

# Dynamic Programming (Lab5)

Q. No.	Description	Test Input	Expected Output
1	<b><u>N-th Catalan number</u></b> Given a number N. The task is to find the Nth Catalan number. The first few Catalan numbers for N = 0, 1, 2, 3, ... are 1, 1, 2, 5, 14, 42, 132, 429, 1430, 4862, ... Note: Positions start from 0 as shown above.	5, 7	42, 429
2	<b><u>Minimum no. of coins</u></b> Given an infinite supply of each denomination of Indian currency { 1, 2, 5, 10, 20, 50, 100, 200, 500, 2000 } and a target value N. Find the minimum number of coins and/or notes needed to make the change for Rs N. You must return the list containing the value of coins required.	(i) 43 (ii) 2400	(i) 20 20 2 1 (ii) 2000 200 200
3	<b><u>N-th Fibonacci number</u></b> Given a positive integer n, find the nth Fibonacci number. Since the answer can be very large, return the answer modulo 1000000007. The series starts with 1 for n=1.	(i) 5 (ii) 10	(i) 5 (ii) 55
4	<b><u>Matrix Chain Multiplication</u></b> Given a sequence of matrices, find the most efficient way to multiply these matrices together, that involves the least number of multiplications. Also print the parenthesis sequence of the multiplication of the matrices. The dimensions of the matrices are given in an array arr[] of size N (such that N = number of matrices + 1) where the ith matrix has the dimensions (arr[i-1] x arr[i]).	Arr[] = {10, 20, 50, 1, 100}	Optimal Sequence is: ( ( A1 ( A2 A3 ) ) A4 ) Optimal no. of multiplications = 2200
5	<b><u>Longest Common Subsequence</u></b> Given two sequences, find the length of longest subsequence present in both of them. Both the strings are of uppercase.	X = ABCBDAB Y = BDCABA	LCS is either BCBA or BDAB or BCAB. Any one is correct.
6	<b><u>Shortest Common Supersequence</u></b> Given two strings, find the <b>LENGTH</b> of the smallest string which has both strings as its sub-sequences.	X = abcd Y = efcd	6 (length of 'abefcd')