



**Bahria University, Islamabad**

**Department of Software Engineering**

**Computing Programming**

**(Fall-2023)**

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Task No:	Task Wise Marks		Documentation Marks		Total Marks (20)
	Assigned	Obtained	Assigned	Obtained	
1	3		5		
2	3				
3	3				
4	3				
5	3				

**Comments:**

**Signature**

## **Assignment 1: Problem Solving (CLO-2)**

### **■ Problem #1**

Imagine you are developing a GPS navigation system. You are given a map with various locations and the roads connecting them. Your task is to write an algorithm to find the shortest path from one location to another. You can assume that you have a list of locations and the distance between each pair of locations. Your algorithm should output the shortest path and the total distance

#### **Solution:**

- START
- Read/input List of locations and their connecting path with distance of each path. (INPUT)
- Now set the starting location and ending location. (INPUT)
- Now determine the paths that connect the two locations. (PROCESSING)
- Now according to the data of distances of each path select the shortest distance path. (PROCESSING)
- Display the shortest path to reach the desired location with the total distance. (OUTPUT)
- END

### **■ Problem #2**

You are working on a project where you need to sort a list of numbers in ascending order. Design an algorithm to efficiently sort a list of integers. You should consider various sorting algorithms, evaluate their time complexity, and choose the most suitable one for the task.

#### **Solution:**

- START
- Read/Input the series of numbers. (INPUT)
- Assign the series of numbers to Arrays. (PROCESSING)
- Now compare the elements from left to right. If the first element is greater than the second elements and so on, the values of elements in arrays will swap. (PROCESSING)
- The swapping will continue in loop until the series of numbers isn't arranged in ascending order. (PROCESSING)
- Print the ascending series of numbers. (OUTPUT)
- END

### ■ Problem #3

The Fibonacci sequence is a series of numbers where each number is the sum of the two preceding ones (e.g., 0, 1, 1, 2, 3, 5, 8, 13, ...). Write an algorithm to calculate the nth Fibonacci number. Your algorithm should be efficient and capable of handling large values of n.

#### **Solution:**

- Start.
- Take value of 'n' for which we want to find Fibonacci number.
- If 'n' is 0 or 1 return 'n' as output.
- Otherwise declare 2 variables a & b to value 0 and 1 respectively.
- Declare another variable C.
- Loop the following and -1 times:  
    Calculate a + b and storing c  
    Update a with the value of b  
    Update b with the value of c
- value of c is our Fibonacci number after loop.
- Stop.

### ■ Problem #4

You are tasked with creating an algorithm for a store's inventory management system. Your algorithm should be able to add and remove items from the inventory, update the quantity of existing items, and generate reports of the items and their quantities. Design an algorithm that efficiently manages the store's inventory based on these requirements.

#### **Solution:**

- Start.
- Create an empty inventory to store items
- Adding:  
    Check if the given item with same ID exists in inventory  
    if exists increase its quantity  
    if not then added a new item entry with details and quantity
- Removing:  
    Check if the given item with the same ID exists  
    Exists remove the given amount of item  
    If not then indicate that item not found

- Reporting:

Go to inventory again and list all items with their details like ID, name, description, price and quantity.

[END]