

Lab Assignment 02



Inspiring Excellence

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|------------------|---|
| Course Code: | CSE111 |
| Course Title: | Programming Language II |
| Topic: | OOP Basics, Instance Variable and Instance Method |
| Number of Tasks: | 11 (Coding: 08, Tracing: 03) |

[Submit all the Coding Tasks (Task 1 to 8) in the Google Form shared on buX before the next lab. Submit the Tracing Tasks (Task 9 to 11) 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]

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**”.

- 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?
- 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

Design the “**Student**” class so that the main method prints the following:

| Tester Class | Output |
|--|--|
| <pre>public class StudentTester1{ public static void main(String [] args){ Student s1 = new Student(); System.out.println("Name of the Student: "+s1.name); System.out.println("ID of the Student: "+s1.id); s1.name = "Bob"; s1.id = 123; System.out.println("Name of the Student: "+s1.name); System.out.println("ID of the Student: "+s1.id); } }</pre> | <pre>Name of the Student: Default ID of the Student: 0 Name of the Student: Bob ID of the Student: 123</pre> |

Task 3

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

| Driver Code | Output |
|--|---|
| <pre>public class CourseTester{ public static void main(String args []){ CSECourse c1 = new CSECourse(); System.out.println("Course Name: "+c1.courseName); System.out.println("Course Code: "+c1.courseCode); System.out.println("Credit: "+c1.credit); } }</pre> | Course Name: Programming Language II Course Code: CSE111 Credit: 3 |

Task 4

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

| Tester Class | Output |
|---|--|
| <pre>public class Tester6{ public static void main(String [] args){ ImaginaryNumber num1 = new ImaginaryNumber(); num1.printNumber(); System.out.println("1*****"); num1.realPart=3; num1.imaginaryPart=7; num1.printNumber(); System.out.println("2*****"); ImaginaryNumber num2 = new ImaginaryNumber(); num2.realPart=1; num2.imaginaryPart=9; num2.printNumber(); } }</pre> | 0 + 0i 1***** 3 + 7i 2***** 1 + 9i |

Task 5

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

| Driver Code | Output |
|--|---|
| <pre>public class Tester5{ public static void main(String[] args) { Course c1 = new Course(); Course c2 = new Course(); System.out.println("===== 1 ====="); c1.updateDetails("Programming Language I","CSE110", 3); c1.displayCourse(); System.out.println("===== 2 ====="); c2.updateDetails("Data Structures","CSE220",3); c2.displayCourse(); System.out.println("===== 3 ====="); c1.updateDetails("Programming Language II","CSE111",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 6

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-----"); System.out.println(as1.makeOptional()); System.out.println("3-----"); } }</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 3----- Number of tasks: 11</pre> |

| | |
|--|---|
| <pre> 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> | <pre> Difficulty level: Moderate Submission required: false 4----- Number of tasks: 12 Difficulty level: Hard Submission required: false 5----- Submission is already not required </pre> |
|--|---|

Task 7

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

| Tester Class | Output |
|--|---|
| <pre> public class Tester9{ 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. ===== </pre> |

| | |
|--|---|
| | Phone Model Nokia 1100 Contacts Stored 3 Stored Contacts: Joy - 01834 Toya - 01334 Aayan - 01135 |
|--|---|

Task 8

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 Tester3{ 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 ====="); </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 </pre> |

```
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();
}
}
```

```
6 =====
Harry Potter Tax Amount: 24000.00 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: 31500.00 Tk
10 =====
Employee Name: Ron Weasley
Employee Salary: 105000.0 Tk
Employee Designation: manager
```

Task 9

Consider the following class:

```
public class Human{
    public int age;
    public double height;
}
```

Show the output of the following sequence of statements:

| <code>Human h1 = new Human();</code> | Output |
|---|--------|
| <code>Human h2 = new Human();</code> | |
| <code>h1.age = 21;</code> | |
| <code>h1.height = 5.5;</code> | |
| <code>System.out.println(h1.age);</code> | |
| <code>System.out.println(h1.height);</code> | |
| <code>h2.height = h1.height - 3;</code> | |
| <code>System.out.println(h2.height);</code> | |
| <code>h2.age = h1.age++;</code> | |
| <code>System.out.println(h1.age);</code> | |
| <code>h2 = h1;</code> | |
| <code>System.out.println(h2.age);</code> | |
| <code>System.out.println(h2.height);</code> | |
| <code>h2.age++;</code> | |
| <code>h2.height++;</code> | |
| <code>System.out.println(h1.age);</code> | |
| <code>System.out.println(h1.height);</code> | |
| <code>h1.age = ++h2.age;</code> | |
| <code>System.out.println(h2.age);</code> | |
| <code>System.out.println(h2.height);</code> | |
| | |

