

## 2.1 - Recursion

Wednesday, October 1, 2025 8:08 PM

↓  
[PM] → Recursion

Principle of Mathematical Induction

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

$4!$

$$[231] \rightarrow 23 \times \epsilon$$

$$[22] = \epsilon$$

↳ sub problem  
↳ smaller version of a problem

$f(1) \rightarrow true$   
 $f(n) \rightarrow f(n-1) \rightarrow true$   
main bta the  
↳  $[f(2) true]$

# Recursion = function calling it self.

for  $n$  ka factorial  

```

int fact(int n) {
    if (n == 0) return 1;
    int n = fact(n-1);
    return n * n; // self work
}
    
```

$n$  ka factorial  
 $fact(n-1)$   
 $(n-1)!$

↳ Every recursive solution has three parts

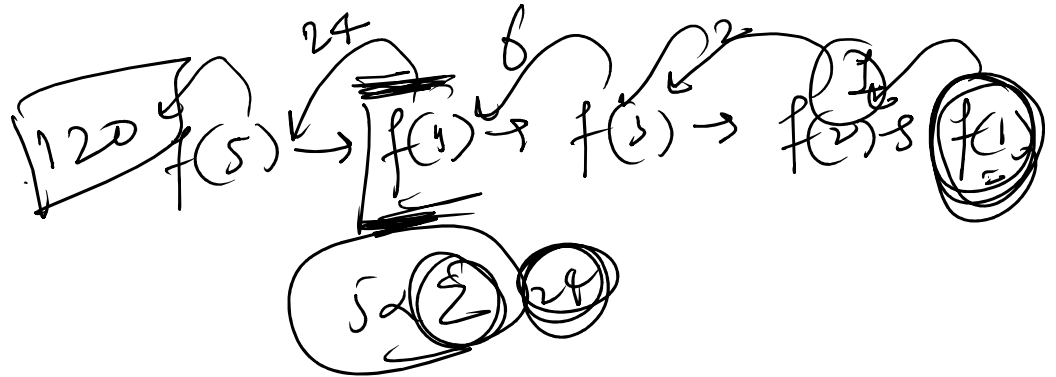
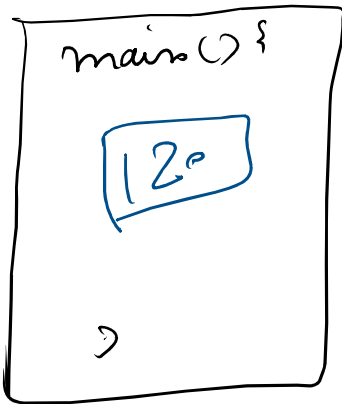
assum  
ki answer humeshe  
shi dega

- Base case (sabse chota case jiska answer mujhe pata hai)
- recursive call
- self work

↳ we only solve for one step, rest is handled by recursion

gru v

Step 1 recursion  
Solved by recursion



① Base case is used to terminate the recursion. Otherwise we will have infinite recursion,  $\rightarrow$  Stack overflow error.

② T.C is NOT always equal to S.C in recursion.

Q) Write a program to find the sum of first 'n' natural numbers.

# Two sum

l  
1 2

3

4

[l, r]

3

$O(n)$

[l, r]

4