Codechef

1) Find (subset all element xor) xor k is maximum
    a) https://www.codechef.com/problems/XORSUB
    b) Dp[i][j] = 1 if only if there exists a subset P of A[1…i] such that Xor of all elements = j, otherwise 0
    c) for i = 1 to N:
    d) for j = 0 to 1023:
    e) dp[i][j] = dp[i - 1][j] | dp[i - 1][j ^ a[i]]
    f) Ans = maximum value of dp[n][j] * (j ^ k) for all j.
2) Minimum nested doll problem
    a) https://www.spoj.com/problems/MDOLLS/
    b) Sort by dec order of width and when equ inc by height
    c) Add new doll to smallest ava height greater than current doll
    d) https://journeywithdp.blogspot.com/2018/06/spoj-mdolls-nested-dolls.html
    e) Similar easy question :
        i) https://cses.fi/problemset/task/1073/
        ii) https://www.spoj.com/submit/MSTICK/
3) Max absolute difference between two subarray
    a) https://www.codechef.com/problems/DELISH
    b) For i in 0 to n-1
    c) Ans = max(leftMax[i] - rightMin[i + 1], rightMax[i + 1] - leftMin[i]
    d) Min and max array using caddance

LeetCode

1. Represent no with minimum no of Perfect Squares
    a. https://leetcode.com/problems/perfect-squares/
    b. dp[i] = min(dp[i], dp[i-j*j]+1); j >= 1 an i - j*j >=0
    c. Using BFS
2. Predict the winner
    a. https://leetcode.com/problems/predict-the-winner/
    b. https://www.geeksforgeeks.org/optimal-strategy-for-a-game-dp-31/

```
F(i, j) represents the maximum value the user
can collect from i'th coin to j'th coin.

F(i, j) = Max(Vi + min(F(i+2, j), F(i+1, j-1) ),
              Vj + min(F(i+1, j-1), F(i, j-2) ))
As user wants to maximise the number of coins. ss
```

```
Base Cases
    F(i, j) = Vi           If j == i
    F(i, j) = max(Vi, Vj)  If j == i + 1
```

3. Partition array into two parts where both have equal sum
    a. sum(subset1) + sum(subset2) = total_sum
    b. sum(subset1) = total_sum / 2
    c. So is there any subset having sum = total_sum/2 ----> subset sum problem
4. Partition array into k equal subsets
    a. https://leetcode.com/problems/partition-to-k-equal-sum-subsets/
    b.
5. Super ugly number
    a. https://leetcode.com/problems/super-ugly-number/
    b. Maintain k pointers which pointes to last ugly number generated by kth prime number multiplication

6. Largest subset sum divisible by k
    a. https://leetcode.com/problems/greatest-sum-divisible-by-three/
    b.

	0	1	2
3	3	0	0
6	9	0	0
5	9	0	14
1	15	10	14

7. Burst Balloon Problem
    a. https://leetcode.com/problems/burst-balloons/submissions/
    b. https://leetcode.com/problems/burst-balloons/discuss/76229/For-anyone-that-is-still-confused-after-reading-all-kinds-of-explanations…
    c. for (int k = left; k <= right; ++k)

       dp[left][right] = max(dp[left][right], nums[left-1] * nums[k] * nums[right+1] +

       dp[left][k-1] + dp[k+1][right])**

       Updated

8. Wiggle subseq
    a. https://leetcode.com/problems/wiggle-subsequence/

9. Split array into largest sum
    a. https://leetcode.com/problems/split-array-largest-sum/

10. DP patterns https://leetcode.com/discuss/general-discussion/458695/Dynamic-Programming-Patterns

Atcoder

11. Find longest path in directed acyclic graph
    a. https://atcoder.jp/contests/dp/tasks/dp_g
    b. Find topological sorting
    c. For each u in topological sorting

        If dp[u] + 1 > dp[v]

            dp[v] = dp[u] + 1

Matrix

12. Maximum Square / Count Square in 2 D matrix
    a. `if(matrix[i][j] == 1) dp[i][j] = min(dp[i - 1][j - 1], min(dp[i - 1][j], dp[i][j - 1])) + 1`
    b. https://leetcode.com/problems/maximal-square/
    c. https://leetcode.com/problems/count-square-submatrices-with-all-ones/

13. Sub matrix with given sum
    a) https://www.interviewbit.com/problems/sub-matrices-with-sum-zero/

    For each row, calculate the prefix sum.

    For each pair of columns,

    calculate the accumulated sum of rows.

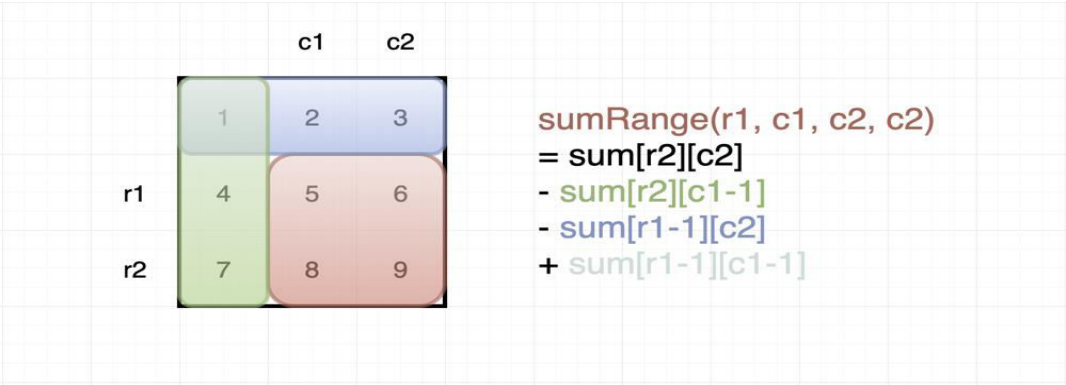
    Now this problem is same to, "Find the Subarray with Target Sum".

    b) https://leetcode.com/problems/max-sum-of-rectangle-no-larger-than-k

14. Maximum Rectangle Area
    a. https://leetcode.com/problems/largest-rectangle-in-histogram
    b. https://leetcode.com/problems/maximal-rectangle/
    c. Apply max histogram problem in each row and keep trace of maximum area

15. Count all Rectangle
    a. https://leetcode.com/problems/count-submatrices-with-all-ones/submissions/

16. https://leetcode.com/problems/matrix-block-sum/



Generate all possible squares
(Only Iterate for Square)

```
for(int i= 1; i < r; i++)
    for(int j= 1;j < c; j++)
        Int len = 0;
        while(i - len >0 && j - len > 0)
            R2 = i  , R1=i-len ,  c2= j ,   c1= j-len
            /// prefix
            Len++;
```

17. https://leetcode.com/problems/odd-even-jump/
18. https://leetcode.com/problems/number-of-ways-to-paint-n-3-grid/
19. https://leetcode.com/problems/stone-game-v/
20. https://www.interviewbit.com/problems/merge-elements/