Factorial

fact(1) = 1

fact(2) = 2 × fact(1)

fact(3) = 3 × fact(2)

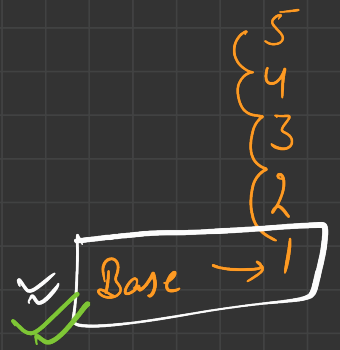
fact(4) = 4 × fact(3)

fact(5) = 5 × fact(4)

$$fact(N) = N \times fact(N-1)$$

$$4! = 4 \times 3 \times 2 \times 1 = 24$$

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



fact(N) = N * fact(N-1) [N=4]

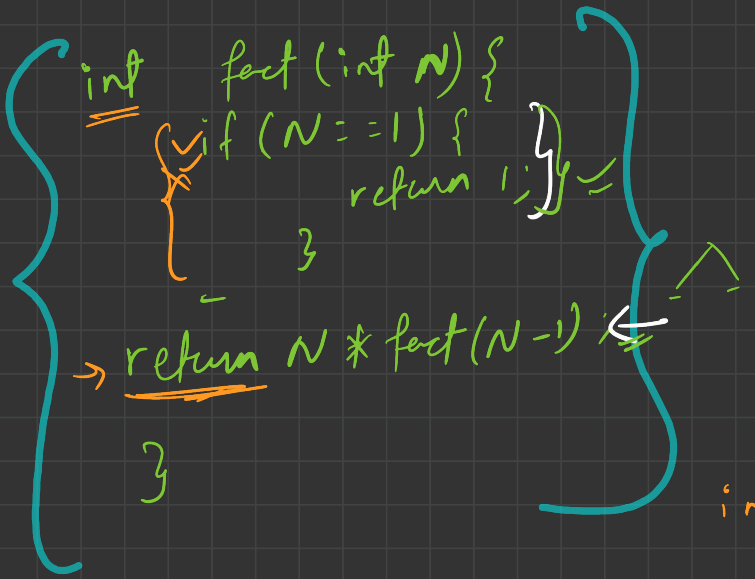
fact(4) = 4 × fact(3) 6 = 24

fact(3) = 3 × fact(2) 2 = 6

fact(2) = 2 × fact(1) 1 = 2

fact(1) = 1

Base (1)



