Paint Fence

Thursday, 1 July 2021 7:50 PM

n → house

k → colors

no. of possible ways to paint house so that atmost two consecutive house have same color??

n = 6

k = 3 R, G, B

	0	1	2	3	4	5
Last two have same color	0	RR GG BB 3	* RGG RBB GRR GBB BRR BGG 6	18	48	- - -
Last two have diff color	R G B K 3	RG RB GR GB BR BG 6	RRG RRB GGR GGB BBR BBG RGR RGB RBR RBG GRB GRG GBR GBG BRB BRG BGR BGB 18	(6+18) * (k-1) 48	- - -	- -

final = dp[0][n-1] + dp[1][n-1] Ans

dp[0][i] = dp[1][i-1]

dp[1][i] = (dp[0][i-1] + dp[1][i-1]) * k-1

Sum

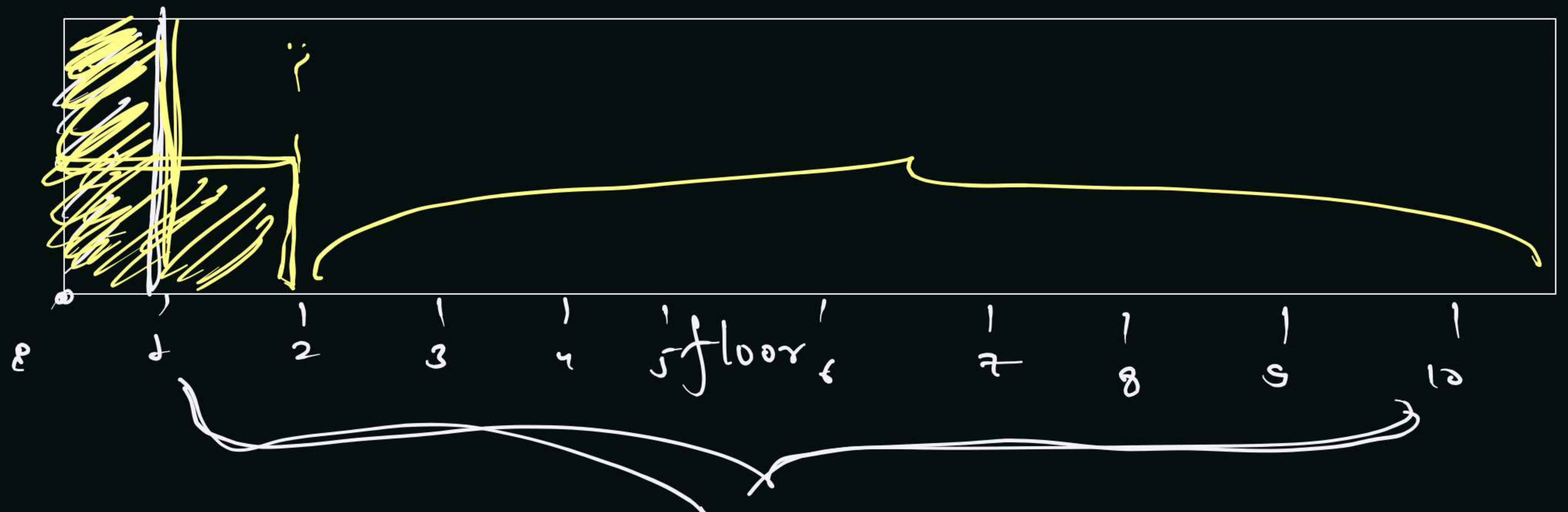
Tiling with 2 * 1

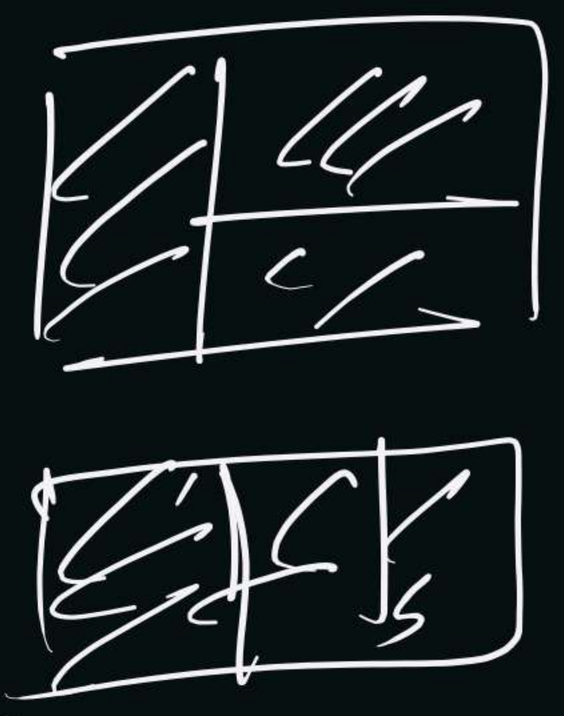
Saturday, 3 July 2021 10:16 AM

