Assignment

Recursion

Dynamic Programming

1. Revisit the problems on recursion in previous assignments and observe which among those can be solved using DP.
2. In combinatorial mathematics, the **Bell numbers** count the possible [partitions of a set](https://en.wikipedia.org/wiki/Partition_of_a_set). First few Bell numbers are 1, [1](https://en.wikipedia.org/wiki/1_(number)), [2](https://en.wikipedia.org/wiki/2_(number)), [5](https://en.wikipedia.org/wiki/5_(number)), [15](https://en.wikipedia.org/wiki/15_(number)), [52](https://en.wikipedia.org/wiki/52_(number)), [203](https://en.wikipedia.org/wiki/203_(number)), 877, 4140, 21147

Given N, find Nth Bell Number modulo 109 + 7. Hint : Read about Bell Triangle.

1. Given a “2 x n” board and tiles of size “2 x 1”, count the number of ways to tile the given board using the 2 x 1 tiles. A tile can either be placed horizontally i.e., as a 1 x 2 tile or vertically i.e., as 2 x 1 tile.
2. Given a value N, if we want to make change for N cents, and we have infinite supply of each of S = { S1, S2, .. , Sm} valued coins, how many ways can we make the change? The order of coins doesn’t matter.
3. Given two strings, find the length of longest subsequence present in both of them. A subsequence is a sequence that appears in the same relative order, but not necessarily contiguous. For example, “abc”, “abg”, “bdf”, “aeg”, ‘”acefg”, .. etc are subsequences of “abcdefg”. Also print the LCS from the DP table constructed.
4. The Longest Increasing Subsequence (LIS) problem is to find the length of the longest subsequence of a given sequence such that all elements of the subsequence are sorted in increasing order. Given an array, find the length of LIS.
5. Given two arrays, find length of the longest common increasing subsequence [LCIS]
6. <https://www.codechef.com/problems/SUMTRIAN>
7. <https://www.spoj.com/problems/ABCPATH/>
8. <https://www.spoj.com/problems/ACODE/>
9. <https://www.spoj.com/problems/AIBOHP/>
10. <https://www.spoj.com/problems/SUMITR/>
11. <https://www.codechef.com/problems/LEPAINT>
12. <https://www.spoj.com/problems/FARIDA/>