Assignment – 1   **Total – 15 marks**

1. A company is tracking its profit for the last 10 months.**[4 marks]**

Month	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Profit	3	-1	9	-2	4	3	1	-5	3	2

   Here, positive value means company has made profit and negative value means it has
   made loss. The manager wants to know the **longest period of months** during which the
   company continuously made profit in every month.
   Expected output:
   Longest consecutive profit period = 3 months
   Month range = {M5, M6, M7}
   Now, solve the problem using **Divide and Conquer** technique.

2. You are on a **hill climbing expedition**, and to stay energized, you can carry **3 types of
   energy drinks**. Each drink contains a different amount of glucose per liter, and your
   goal is to choose which drinks to consume in order to **minimize the glucose level** while
   maintaining your energy. You can drink a **maximum of 6 liters** in total. **[3 marks]**

Drink type	Bottle size	Total glucose per bottle
Galxose-D	3L	75gm
GlucoMax	4L	80gm
Sting	5L	150gm

   Print the minimum glucose level you have to consume and which drinks in what
   amount.

3. A retailer is purchasing products from a supplier to stock in their store. Each
   product is sold in **bundle** with a specific **weight.** The retailer purchases product in
   wholesale rate and sale them in retail price. The retailer can purchase a fraction of
   the bundle if he wants. The warehouse has a fixed capacity, and the retailer aims to
   maximize the **total profit** while staying within the weight limit.
   Consider the following products with the total weight, wholesale price and retail
   price (per kg). **[4 marks]**

product	Weight of a bundle (kg)	Wholesale price of the bundle	Retail price of per kg
Rice	100	4000	55
Sugar	200	9000	62
Wheat	350	7000	30
Onion	250	12000	80

   If the warehouse capacity is 600 kg, then find out which products the retailer should
   buy so that he can make maximum profit. Print the maximum profit and selected items.
   [**Note that:** profit = retail price - wholesale price]

4. A meteorologist is analyzing temperature trends over several days. They have recorded the daily temperatures in an array and want to identify the **maximum average temperature trend** over any 3-day period to understand the warmest trends in a region.

You are given an array where each element represents the daily temperature. Using the **divide and conquer technique**, find the 3 consecutive days (subarray of size 3) that have the **highest total temperature**. **[4 marks]**

Example:

- Array of daily temperatures: [28, 31, 29, 34, 30, 33, 27, 35, 32].
- Output: The 3-day subarray with the maximum total temperature is [34, 30, 33] (total = 97).

Submission guideline:

- Solve 4 problems in 4 .cpp files and rename them as 011XXXXX_1.cpp(for problem 1), 011XXXXX_2.cpp(for problem 2) and so on. Replace 011XXXXX with your student Id.
- Submit only the 4 cpp files in eLMS.
- **Submission deadline**: 11 PM , **15 September** 2025 (Monday)

****You will be asked to write pseudocodes as part of the viva. So, write the code on your own and try to understand each line of it. Your assignment will be evaluated based on your written viva****