

Lab Assignment 02



Inspiring Excellence

Course Code:	CSE111
Course Title:	Programming Language II
Topic:	OOP Basics, Instance Variable and Instance Method
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

You are given the following “**University**” class:

```
public class University{  
    public String name;  
    public String country;  
}
```

Now write a Java **tester** class named “**UniversityTester**”.

- a. Write the main method and create 2 objects of **University** class and print the location of the objects and print the instance variables of the objects. Are the location of the objects the same?

- b. Now change the instance variables of the first object.
name = “Imperial College London”
country = “England”

Now change the instance variables of the second object.

name = “BRAC University”
country = “Bangladesh”

Now check if the instance variables of both objects have changed or not and whether the instance variables of both objects are of the same value or not.

Task 2

Complete the “Cat” class so the main method produces the following output:

Test Class	Output
<pre>public class Test7{ public static void main(String [] args){ Cat c1 = new Cat(); System.out.println("1====="); c1.printCat(); c1.color = "Black"; System.out.println("2====="); c1.printCat(); c1.color = "Brown"; c1.action = "jumping"; System.out.println("3====="); c1.printCat(); } }</pre>	<pre>1===== White cat is sitting 2===== Black cat is sitting 3===== Brown cat is jumping</pre>

Task 3

Design the **Course** class to generate the correct output from the driver code provided below:

Driver Code	Output
<pre>public class Tester3{ public static void main(String[] args) { Course c1 = new Course(); Course c2 = new Course(); c1.updateDetails("Programming Language I", "CSE110", 3); System.out.println("===== 1 ====="); c1.displayCourse(); c2.updateDetails("Data Structures", "CSE220", 3); System.out.println("===== 2 ====="); c2.displayCourse(); c1.updateDetails("Programming Language II", "CSE111", 3); System.out.println("===== 3 ====="); c1.displayCourse(); } }</pre>	<pre>===== 1 ===== Course Name: Programming Language I Course Code: CSE110 Course Credit: 3 ===== 2 ===== Course Name: Data Structures Course Code: CSE220 Course Credit: 3 ===== 3 ===== Course Name: Programming Language II Course Code: CSE111 Course Credit: 3</pre>

Task 4

Design the **CellPhone** class so that the **main** method of tester class can produce the following output:

Tester Class	Output
<pre>public class Tester4{ public static void main(String[]args){ CellPhone phone1 = new CellPhone(); phone1.printDetails(); phone1.model ="Nokia 1100"; System.out.println("1#####"); phone1.storeContact("Joy - 01834"); System.out.println("====="); phone1.printDetails(); System.out.println("2#####"); phone1.storeContact("Toya - 01334"); phone1.storeContact("Aayan - 01135"); System.out.println("====="); phone1.printDetails(); System.out.println("3#####"); phone1.storeContact("Sani - 01441"); System.out.println("====="); phone1.printDetails(); } }</pre>	<pre>Phone Model unknown Contacts Stored 0 1##### Contact Stored ===== Phone Model Nokia 1100 Contacts Stored 1 Stored Contacts: Joy - 01834 2##### Contact Stored Contact Stored ===== Phone Model Nokia 1100 Contacts Stored 3 Stored Contacts: Joy - 01834 Toya - 01334 Aayan - 01135 3##### Memory full. New contact can't be stored. ===== Phone Model Nokia 1100 Contacts Stored 3 Stored Contacts: Joy - 01834 Toya - 01334 Aayan - 01135</pre>

Task 5

1	<code>public class Task5 {</code>
2	<code> public int p = 3, y = 2, sum;</code>
3	<code> public void methodA(){</code>
4	<code> int x = 0, y = 0;</code>
5	<code> y = y + this.y;</code>
6	<code> x = sum + 2 + p;</code>
7	<code> sum = x + methodB(p, y) + y;</code>
8	<code> System.out.println(x + " " + y+ " " + sum);</code>
9	<code> }</code>
10	<code> public int methodB(int p, int n){</code>
11	<code> int x = 0;</code>
12	<code> y = y + (++p);</code>
13	<code> x = x + 2 + n;</code>
14	<code> sum = sum + x + y;</code>
15	<code> System.out.println(x + " " + y+ " " + sum);</code>
16	<code> return sum;</code>
17	<code>}</code>
18	<code>}</code>

Driver code:

<code>public class Tester5 {</code>	Outputs		
<code> public static void main(String [] args){</code>	x	y	Sum
<code> Task5 t1 = new Task5();</code>			
<code> t1.methodA();</code>			
<code> t1.methodA();</code>			
<code> }</code>			
<code>}</code>			