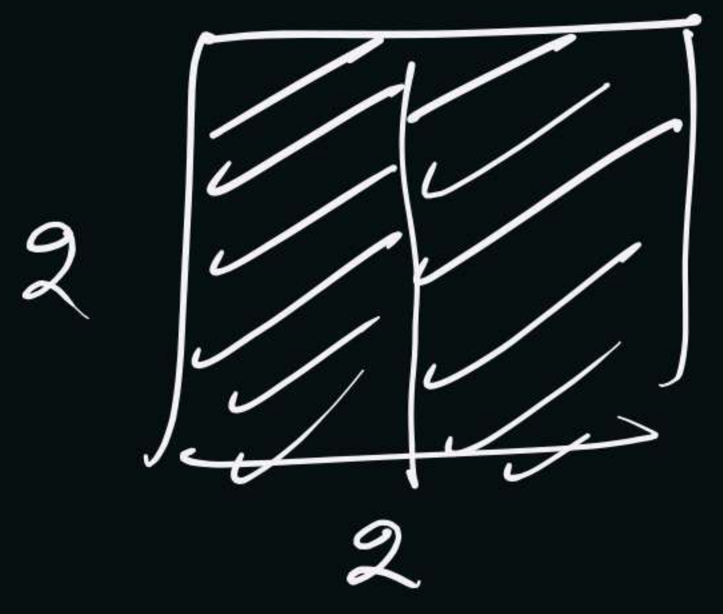
→ vertical

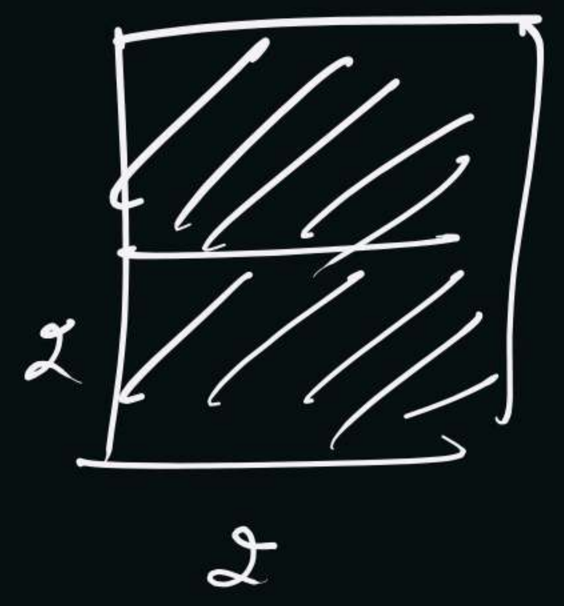
→ Horizontally

total no. of ways for tilling 2*n floor



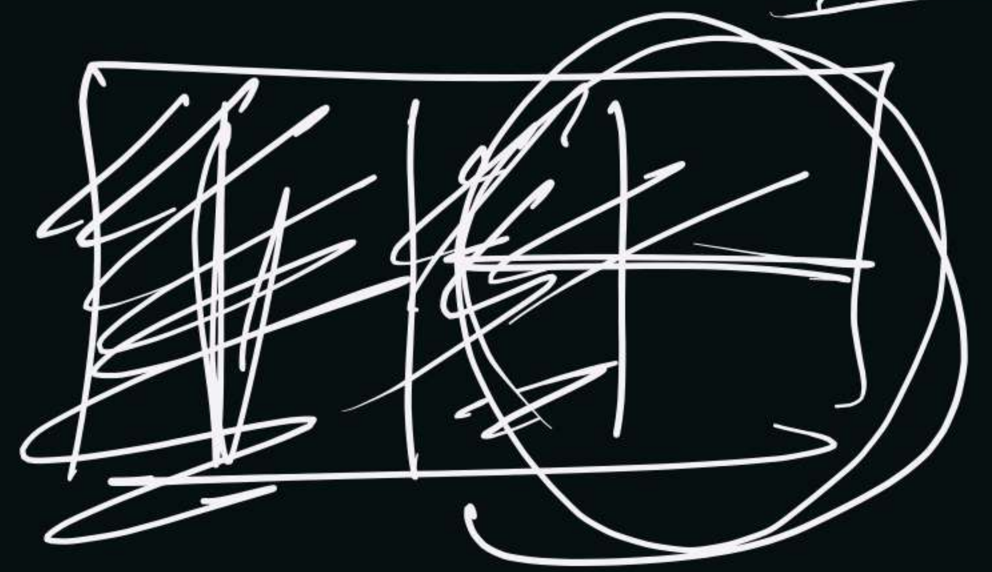


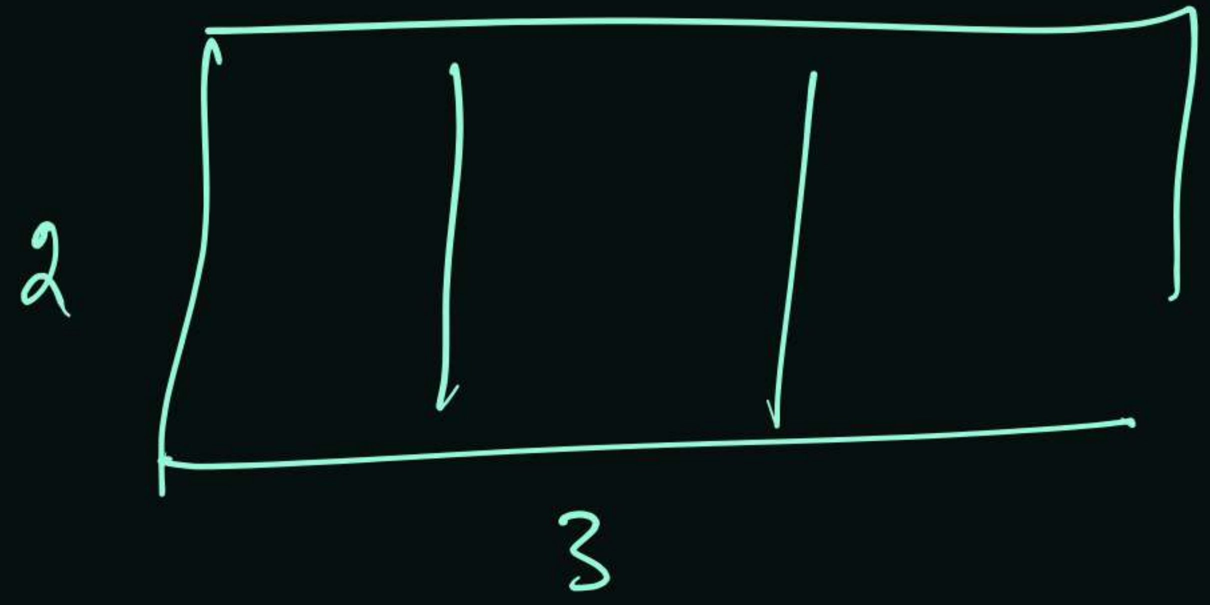


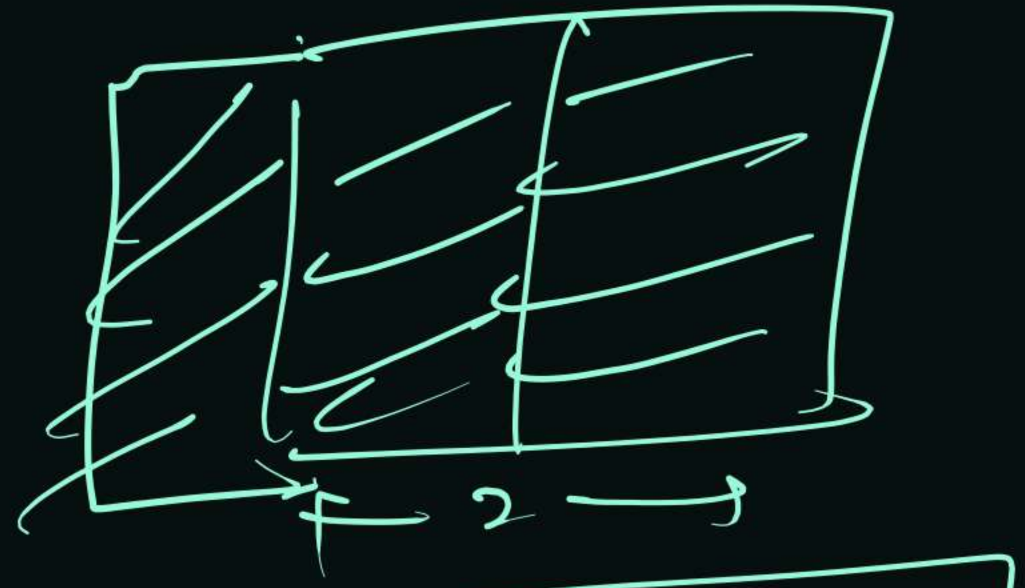


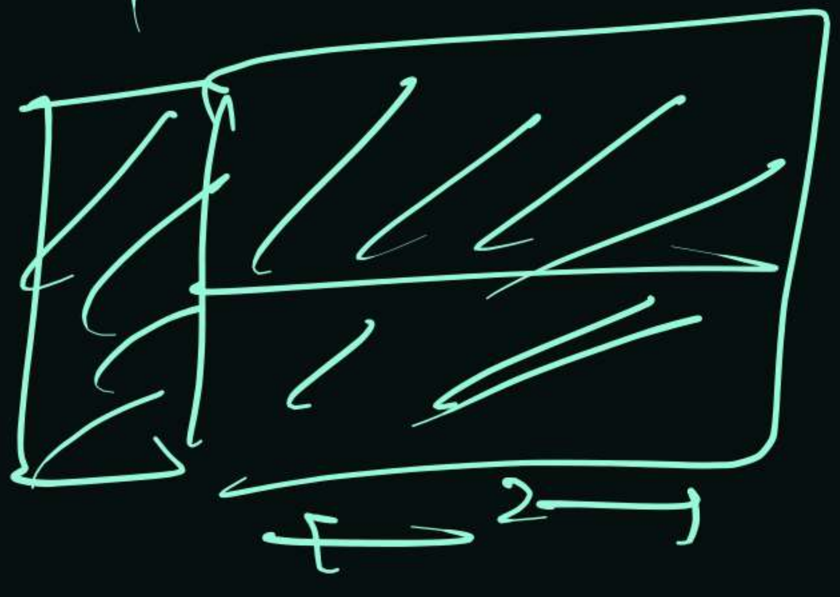
vertical

