

## Recursion

↳ function calls itself directly or indirectly

### factorial

$$\rightarrow 5! = 5 \times 4 \times 3 \times 2 \times 1 = \underline{\underline{120}}$$

### Base case condition

↳ code will terminate

Small problem

$T(n)$

fact(n):

{ if  $n == 0$  or  $n == 1$ :

    return 1

else:

$n > 1$

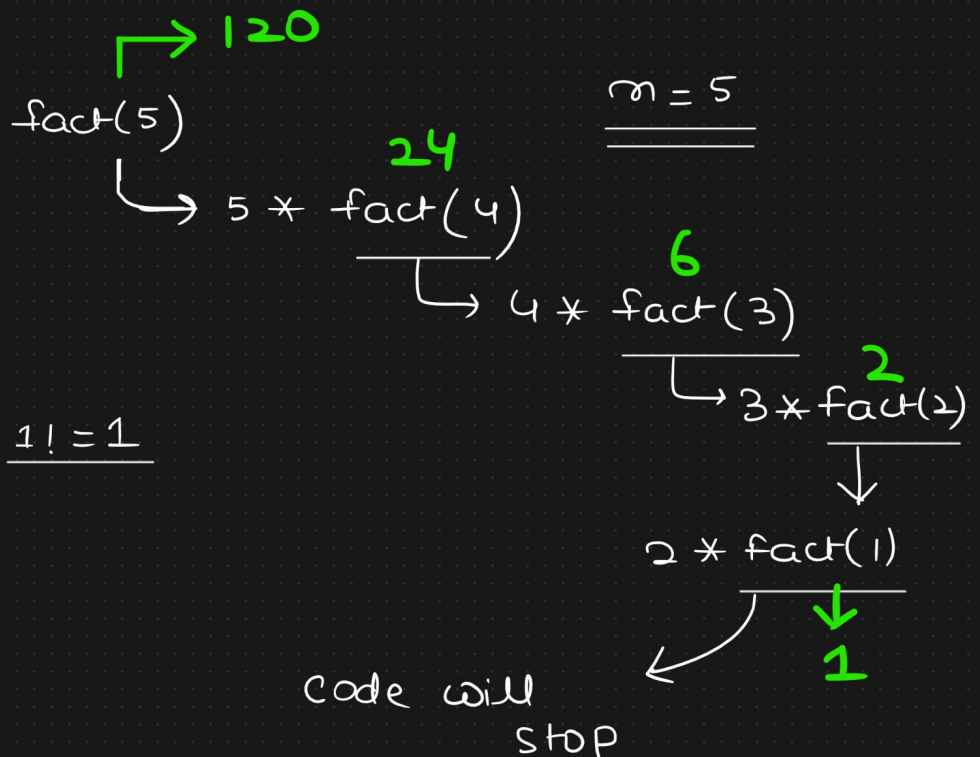
$\text{result} = n \times \text{fact}(n-1)$

$n \times T(n-1)$

    return result

Base case condition

Recursive call



Stack  $\rightarrow$  LIFO  
(Last In First Out)  
 $\Downarrow$   
to store function call

<del>fact(1)</del>
<del>fact(2)</del>
<del>fact(3)</del>
<del>fact(4)</del>
<del>fact(5)</del>

$\rightarrow$  Empty stack

Recurrence Relation

(factorial of number)

$$T(n) = \begin{cases} 1 & n=1 \\ n \times T(n-1) & n > 1 \end{cases}$$

$$T(n) = n \times T(n-1)$$

$\hookrightarrow$  Substitution method