

# Problems based on Recursion – 4

## Assignment Solutions



**Q1 – Given a number n, print the following pattern without using any loop.**

(Easy)

n, n-5, n-10, ..., 0, 5, 10, ..., n-5, n

**Input:** n = 16

**Expected Output:** 16, 11, 6, 1, -4, 1, 6, 11, 16

**Explanation:**

- Create a recursive function with parameters as n, m set as n and flag variable set as true. The flag will be true if m is decrementing and false if m is incrementing.
- Print m and when the flag is false and the value of m is equal to n then return from the function
- If the flag is true then check
  - If m-5 is greater than zero then recur for m-5
  - Else recur for m-5 and set the flag to false, as now we will be moving backward
- Else recur for m+5

**Code:**

<https://pastebin.com/BPNiQ0c8>

**Output Snippet:**

```
Enter the number : 16
16 11 6 1 -4 1 6 11 16

...Program finished with exit code 0
Press ENTER to exit console.
```

**Q2 – Find m-th summation of first n natural numbers where m-th summation of first n natural numbers is defined as following:**

(Medium)

If  $m > 1$ :  $SUM(n, m) = SUM(SUM(n, m - 1), 1)$

Else :  $SUM(n, 1) = \text{Sum of first } n \text{ natural numbers.}$

**Input:** n = 3, m = 2

**Expected Output :** 21

**Explanation:**

- We first write the recursive function for the sum of first n natural numbers.
- Next we create our main recursive function where we pass n and m as arguments.
- We use the question defined equations, if  $m=1$ , we directly call the sum of n function.
- Else we recursively call our function for n and m-1 and then calculate sum of first n natural numbers for this sum.

**Code:**

<https://pastebin.com/c4KQLKL4>

**Output Snippet:**

```
Enter the number n and m : 3 2
21

...Program finished with exit code 0
Press ENTER to exit console.
```

Q3 – Given a number  $n$  which denotes the number of variables in the equation and a  $val$  which denotes the sum of these variables, count the number of such non-negative integral solutions that are possible.

(Medium)

**Sample Input:**  $n=5$   $val=1$

**Sample Output:** 5

**Explanation:**

$$x_1 + x_2 + x_3 + x_4 + x_5 = 1$$

**Number of possible solution are :**

(0 0 0 0 1), (0 0 0 1 0), (0 0 1 0 0),  
(0 1 0 0 0), (1 0 0 0 0)

Total number of possible solutions are 5

**Explanation:**

1. We have created a function `count` of `int` type which will return the total number of non-negative required integral solutions. It has two arguments: the first is  $n$  which denotes the number of variables in the equation and a  $val$  which denotes the sum of these variables.
2. Make a recursive function call to `count(int n, int val)`.
3. Call this `count` function `count(n-1, val-i)` until  $n = 1$  and  $val \geq 0$ , as this is the base case condition if number of variables are 1 and  $val \geq 0$  i.e if number of variables in the equation is 1 and  $val$  is also non negative then only one solution possible so return 1.

**Code:**

<https://pastebin.com/tr6dR03a>

**Output Snippet:**

```
Enter n and val : 5 1
5

...Program finished with exit code 0
Press ENTER to exit console.
```