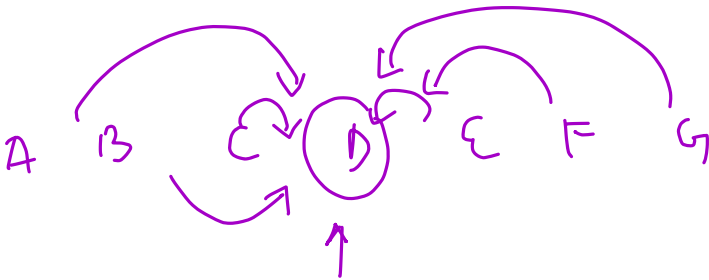
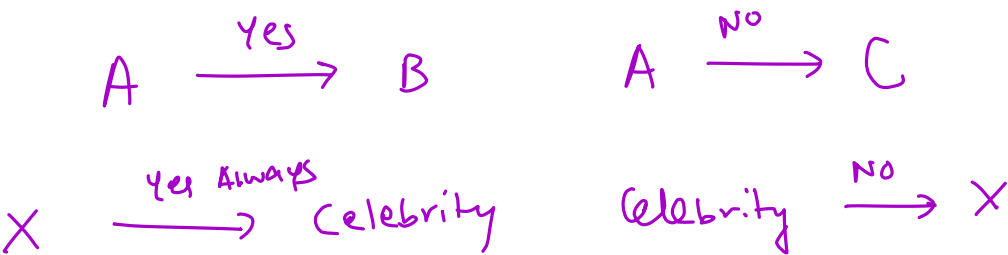
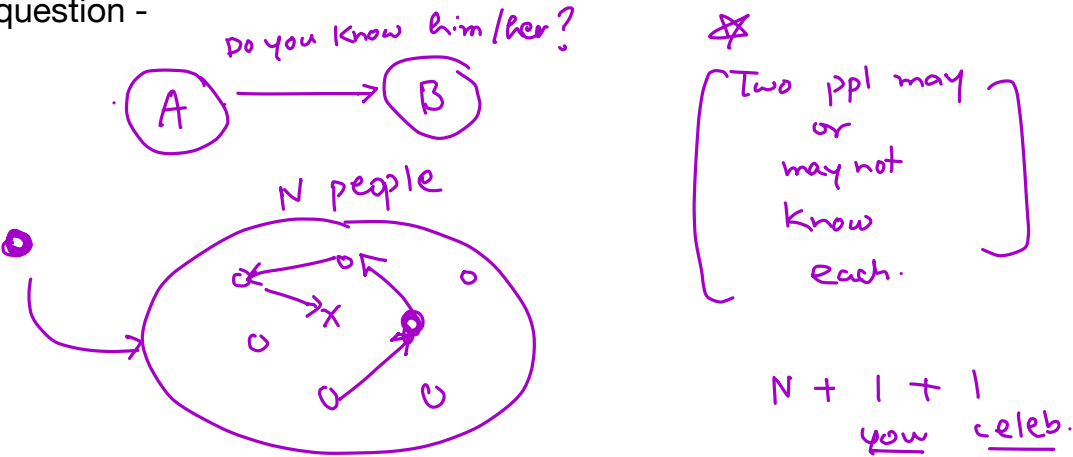
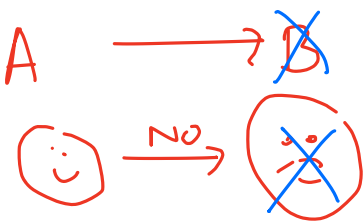
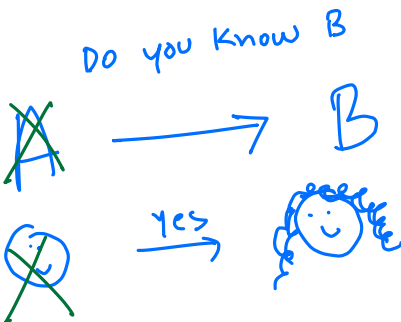


Warm Up Puzzle:
 You are going for a party. In the party there are N people and 1 celebrity. People in the party know the celebrity but celebrity knows no-one.

