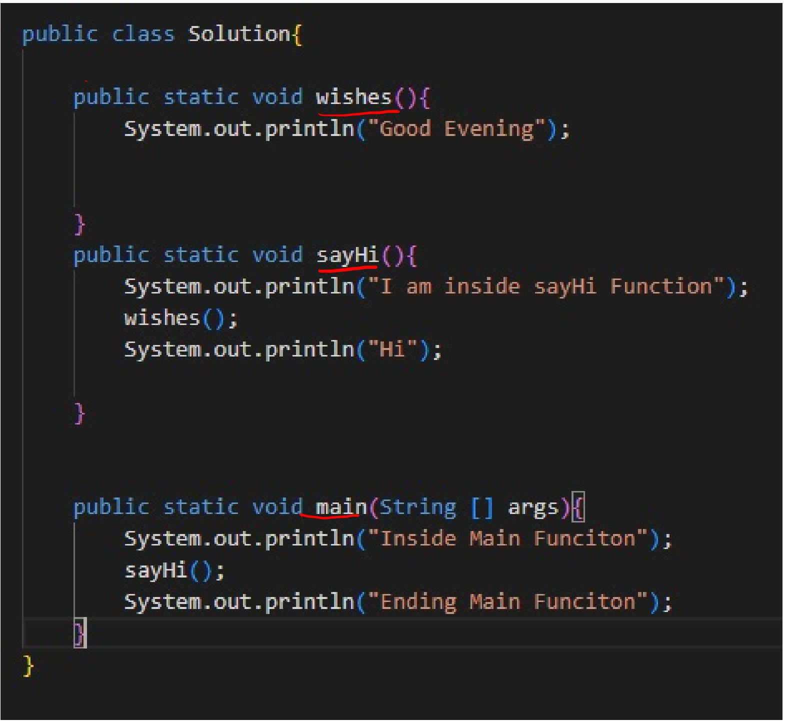
Recursion $\Rightarrow$ Powerful Tool.

$$\begin{tikzcd}[row sep=small]
& \text{Trees} & \\
& \text{Graphs} & \\
\text{Recursion} \arrow[ur, bend right] \arrow[uur, bend right] \arrow[r, bend right] \arrow[dr, bend right] \arrow[ddr, bend right] & \text{DP} & \text{solve easily} \\
& \text{Backtracking} & \\
& \text{Linkedlist} &
\end{tikzcd}$$



```
public class Solution{

    public static void wishes(){
        System.out.println("Good Evening");


    }
    public static void sayHi(){
        System.out.println("I am inside sayHi Function");
        wishes();
        System.out.println("Hi");

    }


    public static void main(String [] args){
        System.out.println("Inside Main Funciton");
        sayHi();
        System.out.println("Ending Main Funciton");
    }
}
```

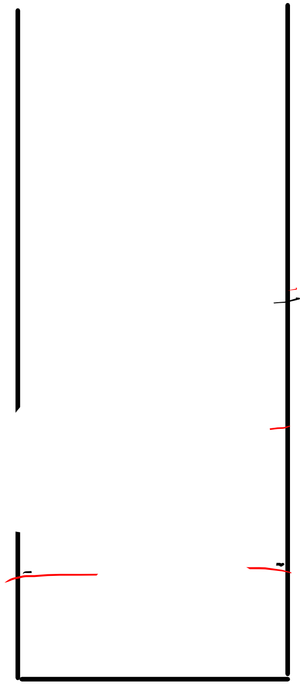
~~Inside~~ M Function.

~~I am~~ inside say Hi

~~GE~~

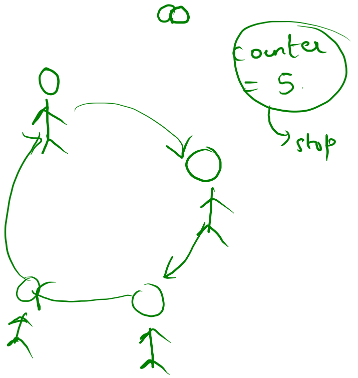
~~Hi~~

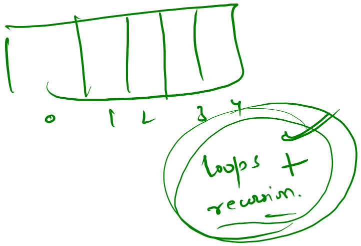
~~End~~ M Fn.