n=3

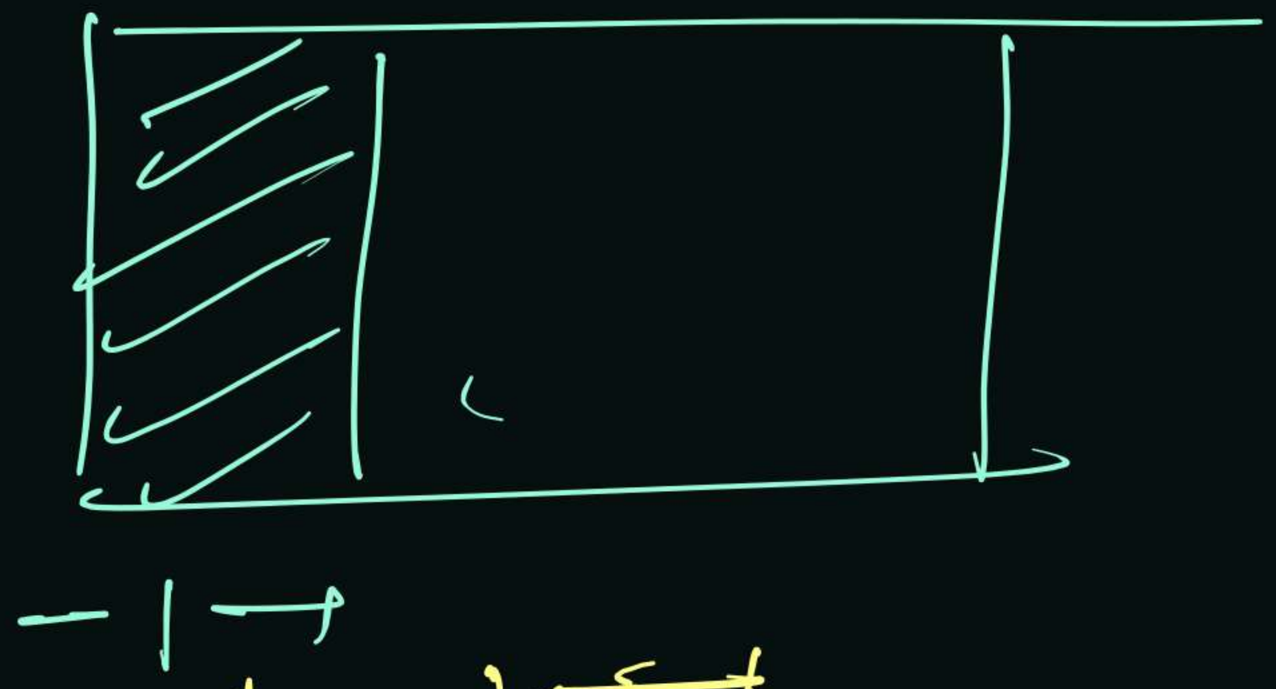




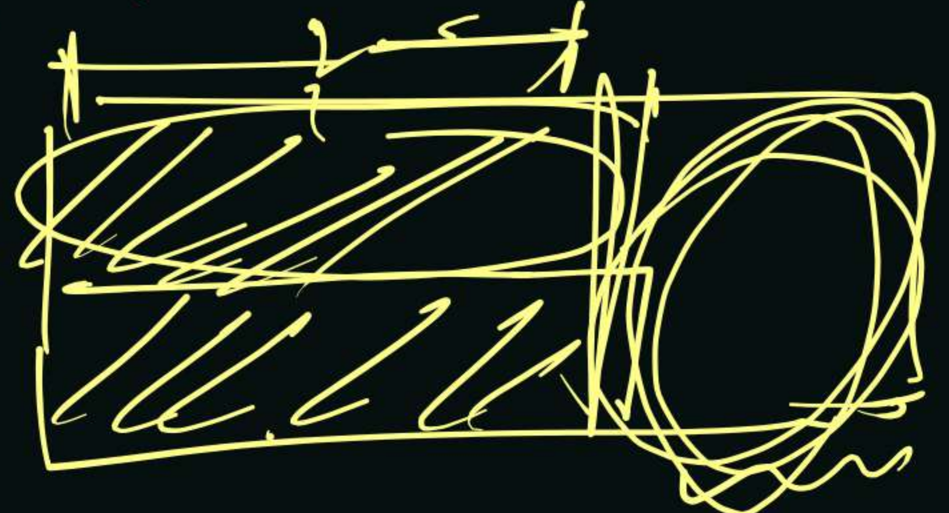


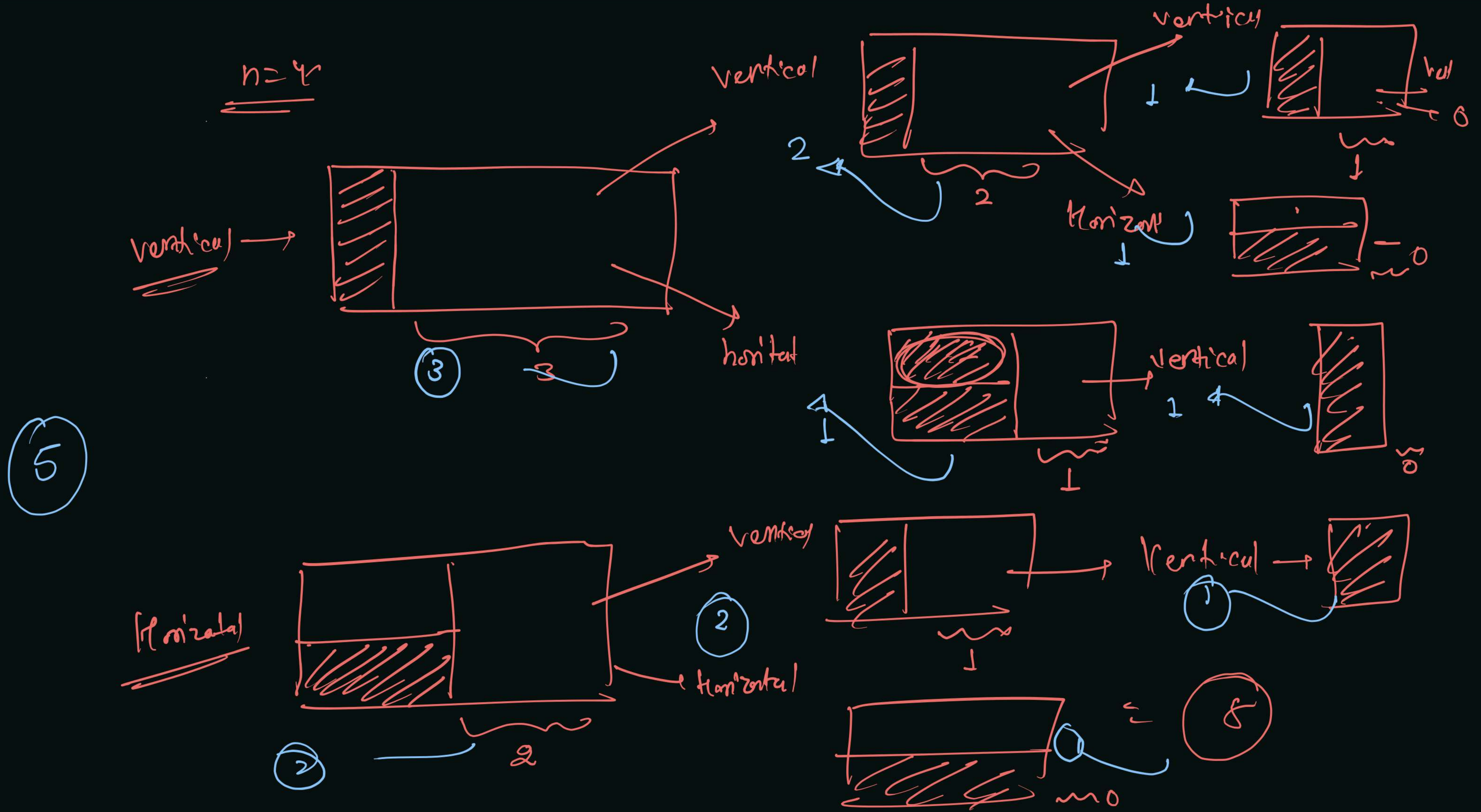


vertical tile



Horizontal tile




n = 4
vertical
vertical
3
5
Horizontal
2
vertical
horizontal
vertical
2
vertical
1
0
vertical
1
vertical
1
vertical
2
1
0
8

How to formulate $2 * 1$ Tilling.