You are also going, but you don't know celebrity. You have to identify the celebrity by asking questions. The format of question -

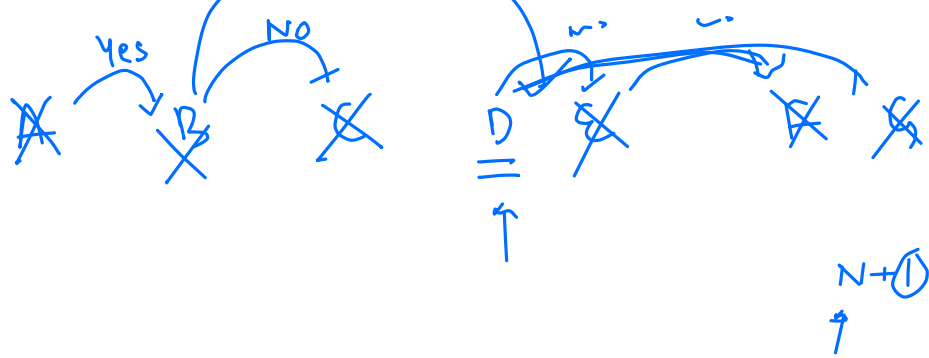


Solution



one question = Eliminate 1 person





Recursion

$$f(n) = n \times \overbrace{f(n-1)}^{(n-1)!}$$

\uparrow Factorial \uparrow

$$5! = 5 \times 4!$$

Understand

memory level

def fact(n)

L1 if n == 0:
L2 return 1

Base case \rightarrow Smallest possible input

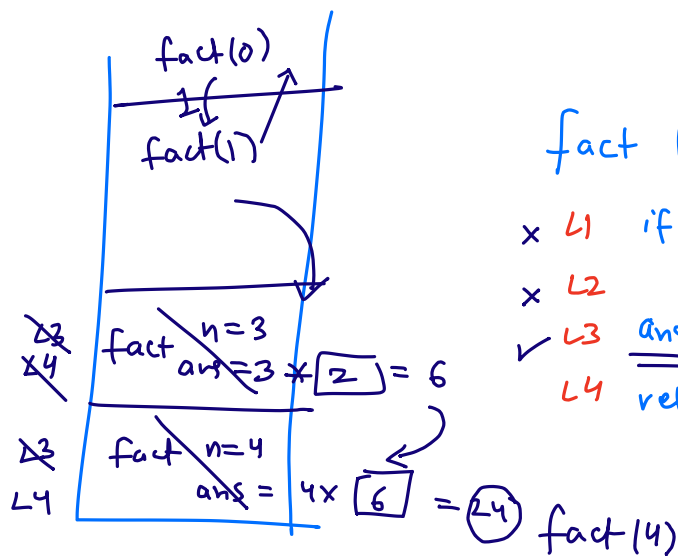
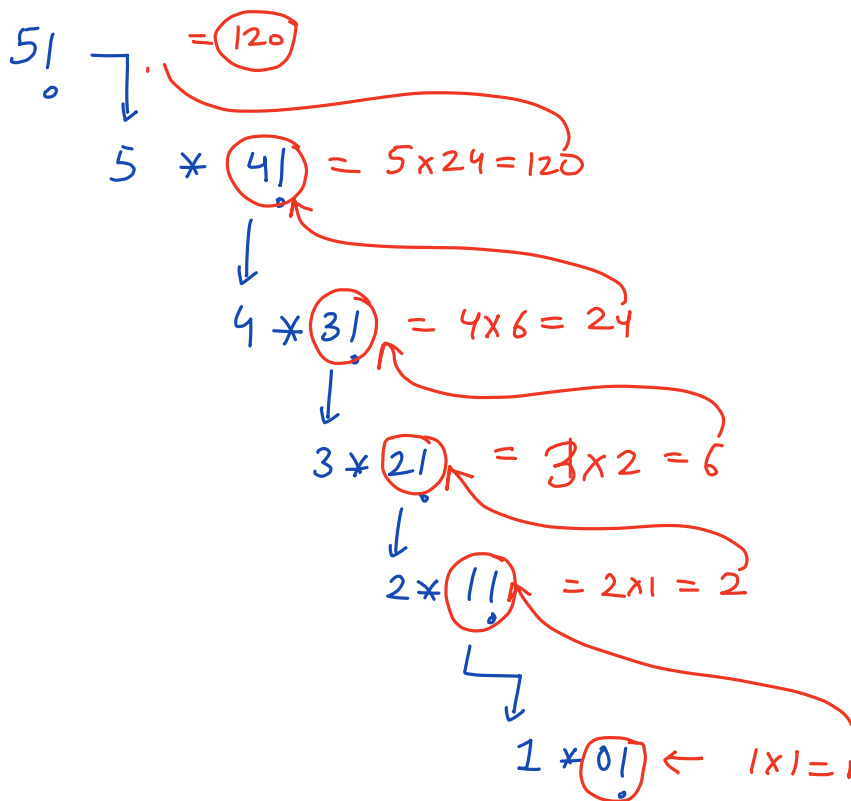
\Rightarrow L3 ans = n * fact(n-1)
L4 return ans