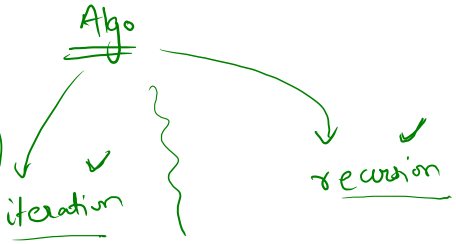


Recursion:- func calling itself.

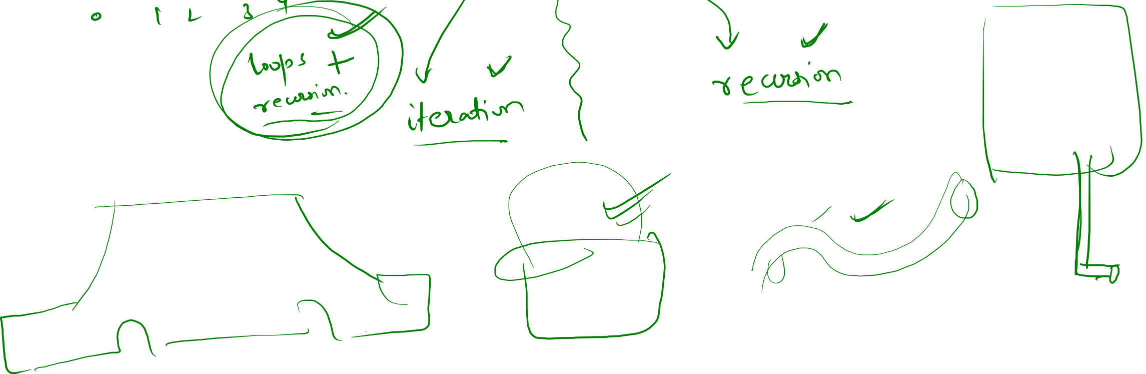
```
sayhi( )
{
    sayhi()
}
```







new



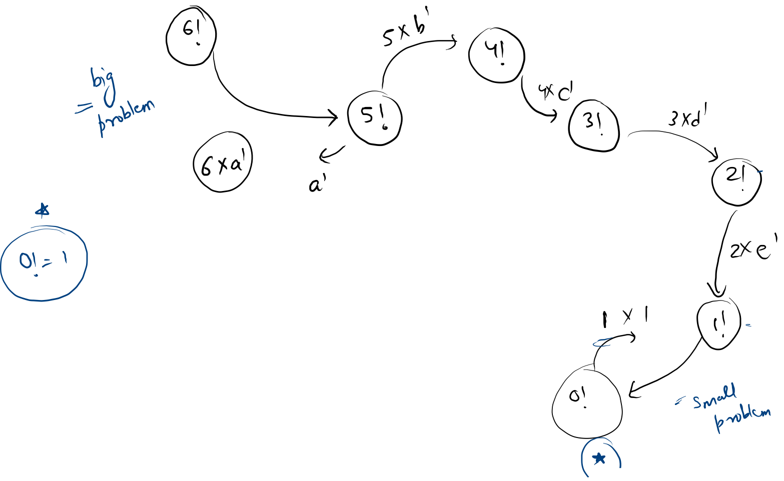
factorial.