Task 6

1	public class Test6{
2	public int sum;
3	public int y;
4	public void methodA(){
5	int x=2, y =3;
6	int [] msg ={3, 7};
7	y = this.y + msg[0];
8	methodB(msg[1]++, msg[0]);
9	x = x + this.y + msg[1];
10	sum = x + y + msg[0];
11	System.out.println(x + " " + y+ " " + sum);
12	}
13	public void methodB(int mg2, int mg1){
14	int x = 0;
15	y = this.y + mg2;
16	x = x + 19 + mg1;
17	sum = this.sum + x + y;
18	mg2 = y + mg1;
19	mg1 = mg2 + x + 2;
20	System.out.println(x + " " + y+ " " + sum);
21	}
22	}

Driver code:

```
public class Tester6{
    public static void main (String args[]){
        Test6 t1 = new Test6();
        t1.methodB(5,-8);
        Test6 t2 = new Test6();
        t2.methodA();
    }
}
```

Outputs

HOMEWORK

Task 1

Design the “**ImaginaryNumber**” class to generate the **output** given below:

Tester Class	Output
<pre>public class Tester7{ public static void main(String [] args){ ImaginaryNumber num1 = new ImaginaryNumber(); String p = num1.printNumber(); System.out.println(p); System.out.println("1*****"); num1.realPart=3; num1.imaginaryPart=7; System.out.println(num1.printNumber()); System.out.println("2*****"); ImaginaryNumber num2 = new ImaginaryNumber(); num2.realPart=1; num2.imaginaryPart=9; System.out.println(num2.printNumber()); } }</pre>	<pre>0 + 0i 1***** 3 + 7i 2***** 1 + 9i</pre>

Task 2

Implement the “**Assignment**” class with necessary properties, so that the given output is produced for the provided driver code.

Driver Class	Output
<pre>public class AssignmentTester{ public static void main(String [] args){ Assignment as1 = new Assignment(); as1.printDetails(); System.out.println("1-----"); as1.tasks = 11; as1.difficulty = "Moderate"; as1.submission = true; as1.printDetails(); System.out.println("2-----"); } }</pre>	<pre>Number of tasks: 0 Difficulty level: null Submission required: false 1----- Number of tasks: 11 Difficulty level: Moderate Submission required: true 2----- Assignment will not require submission</pre>

<pre> System.out.println(as1.makeOptional()); System.out.println("3-----"); as1.printDetails(); System.out.println("4-----"); Assignment as2 = new Assignment(); as2.tasks = 12; as2.difficulty = "Hard"; as2.submission = false; as2.printDetails(); System.out.println("5-----"); System.out.println(as2.makeOptional()); } } </pre>	3----- Number of tasks: 11 Difficulty level: Moderate Submission required: false 4----- Number of tasks: 12 Difficulty level: Hard Submission required: false 5----- Submission is already not required
--	--

Task 3

Create an **Employee** class to provide the expected output.

- An employee will have a name, salary and designation.
- The name will be assigned inside the `newEmployee()` method
- Whenever a New Employee joins his/her salary will be **Tk. 30,000** and the designation will be **junior**.
- Employees with salaries greater than **Tk. 50,000** and **Tk. 30,000** need to pay **30%** and **10%** of salary as tax respectively.
- Employees can be promoted to **senior**, **lead** and **manager** positions. Based on their promotion they will get an increment of **Tk. 25,000**, **Tk. 50,000** and **Tk. 75,000** respectively.

Driver Code	Expected Output
<pre> public class Tester9{ public static void main(String[] args){ Employee emp1 = new Employee(); Employee emp2 = new Employee(); Employee emp3 = new Employee(); emp1.newEmployee("Harry Potter"); emp2.newEmployee("Hermione Granger"); emp3.newEmployee("Ron Weasley"); System.out.println("1 ======"); emp1.displayInfo(); System.out.println("2 ======"); emp2.displayInfo(); System.out.println("3 ======"); emp3.displayInfo(); System.out.println("4 ======"); emp1.calculateTax(); System.out.println("5 ======"); emp1.promoteEmployee("lead"); System.out.println("6 ======"); emp1.calculateTax(); System.out.println("7 ======"); emp1.displayInfo(); System.out.println("8 ======"); emp3.promoteEmployee("manager"); System.out.println("9 ======"); emp3.calculateTax(); System.out.println("10 ======"); emp3.displayInfo(); } } </pre>	<pre> 1 ====== Employee Name: Harry Potter Employee Salary: 30000.0 Tk Employee Designation: junior 2 ====== Employee Name: Hermione Granger Employee Salary: 30000.0 Tk Employee Designation: junior 3 ====== Employee Name: Ron Weasley Employee Salary: 30000.0 Tk Employee Designation: junior 4 ====== No need to pay tax 5 ====== Harry Potter has been promoted to lead New Salary: 80000.00 Tk 6 ====== Harry Potter Tax Amount: 24000.0 Tk 7 ====== Employee Name: Harry Potter Employee Salary: 80000.0 Tk Employee Designation: lead 8 ====== Ron Weasley has been promoted to manager New Salary: 105000.00 Tk 9 ====== Ron Weasley Tax Amount: 31500.0 Tk 10 ====== Employee Name: Ron Weasley Employee Salary: 105000.0 Tk Employee Designation: manager </pre>

