

### Count binary strings:

Question is mentioned in the below image. Given the length of a string we need to give number of strings that can be created which consists of only 0 and 1 where

Two 1s can't repeat, if  $n=2$  then "1,1" is not possible.

**L-16 Count Binary Strings | Dynamic Programming**  
 Friday, 18 September, 2020 06:52 PM

Given a Number  $(N)$ , you need to make a string of length  $N$  with only 0 and 1 allowed with no consecutive 1, how many such strings are possible?

**Ex:**

For $N=1$	ans = 2	{ 0, 1 }
For $N=2$	ans = 3	{ 00, 10, 01 }
For $N=3$	ans = 5	{ 000, 100, 010, 001, 101 }

### Solution:

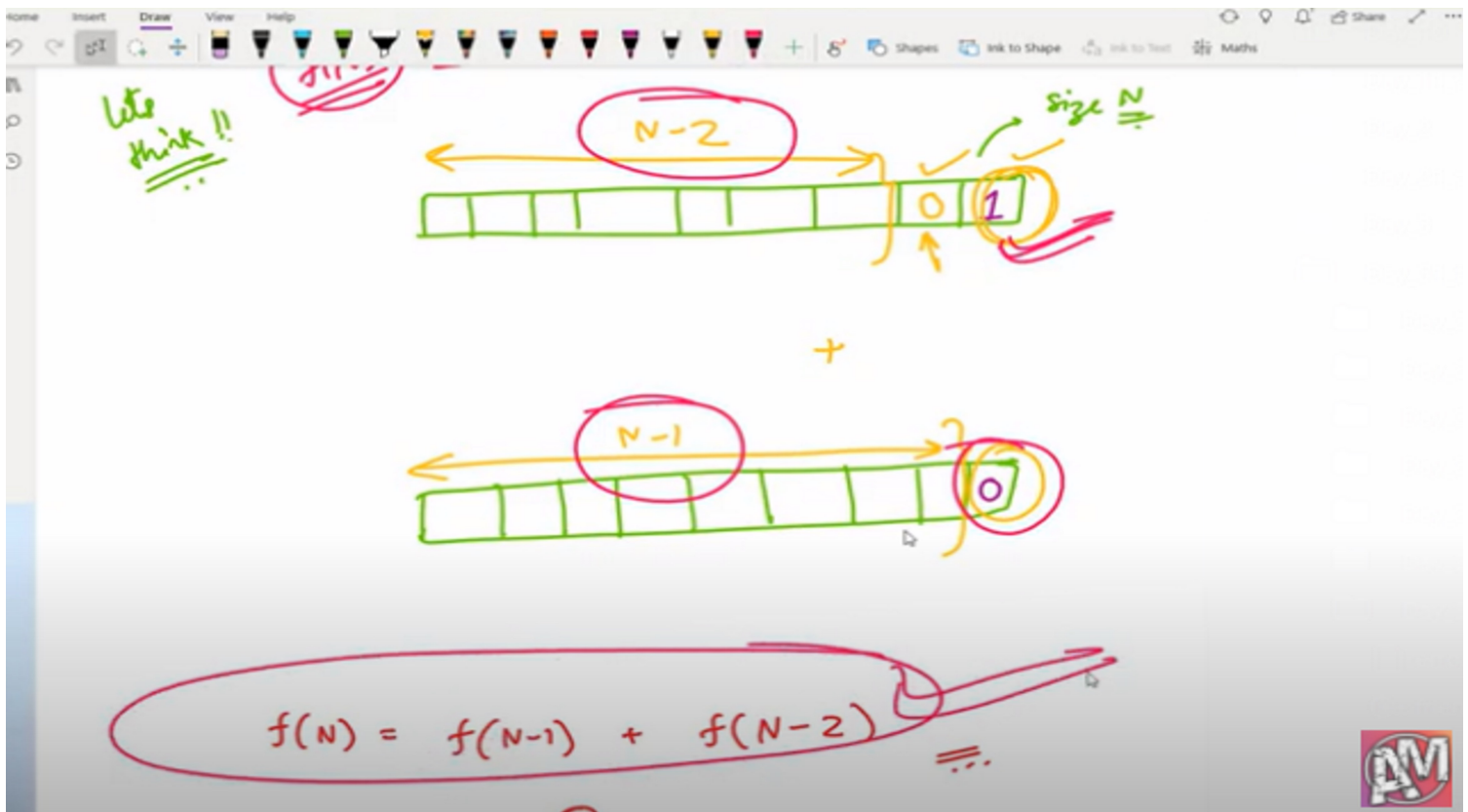
There are two choices,

1. You start with 0

As the below image, in this case you choose 0 as your 1st element and ask recursion to number of ways rest of the string can be filled. In this case will call the function to do the counting for rest  $N-1$  number of elements which is **func(N-1)**.

2. Or you start with 1. and as we can't 1 as the next element so the 2nd element will always be 0. In this case recursion will count the number of ways for  $N-2$  elements, which is **func(N-2)**

Answer is  $\text{ans} = \text{func}(N-1) + \text{func}(N-2)$



### Base case:

if  $N=1$ , then we return 2 as the string either be filled using 1 or 0

If  $N=2$  then we return 3 as we can fill the string in "00", "01", "10" ways and "11" is not allowed.

This is the perfect example where we find the base case after increasing the  $N$  by 1 or 2. It's not absolute that the base case will always start with  $n=0$ .

or

Recurrence Relation

$dp[n] = dp[n-1] + dp[n-2]$

Base Case:

$\text{if } (n == 1)$   
return 2;

$\text{if } (n == 2)$   
return 3;

$n=1$   
2 ways

$n=2$   
3 ways

0 0  
0 1  
1 0

It's exactly same as fibonacci series

So, please write the

- series

so, please write the  
code yourself 😊

