Lab Workbook 2

Software Development HDSWD
Object Oriented Programming Basics Part 2
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Software Life Cycle

The sequence of stages from conception to operation of a program is called the **software life cycle**. And **software engineering** is the application of a systematic and disciplined approach to the development, testing and maintenance of a program. There are five major phases in software life cycle: analysis, design, coding, testing and operation.

Phase	Description
Analysis	In the analysis phase we analyse the problem and determine whether a solution is possible
Design	In the design phase we propose a detailed design of the program. For an object-oriented design, the output from this phase will be a set of classes/objects. An object diagram or I-P-O diagram can be used to show how they communicate among themselves.
Coding	In the coding phase we implement the design into an actual program. Once we have a well-constructed design, implementing it into actual code is really not that difficult.
Testing	In this phase we run the program using different sets of data to show that the program runs correctly.
Operation	Finally, after the testing is successfully completed, we enter the operation phase in which the program will be put into actual use. The most important and time-consuming activity during the operation phase is software maintenance.

Problem 1: Develop a program that takes user input and calculates the area of a Rectangle

area = length * breadth

1. Problem Definition

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2. Design - Overall Plan

Illustrate the design of the program using an Object diagram. You can illustrate your diagram on a separate sheet but make sure to keep it. Describe the classes and objects you will use.

3. Implementation

It is now time to translate your design document into code. You can do this in a number of small steps.

a. Get the input from the user
b. Perform the computation
c. Display the output. The output should be displayed in a meaningful way either in a message box or an output box.

4. Testing

To make sure your program runs correctly you must perform some tests. Fill in the below table.

length	width	Output Expected Result	Actual Result

Problem 2: Develop a program that takes user input and calculates the area of a Circle

$$\text{area} = \Pi r^2$$

1. Problem Definition

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2. Design - Overall Plan

Illustrate the design of the program using an Object diagram. You can illustrate your diagram on a separate sheet but make sure to keep it. Describe the classes and objects you will use.

3. Implementation

It is now time to translate your design document into code. You can do this in a number of small steps.

a. Get the input from the user
b. Perform the computation
c. Display the output. The output should be displayed in a meaningful way either in a message box or an output box.

Note We can use a **constant** for PI. The value of PI is 3.14. What line of code do we need to declare a **constant**?

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4. Testing

To make sure your program runs correctly you must perform some tests. Fill in the below table.

Input (radius)	Expected Result (area of circle)	Actual Result (area of circle)

Problem 3: Develop a program that allows the user to enter a number of hours and converts this number to its equivalent in minutes.

1. Problem Definition

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2. Design - Overall Plan

Illustrate the design of the program using an Object diagram. You can illustrate your diagram on a separate sheet but make sure to keep it. Describe the classes and objects you will use.

3. Implementation

It is now time to translate your design document into code. You can do this in a number of small steps.

a. Get the input from the user
b. Perform the computation
c. Display the output. The output should be displayed in a meaningful way.

4. Testing

To make sure your program runs correctly you must perform some tests. Fill in the below table.

Input **Hours**	**Output** **Expected result**	**Actual Result**

Problem 4: Write an application that asks the user how many hours per week they work and their hourly rate of pay. The program should then calculate their earnings for that week and display the result.

1. Problem Definition

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2. Design - Overall Plan

Illustrate the design of the program using an Object diagram. You can illustrate your diagram on a separate sheet but make sure to keep it. Describe the classes and objects you will use.

3. Implementation

It is now time to translate your design document into code. You can do this in a number of small steps.

a. Get the input from the user
b. Perform the computation
c. Display the output. The output should be displayed in a meaningful way.

4. Testing

To make sure your program runs correctly you must perform some tests. Fill in the below table.

Input No. Hrs	Rate	Output Expected result	Actual Result