Task 4

Implement the “**MobilePhone**” class with necessary properties to produce the given output for the provided driver code.

Driver Class	Output
<pre>public class MobilePhoneTester{ public static void main(String args[]){ MobilePhone m1 = new MobilePhone(); MobilePhone m2 = new MobilePhone(); m1.setContactCapacity(5); m2.setContactCapacity(100); m1.details(); System.out.println("1-----"); m1.addContact("John", 9866); m1.addContact("Maria", 7865); System.out.println("2-----"); m1.details(); System.out.println("3-----"); m1.makeCall(9866); System.out.println("4-----"); m1.addContact("Henry", 2365); System.out.println("5-----"); m1.makeCall(7552); m1.makeCall(2365); System.out.println("6-----"); m1.addContact("Gomes", 4589); m1.addContact("Antony", 8421); m1.addContact("Tony", 5789); System.out.println("7-----"); m1.details(); } }</pre>	<p>Total Contacts: 0 Contact List: 1----- The contact of John is added. The contact of Maria is added. 2----- Total Contacts: 2 Contact List: John:9866 Maria:7865 3----- Calling John . . . 4----- The contact of Henry is added. 5----- Calling 7552 . . . Calling Henry . . . 6----- The contact of Gomes is added. The contact of Antony is added. Storage Full!! 7----- Total Contacts: 5 Contact List: John:9866 Maria:7865 Henry:2365 Gomes:4589 Antony:8421</p>

Task 5

1	public class B {
2	public int temp = 4;
3	public int sum, y, x;
4	public void methodA(int m){
5	int [] n = {2,5};
6	int x = 0;
7	y = m + this.methodB(x++,m)+(temp++);
8	x = this.x + 2 + n[0];
9	sum = sum + x + y;
10	n[0] = sum + 2;
11	System.out.println(n[0]+" "+ x+ " " + sum);
12	}
13	public int methodB(int m, int n){
14	int y = 4 + this.y + m;
15	x = this.y + y + (++temp) - n;
16	sum = x + y + this.sum;
17	System.out.println(y+ " " + this.x + " " +sum);
18	return x;
19	}
20	}

```
public class Tester11 {
    public static void main(String [] args){
        B t1 = new B();
        t1.methodA(5);
        B t2 = new B();
        t2.methodB(12, 2);
    }
}
```

Outputs

Task 6

1	public class A{
2	public int x = 3, y = 5, sum = 9;
3	public int methodA(int temp, int x){
4	this.x += (x++) + temp;
5	if(temp % 5 == 2){
6	sum += (this.y++) + temp;
7	}
8	else{
9	sum += 3;
10	if(y > 5) ++y;
11	}
12	System.out.println(this.x + " " + y + " " + sum);
13	return this.x;
14	}
15	public void methodB(int y){
16	int temp = (y++) + this.y;
17	this.y = (++temp) + methodA(temp, y) + x;
18	sum = y + (++this.x) + (temp++);
19	System.out.println(x + " " + y + " " + (sum++));
20	}
21	public void methodC(int y){
22	y = (this.x++) + sum + 3;
23	System.out.println(x + " " + y + " " + sum);
24	}
25	}

Driver code:

```
public class Test12{
    public static void main(String [] args) {
        A a1 = new A();
        a1.methodA(2, 4);
        a1.methodB(3);
        A a2 = new A();
        a2.methodC(7);
        a1.methodB(3);
    }
}
```

Outputs

Outputs		

Ungraded Tasks (Optional)

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

Task 1

Complete the **Bird** class so that main method produces the following **output**:

Test class	Output
<pre>public class BirdTest{ public static void main(String args[]) { Bird b1 = new Bird(); b1.name = "Parrot"; b1.flyUp(3); b1.makeNoise(); b1.flyDown(5); b1.flyDown(2); b1.flyDown(1); Bird b2 = new Bird(); b2.name = "Eagle"; b2.flyUp(5); b2.flyDown(5); b2.makeNoise(); } }</pre>	Parrot has flown up 3 feet. Squawk Parrot cannot fly down 5 feet. Parrot has flown down 2 feet. Parrot has flown down 1 feet and landed. Eagle has flown up 5 feet. Eagle has flown down 5 feet and landed. Squeee

Task 2

Implement the “**ChickenBurger**” class with necessary properties, so that the given output is produced for the provided driver code.

