===== You're broke! 6 ===== Not enough balance. 7 ===== Balance Updated! Last added: 200.0 Last spent: 101.0 8 =====</pre>

## Task 5

1	public class A{
2	public int x, y, z = 5;
3	public double p = 0.0;
4	public void methodA(int x, int m) {
5	this.x = methodB(this.x);
6	p = x + this.x % m * 3.0;
7	y = y + methodB(x++, this.x);
8	System.out.println(this.x + " " + x + y + " " + p) ;
9	}
10	public int methodB(int q, int n) {
11	int arr[] = {3,4,5};
12	arr[0] = arr[0] + this.x + n;
13	arr[1] = q + arr[1];
14	System.out.println(arr[0] + " " + arr[1] + " " + arr[2]) ;
15	return arr[1] + arr[2];
16	}
17	public int methodB(int y) {
18	if(y % 2 == 0) {
19	int temp = this.methodB(2, y);
20	return temp;
21	}
22	else{
23	return 4;
24	}
25	}
26	}

Driver Code	Output		
<pre> public class Tester11 {     public static void main(String [] args){         A a1;         a1 = new A();         a1.methodA(2,3);         a1.methodB(5,4);     } } </pre>			



## Task 6

1	public class Maze{
2	public int x;
3	public Maze(){
4	int x = 17;
5	this.methodB(x, -this.x);
6	}
7	public void methodA(){
8	int m = 0, x = 9;
9	m = methodB(m-3)+x;
10	this.x = ++x;
11	System.out.println(this.x+" "+m);
12	this.methodB(x,m);
13	System.out.println(x+" "+(m+this.x));
14	methodB(m);
15	}
16	public int methodB(int y){
17	x=y*y;
18	System.out.println(x+" "+y);
19	return x-11;
20	}
21	public void methodB(int z, int x){
22	z=z-2;
23	x=this.x-2*x;
24	System.out.println(z+" "+this.x);
25	}
26	}

[illegible]

## Ungraded Tasks (Optional)

(You don't have to submit the ungraded tasks)

### Task 1

Driver Code	Output
<pre>public class CustomerTester {     public static void main(String[] args) {         Customer c1 = new Customer();         c1.createCustomer("John");         System.out.println("1=====");         c1.showCart();         System.out.println("2=====");         c1.addItem("Apple", 2);         c1.addItem("Orange", 5);         c1.addItem("Bread", 5);         c1.addItem("Milk", 3);         c1.addItem("Eggs", 2);         System.out.println("3=====");         c1.showCart();         System.out.println("4=====");         c1.calculatePrice();         System.out.println("5=====");         Customer c2 = new Customer();         c2.createCustomer("Jane");         c2.addItem("Apple", 2, "Orange", 5);         c2.addItem("Chocolates", 15, "Bread", 5);         c2.addItem("Milk", 3);         System.out.println("6=====");         c2.showCart();         System.out.println("7=====");         c2.calculatePrice();     } }</pre>	<pre>1===== Customer: John 2===== Apple added to cart Orange added to cart Bread added to cart Milk added to cart Cart is full 3===== Customer: John Item: Apple Price: 2 Item: Orange Price: 5 Item: Bread Price: 5 Item: Milk Price: 3 4===== Total: 15 5===== Apple and Orange added to cart Chocolates and Bread added to cart Cart is full 6===== Customer: Jane Item: Apple Price: 2 Item: Orange Price: 5 Item: Chocolates Price: 15 Item: Bread Price: 5 7===== Total: 27</pre>

## Task 2

Driver Code	Sample Output
<pre>public class CalculatorTester {     public static void main(String[] args) {         Calculator calc = new Calculator();          System.out.println("1=====");         calc.add(10, 20);         System.out.println("2=====");         calc.add(5, 15, 25);         System.out.println("3=====");         calc.multiply(6, 7);         System.out.println("4=====");         calc.multiply(2, 3, 4);         System.out.println("5=====");         calc.multiply("Hello", 3);         System.out.println("6=====");         calc.multiply("Java", 5);     } }</pre>	<pre>1===== 30 2===== 45 3===== 42 4===== 24 5===== Hello-Hello-Hello 6===== Java-Java-Java-Java-Java</pre>