Vertical Arrange + Horizontal.

$$f(n) = f(n-1) + f(n-2)$$

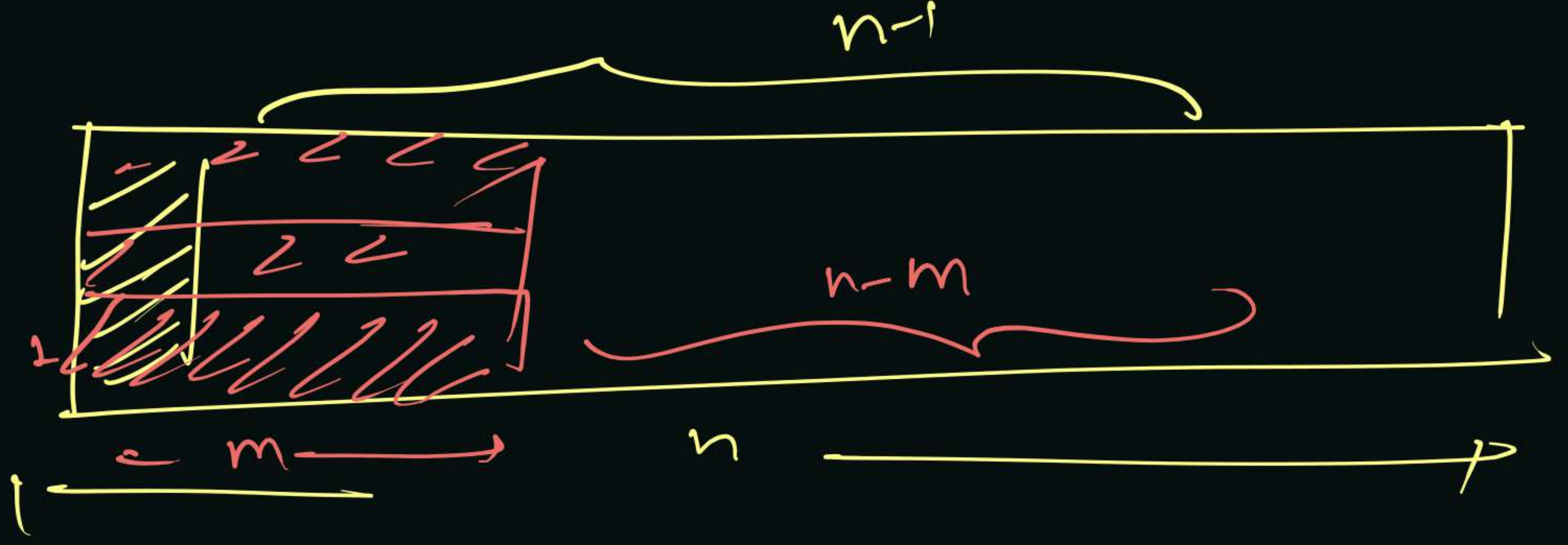
$$\boxed{f(n) = f(n-1) + f(n-2)} \longrightarrow \text{fibbonacci series}$$

Tiling with M*1

Saturday, 3 July 2021 10:16 AM

floor = m * n

tile → m * 1 → Horizontally
→ vertically.



m=3

n=7

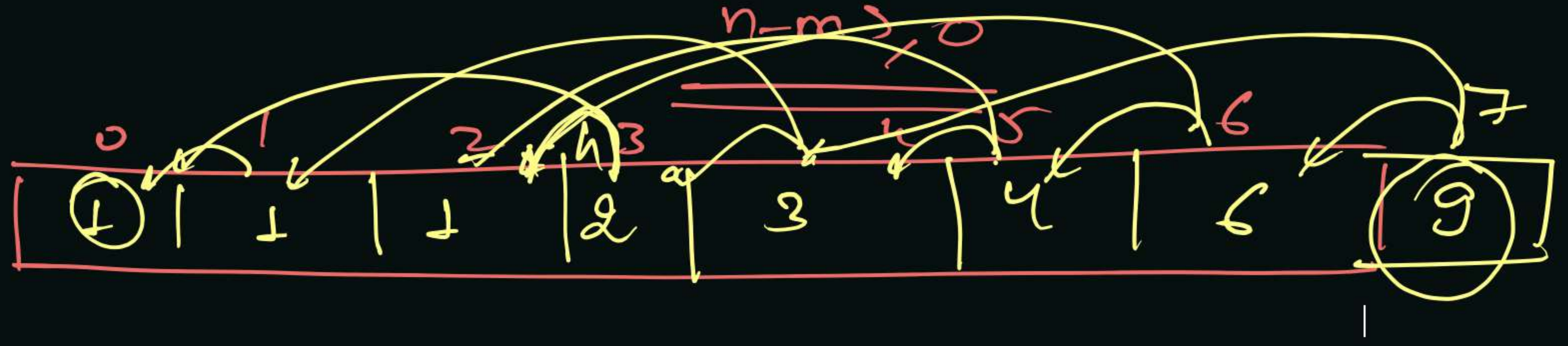
vertical

vertically

Horizontal

$$f(n) = f(n-1) + f(n-m)$$

dp



Friends Pairing

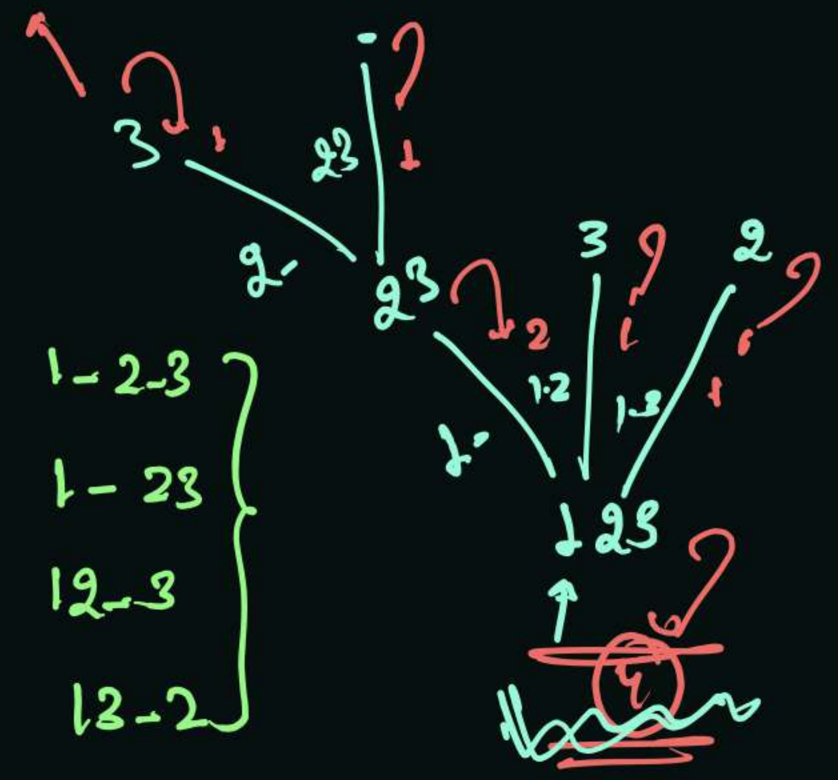
Saturday, 3 July 2021 10:17 AM

n-people, no. of possible ways of grouping so that they can stay single or can pair up with someone.