Task 10

Consider the following class:

```
public class Student{
    public String name;
    public double cgpa;
}
```

Show the output of the following sequence of statements:

| | |
|------------------------------------|---------------|
| Student s1 = new Student(); | Output |
| Student s2 = new Student(); | |
| Student s3 = null; | |
| s1.name = "Student One"; | |
| s1.cgpa = 2.3; | |
| s3 = s1; | |
| s2.name = "Student Two"; | |
| s2.cgpa = s3.cgpa + 1; | |
| s3.name = "New Student"; | |
| System.out.println(s1.name); | |
| System.out.println(s2.name); | |
| System.out.println(s3.name); | |
| System.out.println(s1.cgpa); | |
| System.out.println(s2.cgpa); | |
| System.out.println(s3.cgpa); | |
| s3 = s2; | |
| s1.name = "old student"; | |
| s2.name = "older student"; | |
| s3.name = "oldest student"; | |
| s2.cgpa = s1.cgpa - s3.cgpa + 4.5; | |
| System.out.println(s1.name); | |
| System.out.println(s2.name); | |
| System.out.println(s3.name); | |
| System.out.println(s1.cgpa); | |
| System.out.println(s2.cgpa); | |
| System.out.println(s3.cgpa); | |

Task 11

| | |
|----|---|
| 1 | public class Task11 { |
| 2 | public int p = 3, y = 2, sum; |
| 3 | public void methodA(){ |
| 4 | int x = 0, y = 0; |
| 5 | y = y + this.y; |
| 6 | x = sum + 2 + p; |
| 7 | sum = x + y + methodB(p, y); |
| 8 | System.out.println(x + " " + y+ " " + sum); |
| 9 | } |
| 10 | public int methodB(int p, int n){ |
| 11 | int x = 0; |
| 12 | y = y + (++p); |
| 13 | x = x + 2 + n; |
| 14 | sum = sum + x + y; |
| 15 | System.out.println(x + " " + y+ " " + sum); |
| 16 | return sum; |
| 17 | } |
| 18 | } |

Driver code:

| <pre> public class Tester11 { public static void main(String [] args){ Task11 t1 = new Task11 (); t1.methodA(); t1.methodA(); } } </pre> | Outputs | | |
|--|---------|---|-----|
| | x | y | Sum |
| | | | |
| | | | |
| | | | |
| | | | |

Ungraded Tasks (Optional)

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

Task 1

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("====="); c1.printCat(); c1.color = "Black"; System.out.println("====="); c1.printCat(); c1.color = "Brown"; c1.action = "jumping"; System.out.println("====="); c1.printCat(); } }</pre> | <pre>===== White cat is sitting ===== Black cat is sitting ===== Brown cat is jumping</pre> |

Task 2

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

| Test class | Output |
|---|--|
| <pre>public class Test8{ 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); } }</pre> | <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. Squee</pre> |

| | |
|--|--|
| <pre> b2.flyDown(5); b2.makeNoise(); } }</pre> | |
|--|--|

Task 3

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); 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";</pre> | <pre> Sesame 200 Less Not Set -----1----- Cannot serve now. Customize Spice 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</pre> |

| | |
|---|--|
| <pre> b2.customizeSpiceLevel("Naga"); System.out.println("-----5-----"); System.out.println(b2.serveBurger()); } } </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> | <pre> 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 </pre> |

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Task 5

| | |
|----|---|
| 1 | public class Test1{ |
| 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 | } |

| | | | |
|---|----------------|--|--|
| <pre> public class Tester5{ public static void main (String args[]){ Test1 t1 = new Test1(); t1.methodB(5,-8); Test1 t2 = new Test1(); t2.methodA(); } } </pre> | Outputs | | |
| | | | |
| | | | |
| | | | |