Rec Case

	fact n=0	
L3	fact n=1	fact(0)
L4	ans = 1 *	<u>1</u> = 1
L3	fact n=2	fact(1)
L4	ans = 2 *	<u>1</u> = <u>fact(5) / 2</u>
L3	fact n=3	fact(2)
L4	ans = 3 *	<u>2</u> = 6
L3	fact n=4	fact(3)
L4	ans = 4 *	<u>6</u> = 24
L3	fact n=5	fact(4)
L4	ans = 5 *	<u>24</u> = 120

Stack

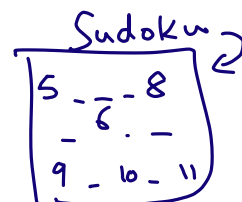
ans = 120



fact (n):

- x L1 if $n == 0$
- x L2 return 1
- ✓ L3 ans = n * fact(n-1) → Paused at this line
- L4 return ans

→ Loop is always performed.



$$\begin{aligned} \text{Multiply} \quad & * \\ f(a, n) &= \overbrace{a}^{\text{You}} + \overbrace{f(a, n-1)}^{\text{Rec}} \\ &= \underbrace{a + \overbrace{a + a + \dots + a}^{n-1 \text{ times}}}_{n \text{ times}} \end{aligned}$$

$$\frac{a * n}{= n * a}$$

$a \geq 0$
 $n \geq 0$

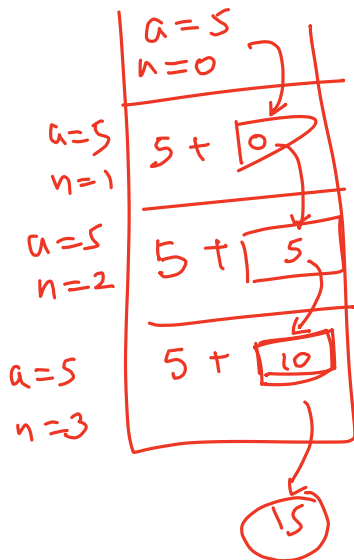
Base case $f(a, n)$:

if $n == 0$
return 0

return $a + \underbrace{f(a, n-1)}_{\uparrow}$

$a * 1 = a$
 \uparrow

5x3



Power

$5^3 = 125$

a^n

$= a \cdot \underbrace{a^{n-1}}$

$$\text{rec. } \underbrace{f(a, n)} = a * f(a, n-1) \quad \text{correct :)}$$

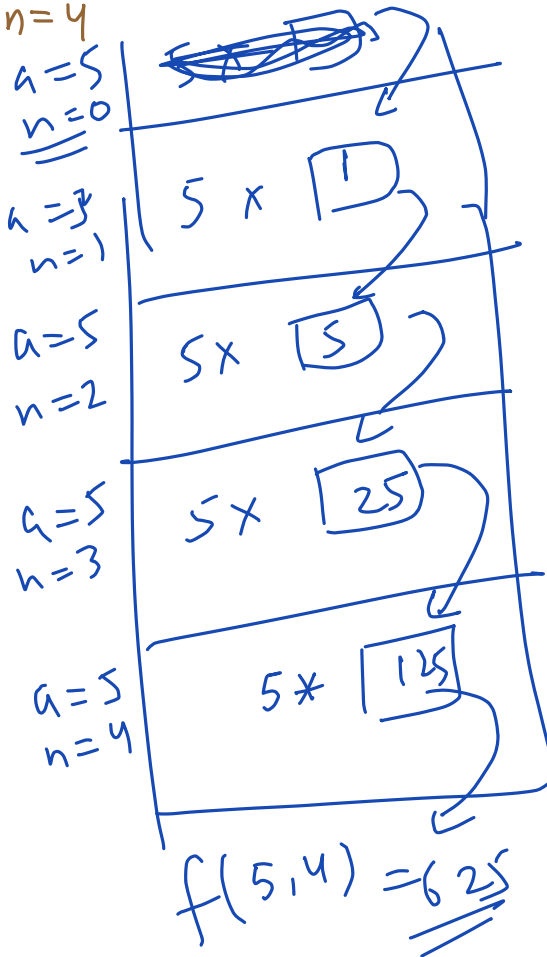
Base Case if $n==0$ return 1

Stack
Draw Memory Diagram

5⁴

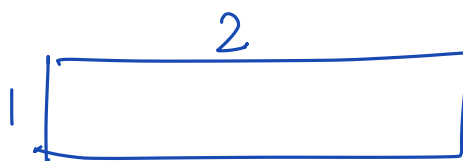
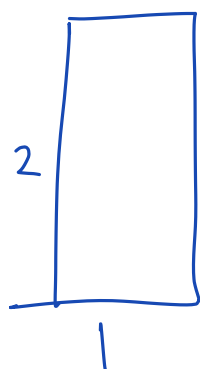
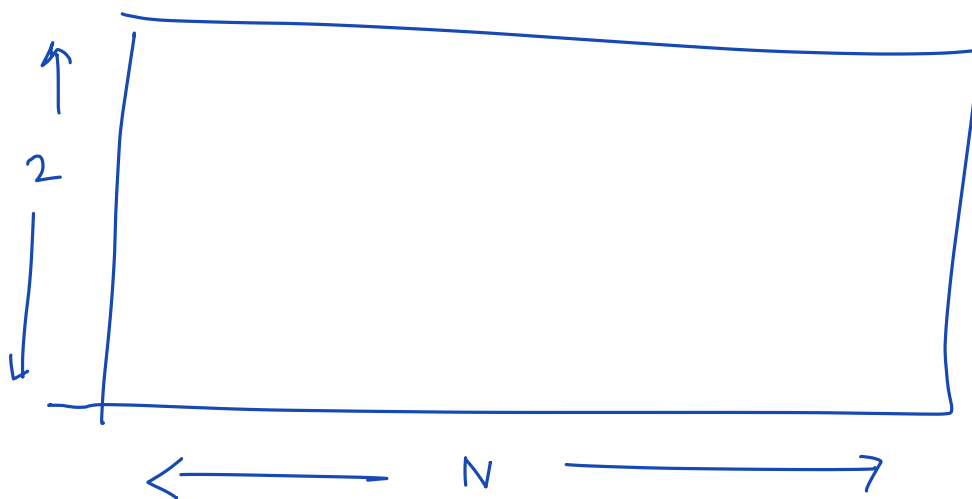
$n=0$
 $a=1$