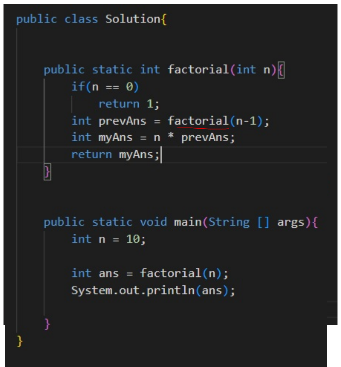
6! = 720

n=6

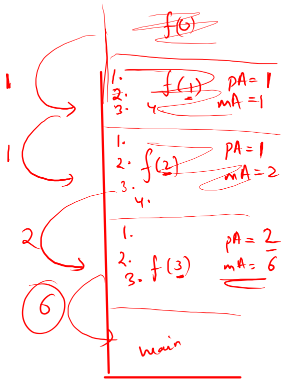
↳ 6 × 5 × 4 × 3 × 2 × 1

for (i=[1 ⟶ n])
    ans *= i;



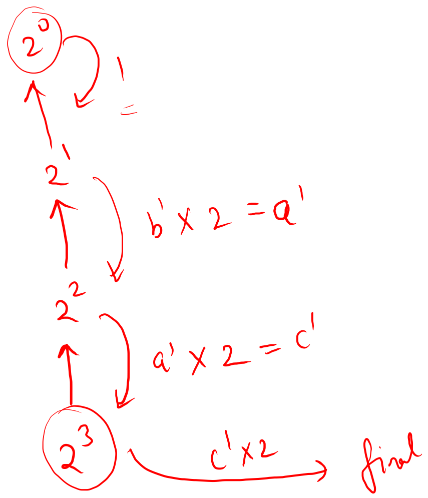


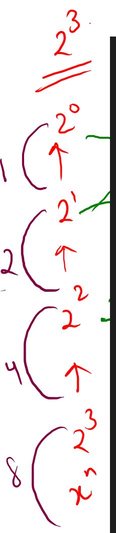
```java
public class Solution{


    public static int factorial(int n){
        if(n == 0)
            return 1;
        int prevAns = factorial(n-1);
        int myAns = n * prevAns;
        return myAns;
    }


    public static void main(String [] args){
        int n = 10;

        int ans = factorial(n);
        System.out.println(ans);

    }
}
```

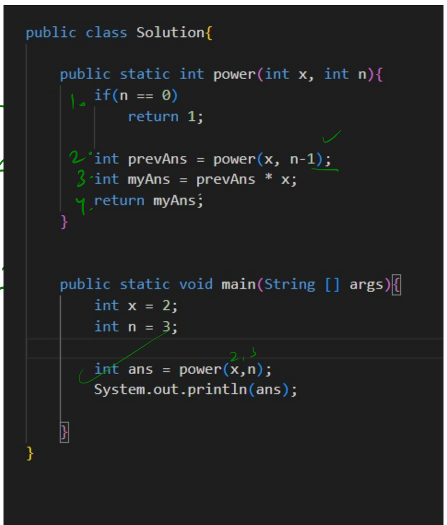


Power of number x^n

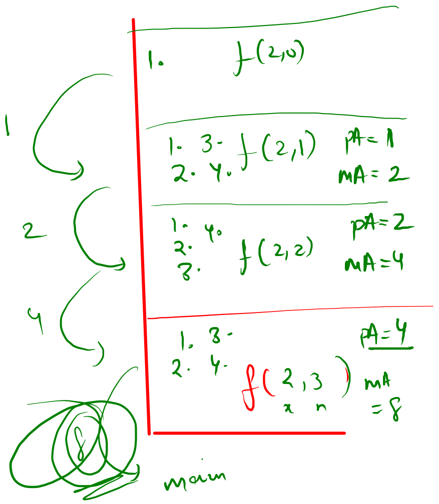
$x = 2$
$n = 3$ $\Rightarrow$ 8







```
public class Solution{

    public static int power(int x, int n){
        if(n == 0)
            return 1;

        int prevAns = power(x, n-1);
        int myAns = prevAns * x;
        return myAns;
    }

    public static void main(String [] args){
        int x = 2;
        int n = 3;

        int ans = power(x,n);
        System.out.println(ans);
    }
}
```


1. f(2,0)
1
1. 3. 2. 4. f(2,1) pA = 1 mA = 2
2
1. 4. 2. 3. f(2,2) pA = 2 mA = 4
4
1. 3. 2. 4. f(2,3) x n pA = 4 mA = 8
8
main