## Task 3

Driver Code	Sample Output
<pre>public class LibraryTest {     public static void main(String[] args) {         Book book1 = new Book();         book1.createBook("The Great Gatsby");          Book book2 = new Book();         book2.createBook("1984", "George Orwell");          Book book3 = new Book();         book3.createBook("To Kill a Mockingbird", "Harper Lee", "Fiction");          System.out.println(" ---Book Customization--- ");         book1.customizeGenre("Classic");         book1.customizePages(180);          book2.customizeGenre("Dystopian");         book2.customizePages(328);          book3.customizePages(281);          System.out.println();          System.out.println(" ---Library Inventory--- ");         book1.displayDetails();         book2.displayDetails();         book3.displayDetails();     } }</pre>	<pre> ---Book Customization---  Updated genre of "The Great Gatsby" to Classic. Updated pages of "The Great Gatsby" to 180 pages. Updated genre of "1984" to Dystopian. Updated pages of "1984" to 328 pages. Updated pages of "To Kill a Mockingbird" to 281 pages.   ---Library Inventory---  Title: The Great Gatsby, Author: Unknown, Genre: Classic, Pages: 180 Title: 1984, Author: George Orwell, Genre: Dystopian, Pages: 328 Title: To Kill a Mockingbird, Author: Harper Lee, Genre: Fiction, Pages: 281</pre>



## Task 4

Driver Code	Sample Output
<pre>public class MovieManagerTest {     public static void main(String[] args) {         Movie inception = new Movie();         inception.setMovieDetails("Inception", "Christopher Nolan", 8.8);          System.out.println("1=====");         inception.addActors("Leonardo DiCaprio", "Joseph Gordon-Levitt");         inception.addActors("Ellen Page");         inception.showInfo();          System.out.println("2=====");         Movie avengers = new Movie();         avengers.setMovieDetails("Avengers: Endgame", "Anthony Russo", 8.4);         avengers.addActors("Robert Downey Jr.", "Chris Evans", "Scarlett Johansson");         avengers.showInfo();          System.out.println("3=====");         Movie parasite = new Movie();         parasite.setMovieDetails("Parasite", "Bong Joon-ho");         parasite.addActors("Song Kang-ho", "Choi Woo-shik");         parasite.updateRating(8.6);         parasite.showInfo();          System.out.println("4=====");         parasite.updateRating(8.9);         parasite.showInfo();     } }</pre>	<pre>1===== Added actor "Leonardo DiCaprio" to "Inception". Added actor "Joseph Gordon-Levitt" to "Inception". Added actor "Ellen Page" to "Inception". Title: Inception Director: Christopher Nolan Rating: 8.8 Actors: Leonardo DiCaprio, Joseph Gordon-Levitt, Ellen Page 2===== Added actor "Robert Downey Jr." to "Avengers: Endgame". Added actor "Chris Evans" to "Avengers: Endgame". Added actor "Scarlett Johansson" to "Avengers: Endgame". Title: Avengers: Endgame Director: Anthony Russo Rating: 8.4 Actors: Robert Downey Jr., Chris Evans, Scarlett Johansson 3===== Added actor "Song Kang-ho" to "Parasite". Added actor "Choi Woo-shik" to "Parasite". Updated rating of "Parasite" to 8.6 Title: Parasite Director: Bong Joon-ho Rating: 8.6 Actors: Song Kang-ho, Choi Woo-shik 4===== Updated rating of "Parasite" to 8.9 Title: Parasite Director: Bong Joon-ho Rating: 8.9 Actors: Song Kang-ho, Choi Woo-shik</pre>

## Task 5

1	public class Test3 {
2	int x = 2, y = 4, sum = 3;
3	int arr[] = {x, y, sum};
4	public void methodA(int x) {
5	arr[0] += methodB(y, this.x) + methodC(x);
6	System.out.println(x + " " + this.x + " " + sum);
7	arr[1] += this.x * (++y) / (sum % x);
8	System.out.println(y + " " + sum + " " + this.x);
9	arr[2] += methodC(x) + methodB(this.x, sum);
10	System.out.println(arr[0] + " " + arr[1] + " " + arr[2]);
11	}
12	public int methodB(int q, int n) {
13	int arr2[] = {7, 8};
14	int a = (arr2[0]++) - q;
15	int b = (++arr2[1]) - n;
16	return a + b;
17	}
18	public int methodC(int z) {
19	z = sum + methodB(x, sum) - z;
20	return z/2;
21	}
22	}

<pre> public class Tester3{     public static void main(String [] args){         Test3 t3 = new Test3();         t3.methodA(7);     } } </pre>	<b>Outputs</b>		