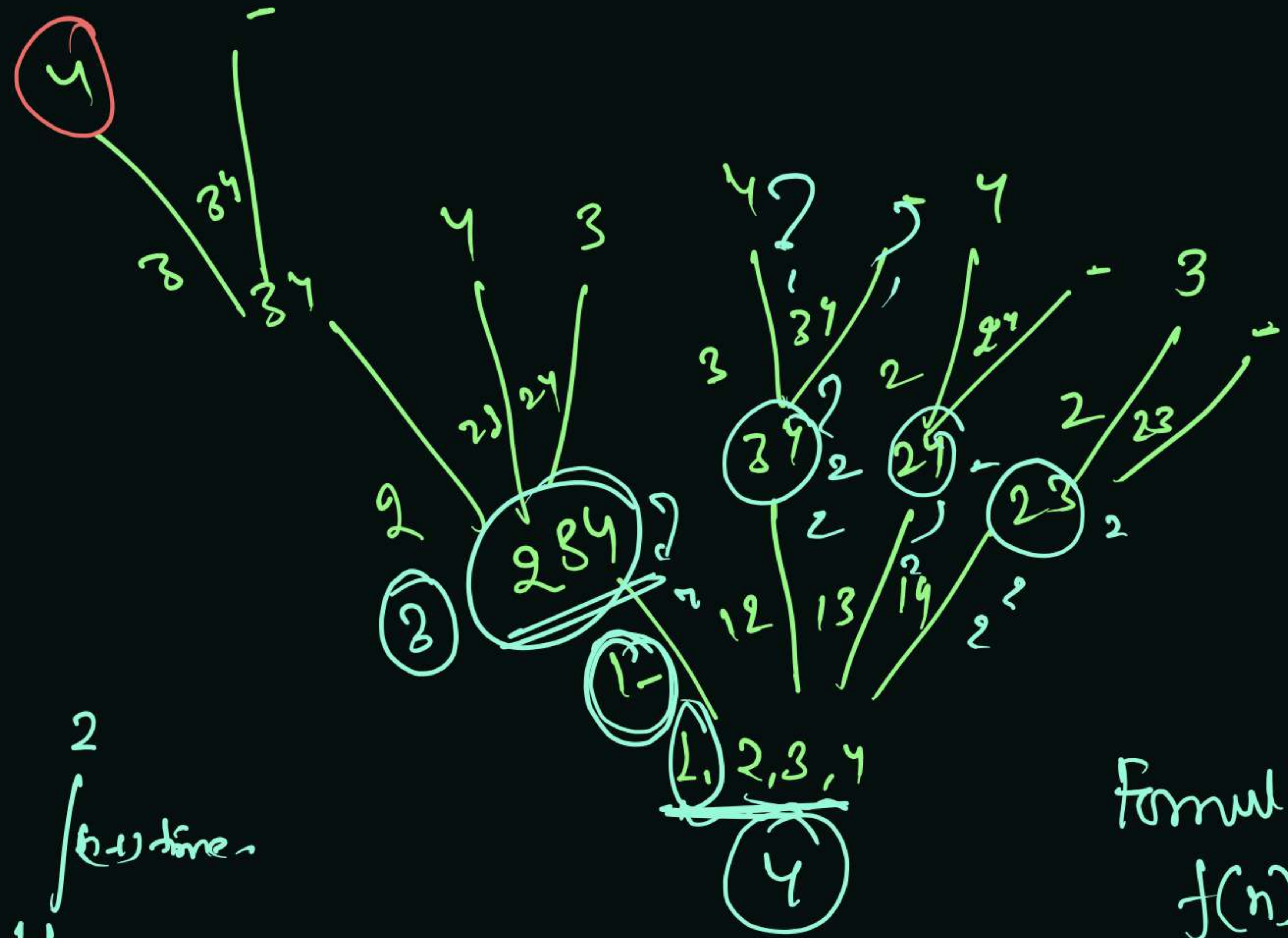
count = ✓

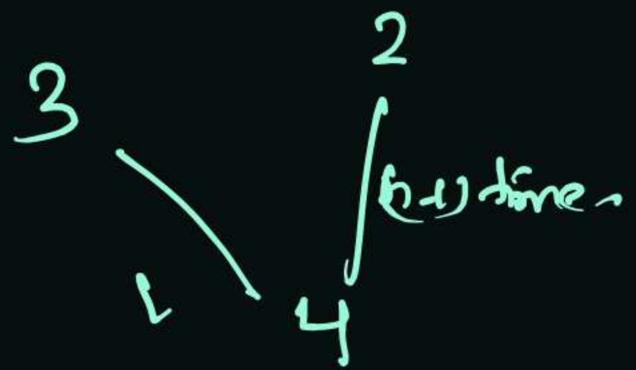
possibility printing ×

1-2-3
1-23
12-3
13-2