$a=5, n=4$



Floor

$$f(\underline{N}) =$$



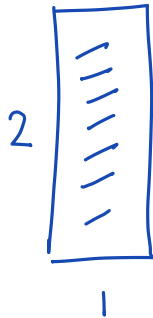
$N = 3$

$N \times 2$



1 way Not placing a Tile

$N = 1$



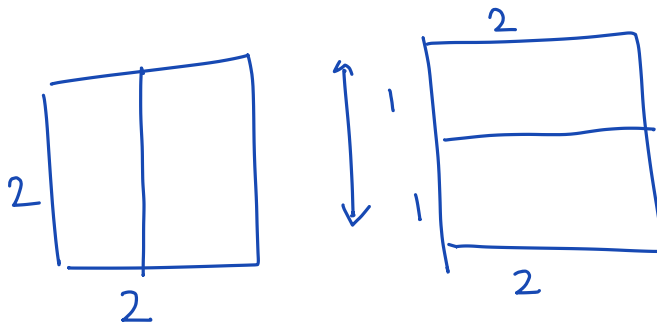
1 way

1 way

Base case

$n = 0 \rightarrow 1$
 $n = 1 \rightarrow 1$
 $n = 2 \rightarrow 2$
 $n = 3 \rightarrow 3$
 $n = 4 \rightarrow 5$
 $n = 5 \rightarrow 8$
 $n = 6 \rightarrow 13$
 $=$

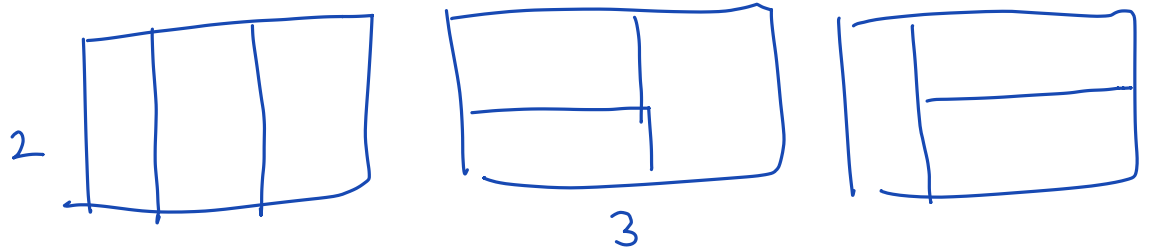
$N = 2$



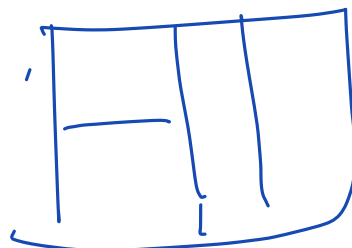
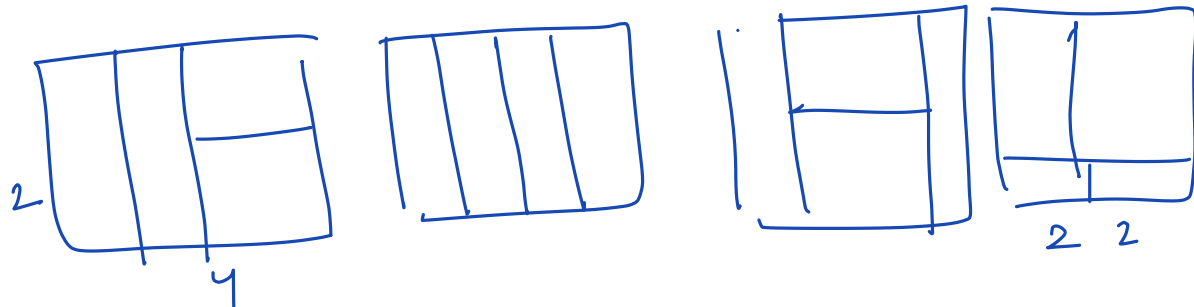
2 ways

