Competitive Coding Experiment 4

Punit Kumar KRG-2A
23BCS14148

Q :- Given an array of N integers find sum of $f(x,y)$ such that $1 \le i \le n$, $1 \le j \le n$, Return modulo 1e9+7.

Brute :- Generate all pairs, convert it to bits
* Do XOR of them and add in ans.

Optimal :-
* for each bit position of count how many are set i.e count1.
* Remaining one will be count0 = n - count1.
* add in ans as (count1 * count0) %. 1e9+7.
* At last return ans *2 (for reverse of pairs).

pseudocode :-

```
for (i = 0 ⟶ i = 32) {
    count1 = 0;
    for (j = 0 ⟶ j = n-1) {
        if (arr[j] && (1 << i)) // set or not.
            count1 ++;

    count0 = n - count1;
    ans += count0 * count1;
}
return ans * 2;
```

Time Complexity :- O(32 x n)

Space Complexity :- O(1)