1-2-3
1-23
12-3
13-2





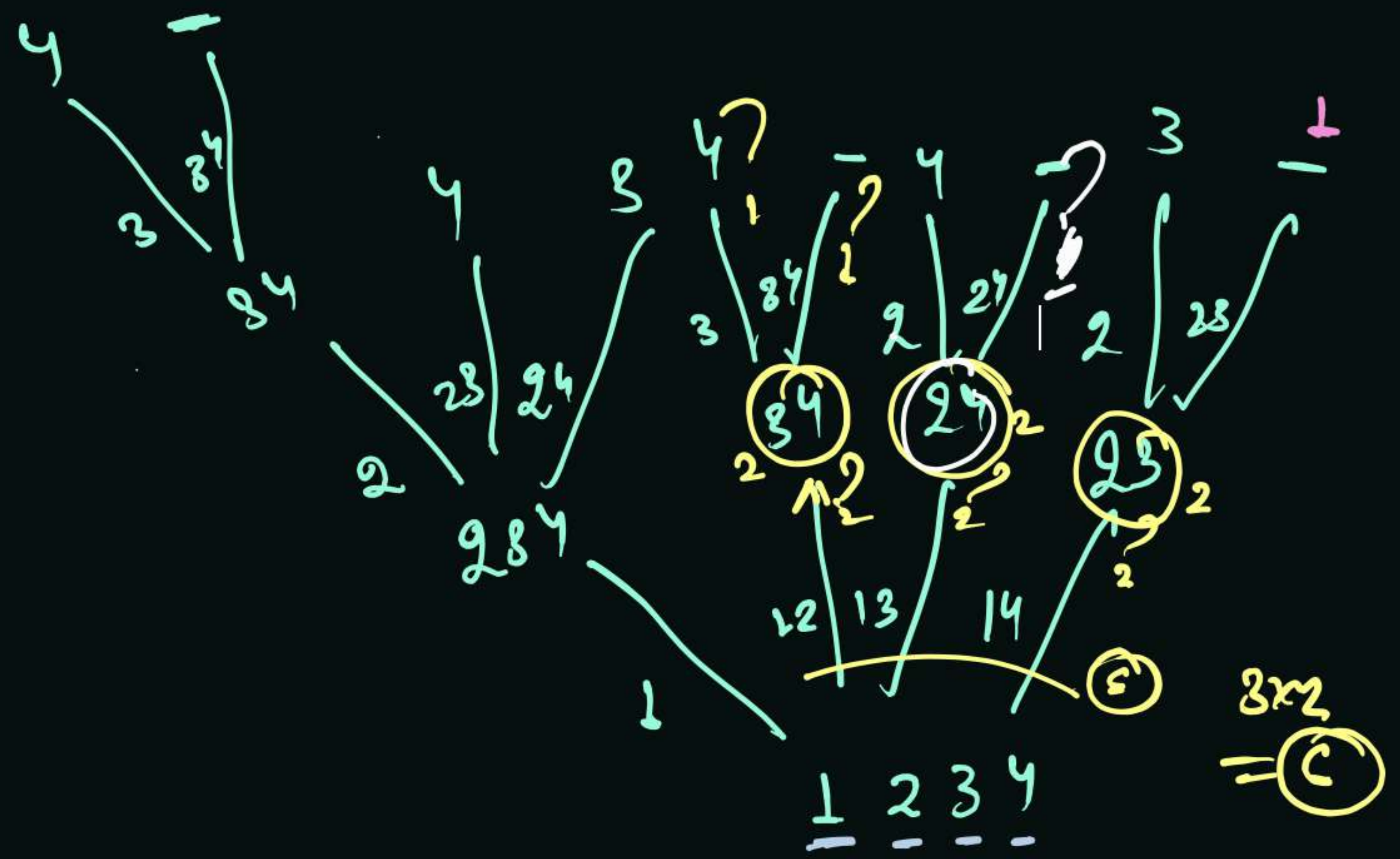
1-2-3-4
1-2-34
1-23-4
1-24-3
12-3-4
12-34
13-2-4
13-24
14-2-3
14-23

