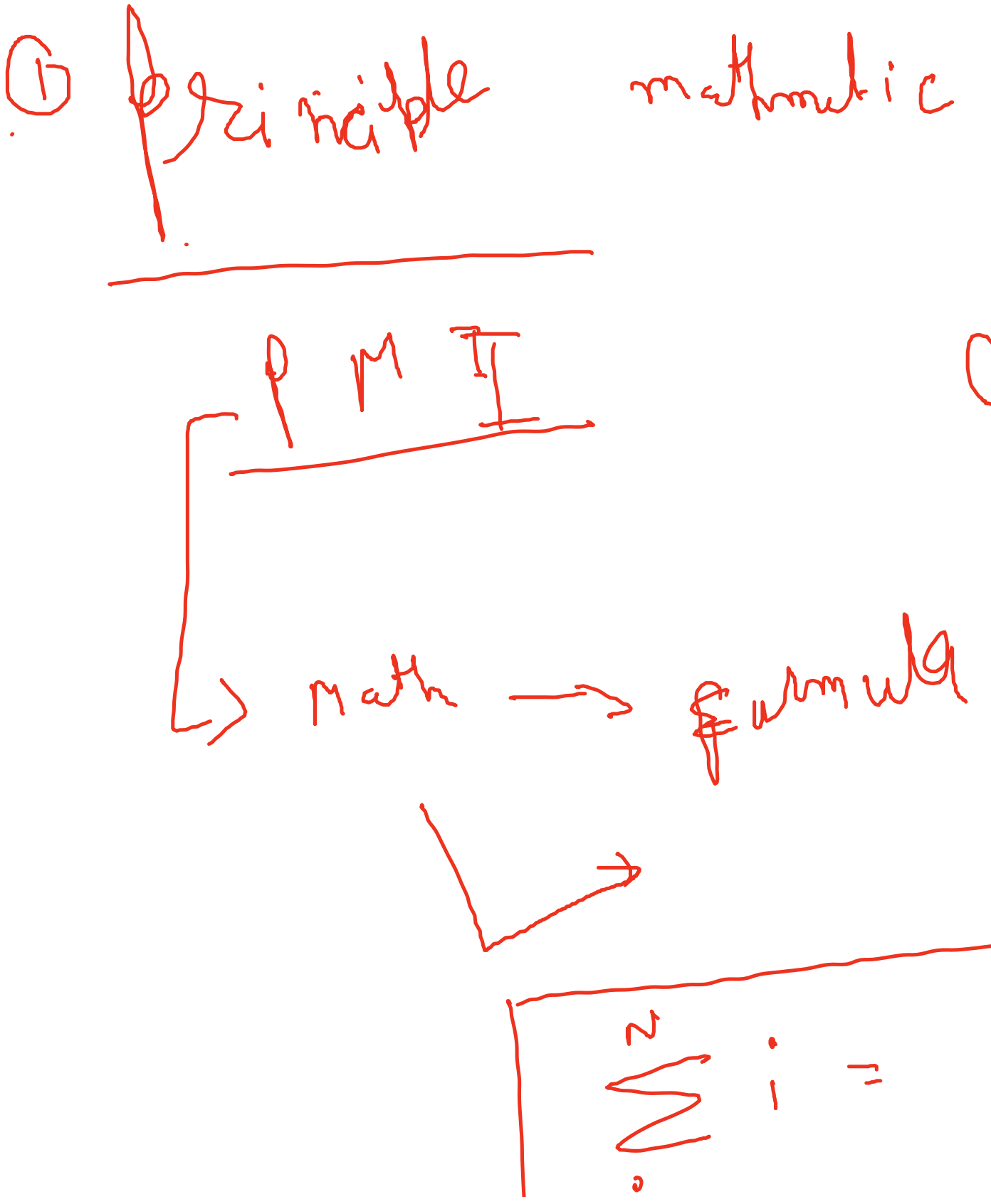
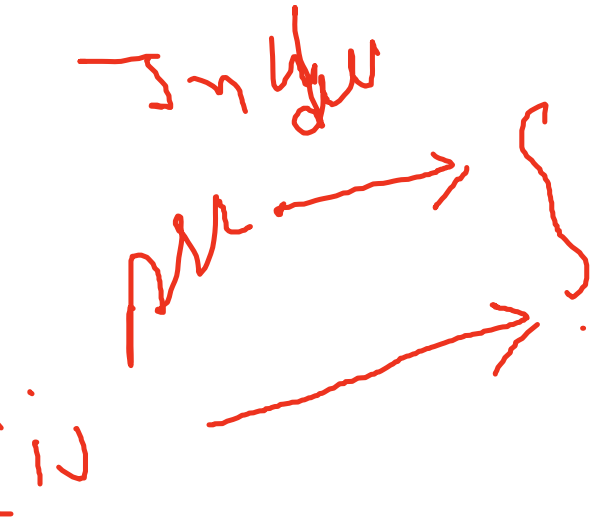
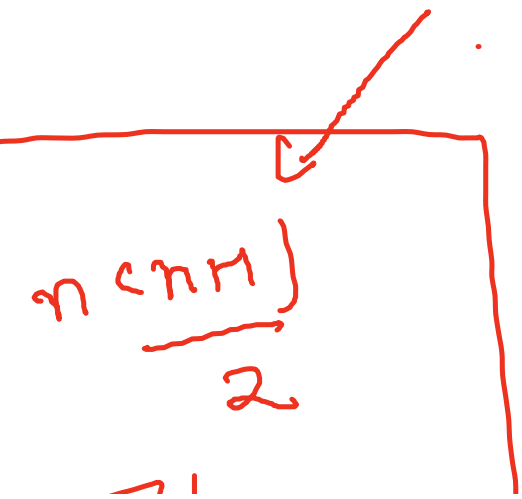
Lec20