[Note:

1. There are four available spice levels: **Mild**, **Spicy**, **Naga** and **Extreme**. You can store these values in a String array.
2. You might need to use the `equals()` method to compare two string values.]

Driver Class	Output
<pre>public class BurgerMaker{ public static void main(String [] args){ ChickenBurger b1 = new ChickenBurger(); System.out.println(b1.bun); } }</pre>	Sesame 200 Less Not Set -----1----- Cannot serve now. Customize Spice

```

System.out.println(b1.price);
System.out.println(b1.sauceOption);
System.out.println(b1.spiceLevel);
System.out.println("-----1-----");
System.out.println(b1.serveBurger());
System.out.println("-----2-----");
b1.customizeSpiceLevel("Extreme Jhaal");
b1.customizeSpiceLevel("Spicy");
System.out.println("-----3-----");
System.out.println(b1.serveBurger());
System.out.println("-----4-----");
ChickenBurger b2 = new ChickenBurger();
b2.bun = "Brioche";
b2.price += 50;
b2.sauceOption = "Regular";
b2.customizeSpiceLevel("Naga");
System.out.println("-----5-----");
System.out.println(b2.serveBurger());
}

}

```

Level first.

-----2-----
This spice level is unavailable.
Spice level set to Spicy.

-----3-----
The burger is being served:-
Bun Type: Sesame
Price: 200
Sauce Option: Less
Spice Level: Spicy

-----4-----
Spice level set to Naga.

-----5-----
The burger is being served:-
Bun Type: Brioche
Price: 250
Sauce Option: Regular
Spice Level: Naga

Task 3

Design the **MagicPotion** class so that the following Tester class generates the expected output

- Potion cannot be activated if potion strength below 5

Driver Code	Outputs
public class MagicTester {	=====
public static void main(String[] args) {	Potion colour: blue
MagicPotion potion = new MagicPotion();	Potion strength: 4
potion.setDetails("blue", 4);	Is active: false
System.out.println("=====");	=====
potion.activate();	Potion colour: blue
potion.describe();	Potion strength: 5
System.out.println("=====");	Is active: false
potion.boost();	=====
potion.describe();	Potion colour: blue
System.out.println("=====");	Potion strength: 5
potion.activate();	Is active: true
potion.describe();	=====
System.out.println("=====");	Is potion strong? false
System.out.println("Is potion strong? " +	=====
potion.isStrong());	Already activated
System.out.println("=====");	Potion colour: blue
potion.boost();	Potion strength: 6
potion.activate();	Is active: true
potion.describe();	=====
System.out.println("=====");	Is potion strong? false
System.out.println("Is potion strong? " +	=====
potion.isStrong());	Is potion strong? true
System.out.println("=====");	=====
potion.boost();	Potion colour: blue
System.out.println("Is potion strong? " +	Potion strength: 4
potion.isStrong());	Is active: false
System.out.println("=====");	=====
potion.weaken();	
potion.weaken();	
potion.weaken();	
potion.describe();	
}	
}	

Task 4

```

1 public class TraceA{
2     public int x = 0, y = 8, sum = 0;
3     public void methodA(int y, int x){
4         int [] arr = {4, 7};
5         this.x += x;
6         arr[0] = y++;
7         arr[1] += arr[1] % arr[0] * x;
8         if ( y % 2 == 0){
9             sum = x + methodB(arr[0]++, arr[1], y) + this.x;
10        }
11    else{
12        sum = this.y + methodB(++arr[0], arr[1], x) + this.y;
13    }
14    System.out.println(x+ " " + arr[0] + " " + sum);
15  }
16  public int methodB(int a, int b, int x){
17      sum = sum % x;
18      if( a % b == x ){
19          return this.y--;
20      }
21      this.x = a * b / x;
22      y += this.x % this.y;
23      System.out.println(a + " " + this.x + " " + y);
24      return y;
25  }
26 }
```

Driver code:

```

public class TesterX{
    public static void main(String [] args){
        TraceA t1 = new TraceA();
        t1.methodA(4, 7);
        int x = t1.methodB(3,2,1);
        System.out.println(t1.y + " " + t1.sum + " " + x);
    }
}
```

Output