$5! = 5 \times 4! = 120$

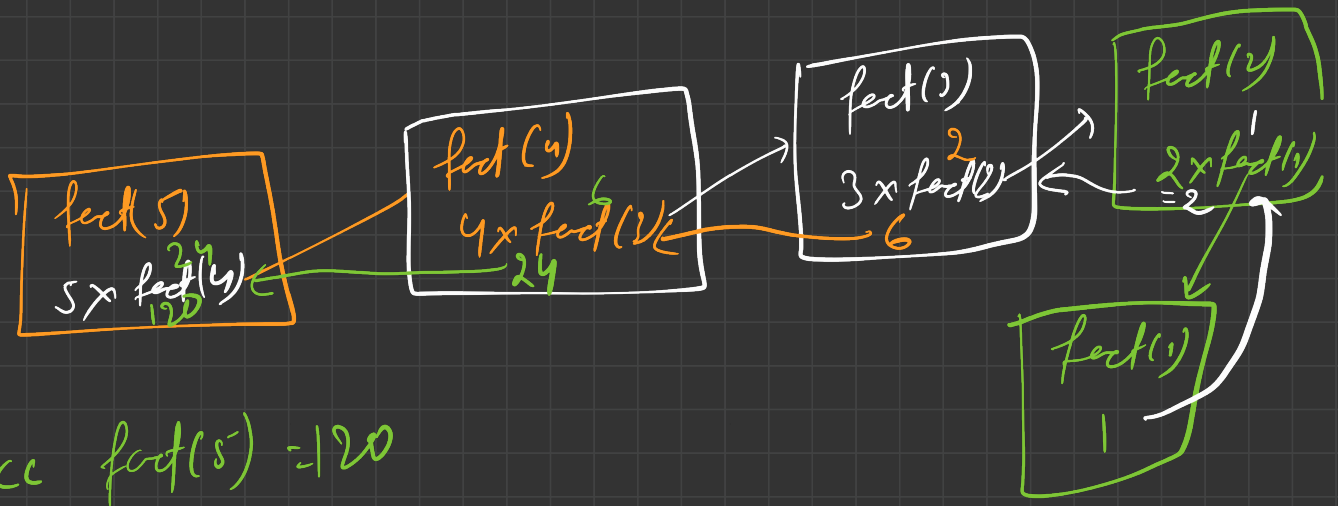
$4! = 4 \times 3! = 24$

$3! = 3 \times 2! = 6$

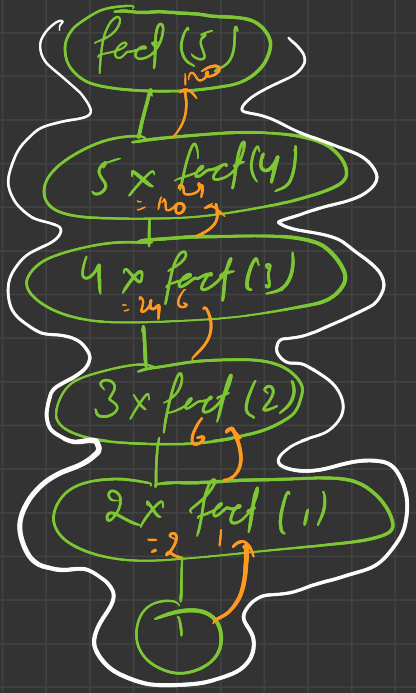
$2! = 2 \times 1! = 2$

$1! = 1$

```
int main() {
    n = 5;
    cout << fact(n);
}
```



cout << fact(5) ;120



Sum of First N number

$n = 5$

$Sum(1) = 1$

$Sum(2) = 2 + sum(1)$

$Sum(3) = 3 + sum(2)$

$Sum(4) = 4 + sum(3)$

$Sum(N) = N + sum(N-1)$

$5 = 5 + sum(4)$

$4 = 4 + sum(3)$

$3 = 3 + sum(2)$

$2 = 2 + sum(1)$

$1 = 1$

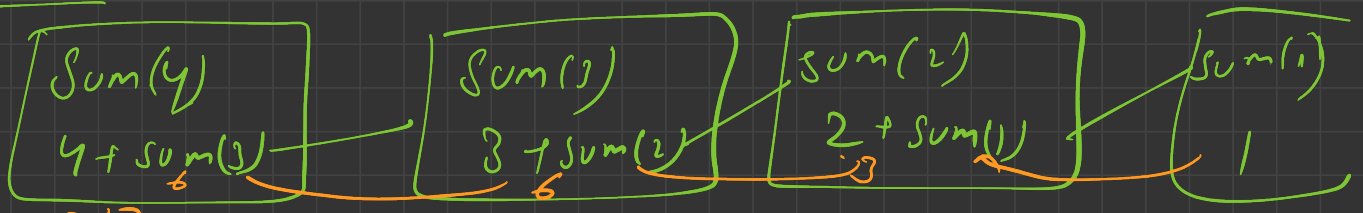
15

```
int sum(int N){
    if (N == 1) {
        return 1;
    }

    return N + sum(N-1)
}
```

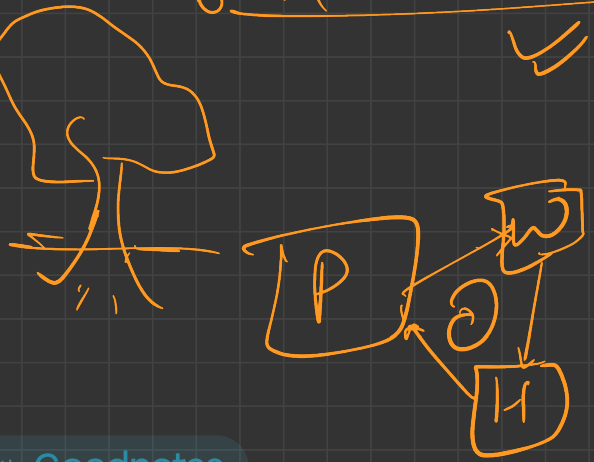
```
int main() {
    n = 5
    cout << sum(n);
}
```

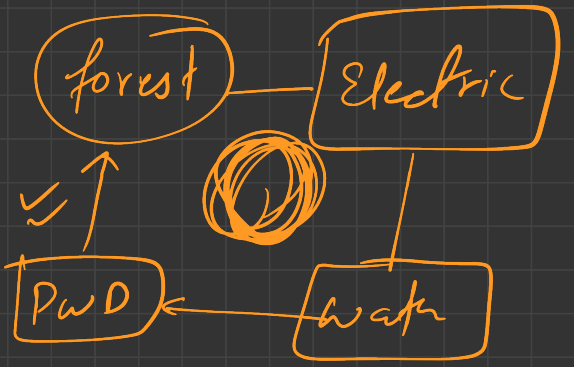
n = 4



$4 + 3 + 2 + 1 = 10$

$Sum(N) = N + Sum(N-1)$





Power of 2

num, n

Pow(2,1) = 1

Pow(2,2) = 2 × Pow(2,1)

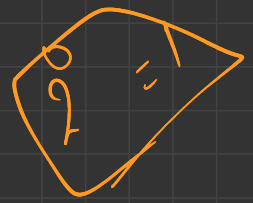
Pow(2,3) = 2 × Pow(2,2)

Pow(2,4) = 2 × Pow(2,3)

Pow(2,n) = 2 × Pow(2,n-1)

num	n
2	5
2	4
2	3
2	2
2	→1

```
int Pow(int num, int n){
    if(n==1){
        return num;
    }
```



return 2 × Pow(2, n-1)

}

Square of N Number

$Sq(1) = 1$

$Sq(2) = 2^2 + Sq(1)$

$Sq(3) = 3^2 + Sq(2)$

$Sq(4) = 4^2 + Sq(3)$

$$Sq(n) = n^2 + Sq(n-1)$$

→ 4
3
2
→ 1
← Base

```
int sqsum(int n){
    if(n==1){
        return 1;
    }
    return n*sqsum(n-1)
}
```

$n \geq 1$

```
int main(){
    int n = 4
    cout << sqsum(n);
}
```