Monday, 5 July 2021 6:57 PM







i = 1

(1) For small input

base

$\sum_{i=1}^{N} i = ?$

big → small

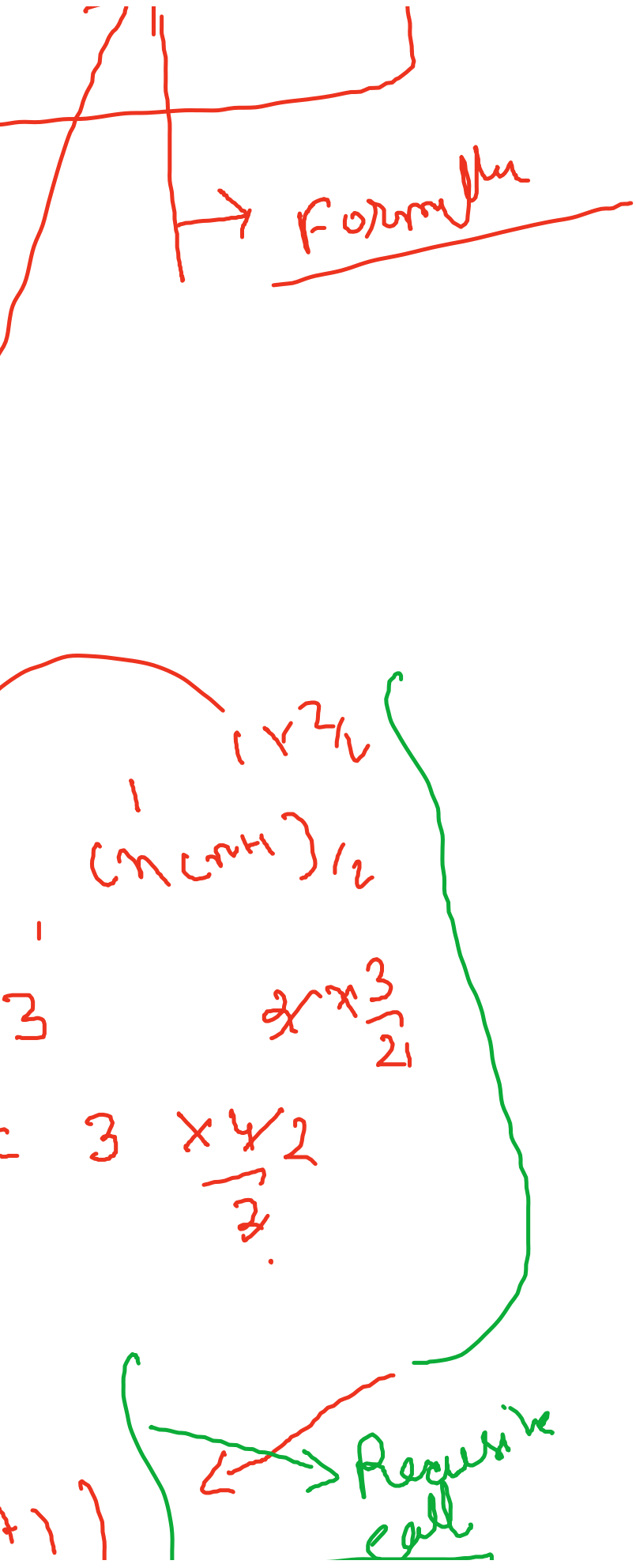
base

$N = 1$ $\quad 1 = 1$

$N = 2$ $\quad 1+2 =$

$N = 3$ $\quad 1+2+3$

(ii) $N = k$ $\quad 1^k$ $\quad i = k(k^$


Formula
Recursive call

