

**Tutorial 6: Backtracking & Dynamic Programming**

**Q1** Given a number N, write a pseudo code of backtracking algorithm to count the number of ways to express N as sum of 1, 3 and 4.

Examples:

```
Input : N = 4
Output : 4
Explanation: 1+1+1+1
              1+3
              3+1
              4

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Input : N = 5
Output : 6
Explanation: 1 + 1 + 1 + 1 + 1
              1 + 4
              4 + 1
              1 + 1 + 3
              1 + 3 + 1
              3 + 1 + 1
```

**Q2** Write the pseudo code of dynamic programming (both top-down and bottom-up approaches) for the problem in Q1.

**Q3** What is the complexity for the algorithms in Q1 and Q2?