* Problems *

(1) From an array A of N integers, a subsequence is chosen at random. Let MAX be the max. element of the chosen subsequence. Find the expected MAX value ~~value~~ of the subsequence of array A → constraints not decided
Ans = (P/Q where P and Q are coprime
% MOD = 1e9+7 .)

(2) Given an array A of N integers [$A_i \geq 0$ and $A_i \leq 10^6$]
Let G = gcd (Array A). In one operation you can decrease any number by 1. (Keeping it ≥ 0)
Find maximum G attainable in $\leq K$ operations.
$K \leq 10^{12}$, $N \leq 10^6$

(3) Grid (N x M) N rows, M columns
contains positive integers.
For each starting cell, find maximum path length upto which you can travel., s.t.
the followed path is strictly increasing
$N \cdot M \leq 10^6$
$1 \leq mat[i][j] \leq 10^9$

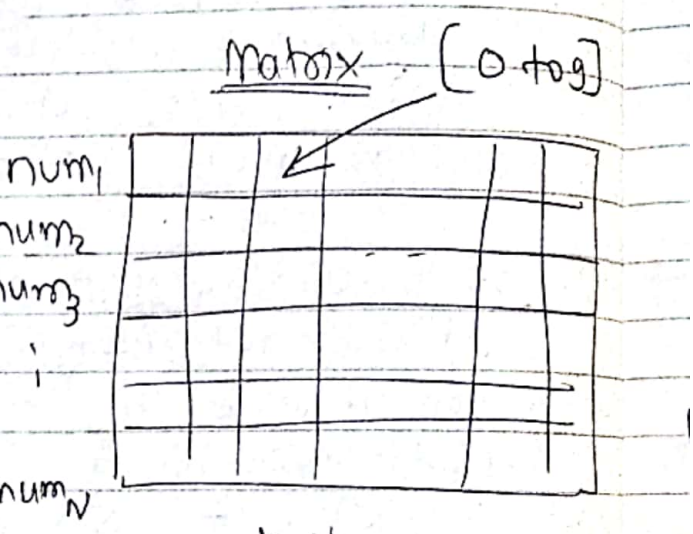
(4) Find the no. of strings of length $N \geq 8$, $N \leq 10^{18}$ consisting only of words "NACHIKET" that can be formed s.t no 2 same characters are adjacent.
$N \leq 10^{18}$, Answer modulo 1e9+7

(5) Array A (length N) $A_i \leq 10^{15}$. Queries.
Type (A): [id value] → Update A[id] = value
Type (B): Find max $(A_i \oplus X)$ $(L \leq i \leq R)$ Given [X L R]

⑥ Find the expected value of the sum of a subsequence of length K in array A of N integers
(constraints not decided)

⑦

Given N numbers of length M (may contain leading zeros), Calculate minimum no. of changes required (changing one digit of one number = 1 change) to make the sum of all nos. ($num_1 + num_2 + \cdots + num_N$) divisible by K



$2 \le K \le 100$, $M, N \le 100$, $mat[i][j] \in [0, 9]$
(constraints not fixed)

⑧

Array of strings of length N, A
Query of Type: [L, R]
→ find no. of $(L \le i < j \le R)$ s.t. A[i] and A[j] are anagrams

⑨ Two players A and B play a game s.t A goes first.
They start with number N,
In each turn, a player has to choose one of prime factors (X) of N and perform: $N = N - X$

The player who cannot choose a prime factor ($N = 1$) looses. find who wins, if they both play optimally

($N \le 10^6$)

(10) Given a DAG, find the max. length of a path such that parities of values on that path alternate
N (nodes in DAG) $\leq 10^5$

(11) Given a tree of N nodes, each has $A[i]$ value $A[i] \leq 10^9$
Queries
Type: [u value]
→ find no. of nodes in subtree of u with $A[v] \leq$ value

[☆ Maybe add updates also ?]

(12) Array of N integers. (EASY)
In one operation you can increase or decrease $A[i]$. Find minimum operations required so that all $A[i]$'s are prime. (not necessarily same)

(13) Given N ranges $[L_i, R_i]$ N upto 10^5
Each range (i) has $[1 \leq L_i, R_i \leq 10^9]$
cost[i] associated with it
and penalty[i] associated with it
Find max. value of total_value choosing a subset of non intersecting segments, s.t every range i you take into subset adds: cost[i]
and every range i you don't into subset subtracts: penalty(i) from total value

$[-10^9 \leq cost[i], penalty(i) \leq 10^9]$