

# Assignment 3

## Instructions:

- Read the questions very carefully and write all the functions as you are instructed in the question. You should take the input following the sample input format. Your output should also match the sample outputs. Note that your code should work for all reasonable inputs, not just sample inputs.
- Adopting any unfair means will result in -100%.
- Submit the codes in ELMS. Name the files 1.cpp, 2.cpp etc. Only submit the .cpp files.

## Question 1: Subset sum problem

Find whether a given integer  $X$  is a sum of any subset of a given array  $A=\{a_1, \dots, a_n\}$ .

- Write a recursive equation for solving the given problem. Use this to solve B and C.
- Determine whether  $X$  is a sum of any subset of  $A$  using naive recursion.
- Determine whether  $X$  is a sum of any subset of  $A$  using the tabulation method. If yes, then print the subset.

Sample Input $n$ $a_1, \dots, a_n$ $X$	Sample Output
5 2 4 6 5 8 15	15 is a subset sum $5 + 6 + 4 = 15$

## Question 2

You own a cake shop. You have baked a red-velvet cake and sliced it in  $n$  pieces. *In your town, the price of  $k$  pieces of cake together is  $p_k$  taka.* How should you sell the  $n$  pieces so that your income is maximized.

- Take the list of prices  $p_k$ , and  $n$  as input.
- Find the solution using naive recursion.
- Find the solution using the tabulation method.

[Hint: Rod cutting]

Sample Input $n$ $p_1, p_2, \dots, p_n$	Sample output
5 2 6 9 10 12	income: 15 taka 2 pieces together 6 taka 3 pieces together 9 taka