# ANCC SHIVALIK 2023

# Practice sheet week-3(1) Hints.

## Introduction:

As problems are not that simple we want to provide some hints that may guide you to solving the problems, You may wish not to use the this, but many of you are new to these concepts so using guide may help learn faster.

## Hints:

### Problem **A2. Anything for an Ice cream**

This concept is related to delta encoding, think about the first difference sequence. Can you build first difference sequence from the a given sequence also can you do the inverse?

Bonus: Can you now solve the problem if the serving is done such that instead of given p scoops of ice cream for l to r. that started giving p+k(i-l), where i here is the child number being served.

### Problem **C2. f(f(…..f(f(n))))**

Can you see how this is similar to fast power algorithm we discussed in week-2?

### Problem **D2. Building an Aquarium**

If I give you a value of ‘h’ and ask you to verify if it can be build by using at most x amount of water, can you do this in O(n)?

Now assume the following sequence 1,1,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0 a bunch of 1’s followed by a bunch of 0’s.
If I ask you to find the position of last `1` in the sequence,
can you do this in O(n)?
can you do this in O(log(n)) ?

Can you solve the original question in O(nlog(n)) ?

### Problem **E2. Tracking Segments**

Assume the following question. Given a sequence of 0’s and 1’s of length n, and I give you Q queries asking in query i no of 1’s in the sub sequence $[L_i, R_i]$.
Can you find a way to do this in O(n + Q)? (prefix sum?)

After this does the problem no look similar to D2?

## Problem **G2. Banks That Drive The Economy**

Did you remember how we got the Nth Fibonacci number in O(log(n)) from week-2 pdf. Can you write something similar here?

## Problem **H2. Product Oriented Recurrence**

Can you somehow change this into same as G2? Its hard to see directly try it.
Did you complete the Modular inverse? (Week-3(2))