10

Formula →

$$f(n) = f(n-1) + (n-1)\,f(n-2)$$

How to formula →



1-2-3-4

1-2-34

1-23-4

1-24-3

12-3-4

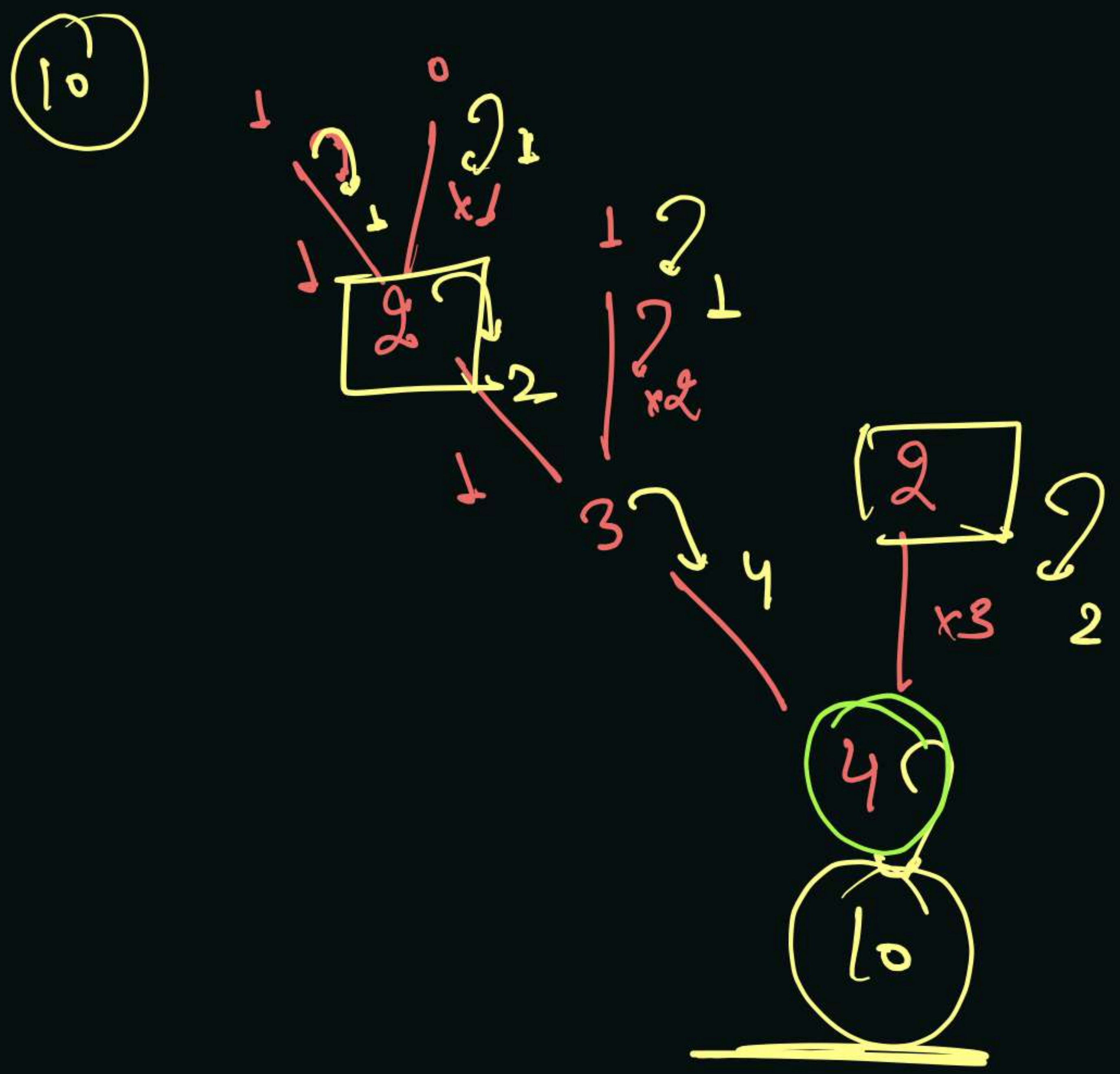
12-34

13-2-4

13-24

14-2-3

14-23



$f(0) = 1$

$f(1) = 1$

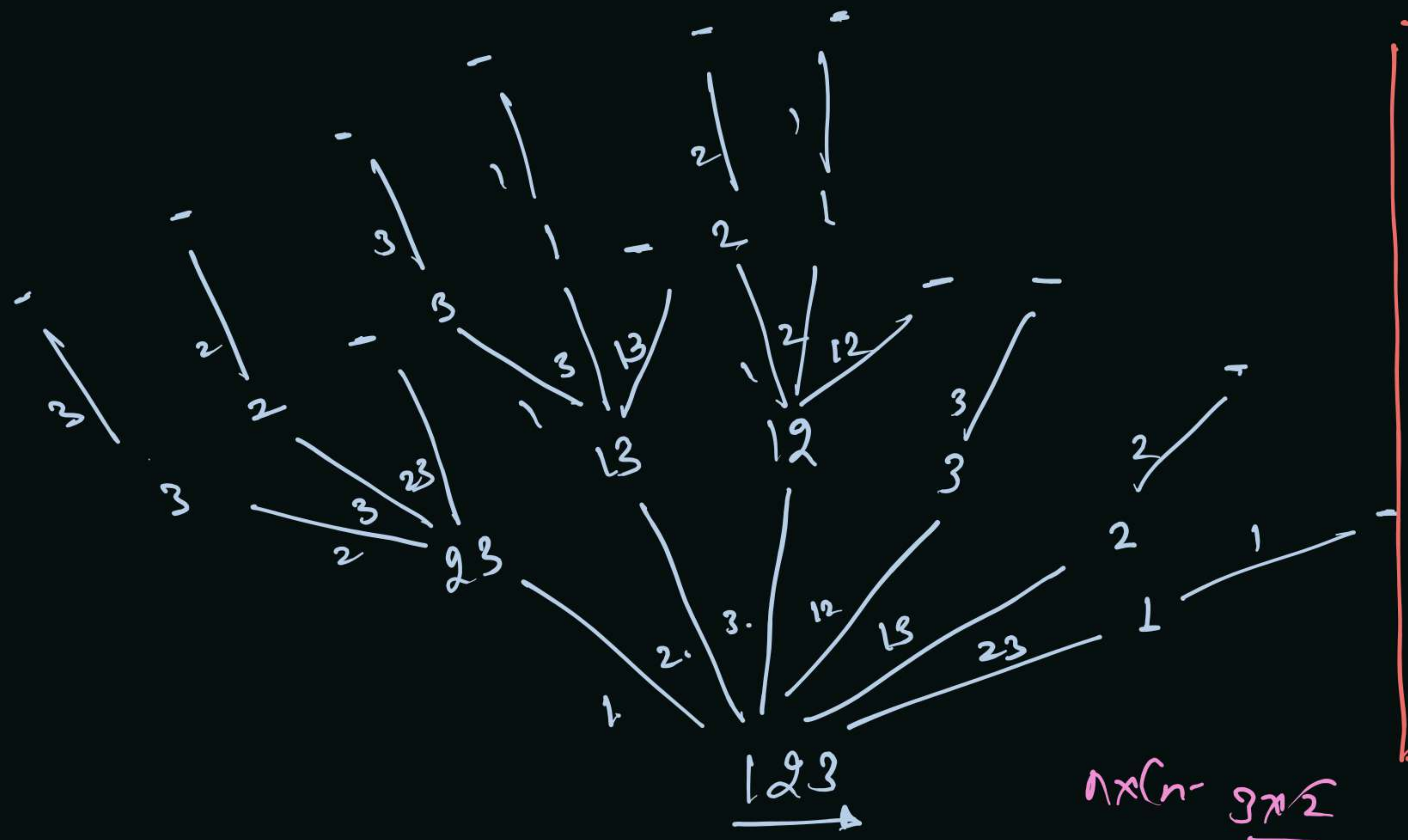
$dp[i] = dp[i-1] + (i-1) * dp[i-2]$

$f(n) = f(n-1) + (n-1) * f(n-2)$ ⟶ combination

To print permutation →

$$f(n) = n * f(n-1) + \frac{n*(n-1)}{2} * f(n-2)$$

permutation



$n \times (n-$ $\frac{3 \times 2}{2}$

1-2-3
1-3-2
1-23
2-1-3
2-3-1
2-13
3-1-2
3-2-1
3-12
12-3
13-2
23-1

$^nC_2$

$$\frac{n!}{(n-2)!\,2!}$$

$$\frac{n \times (n-1)\cancel{(n-2)!}}{\cancel{(n-2)!}\,2}$$

$$= \frac{n(n-1)}{2}$$