$N = 3$

3 ways



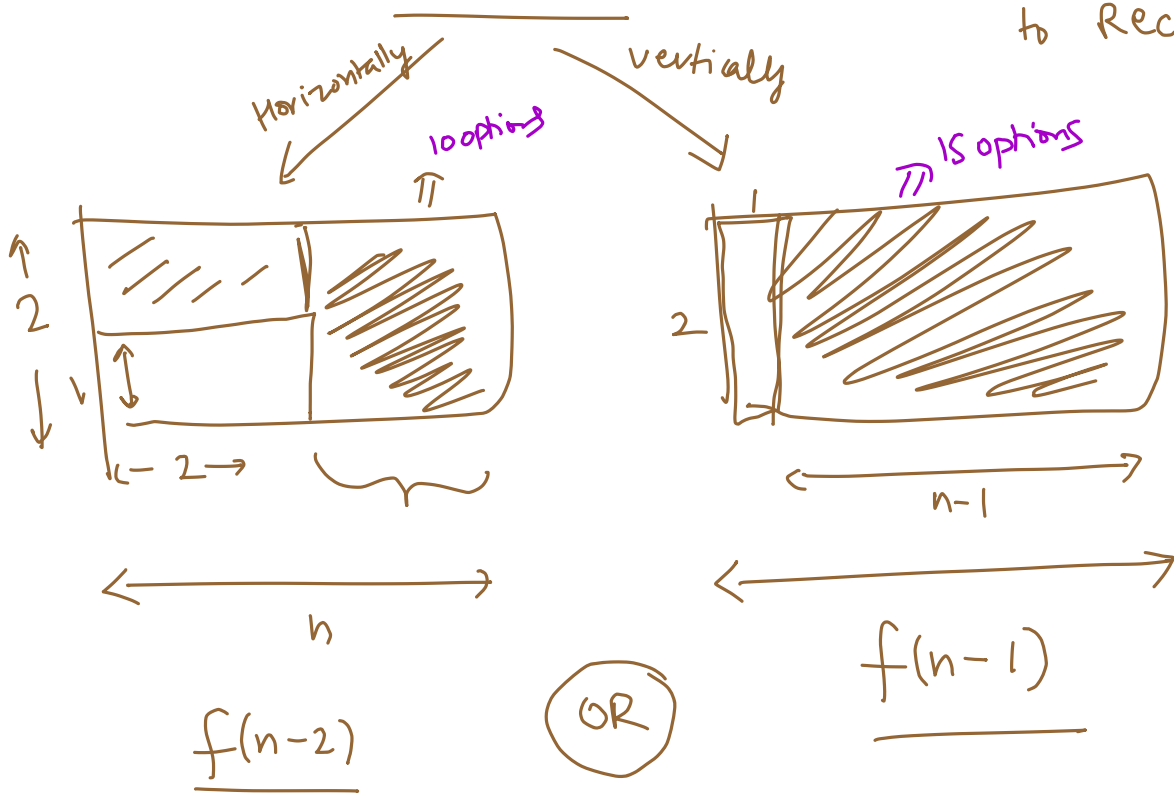
$N = 4$



5 ways

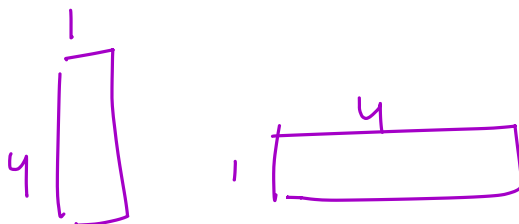
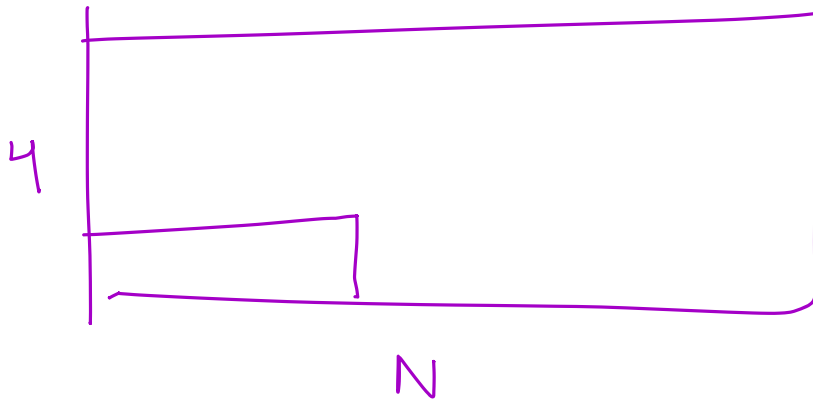
$f(n)$
Options

1 Tiles
Leave Rest everything
to Rec.

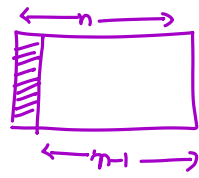


$$f(n) = f(n-1) + f(n-2)$$

Solution



flw



and
1. $f(n-1)$

or