$\sum_{i=1}$

$1 \cdot 2 \ldots k \quad k+1$

$N = k+1$

111

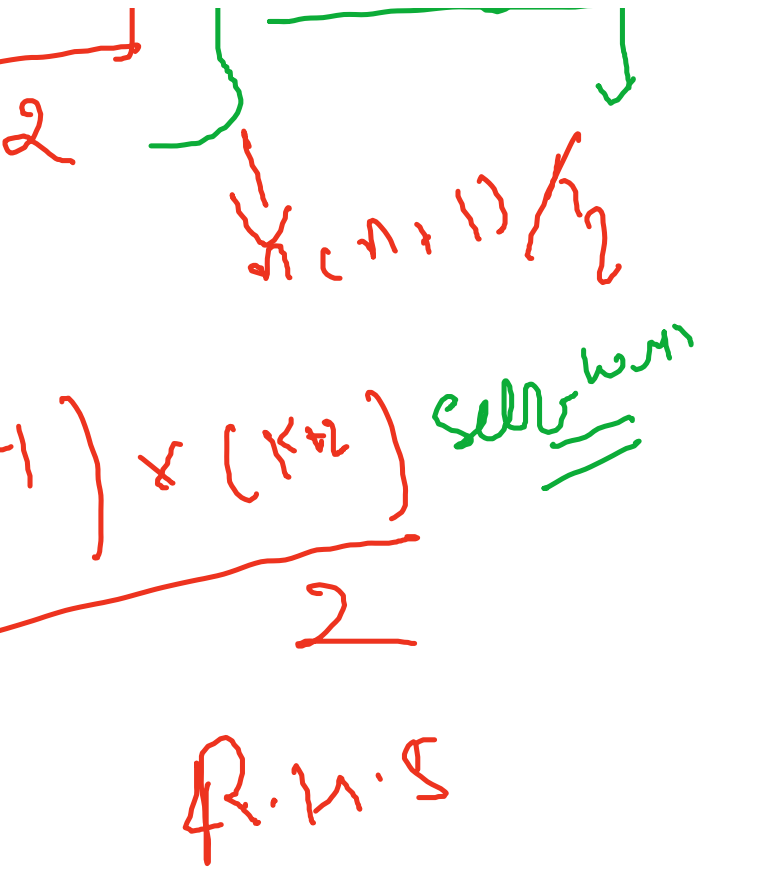
$1, 2, \ldots, k, k+1$

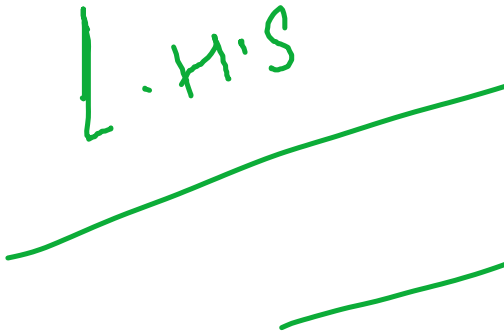
$$\sum_{i=1}^{k+1} i = (k+ \ldots$$

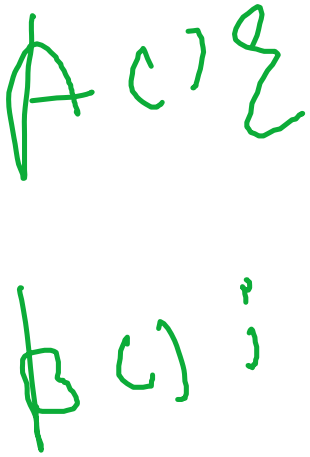
$$\left(\sum_{i=1}^{k} i \right) + (k+1)$$

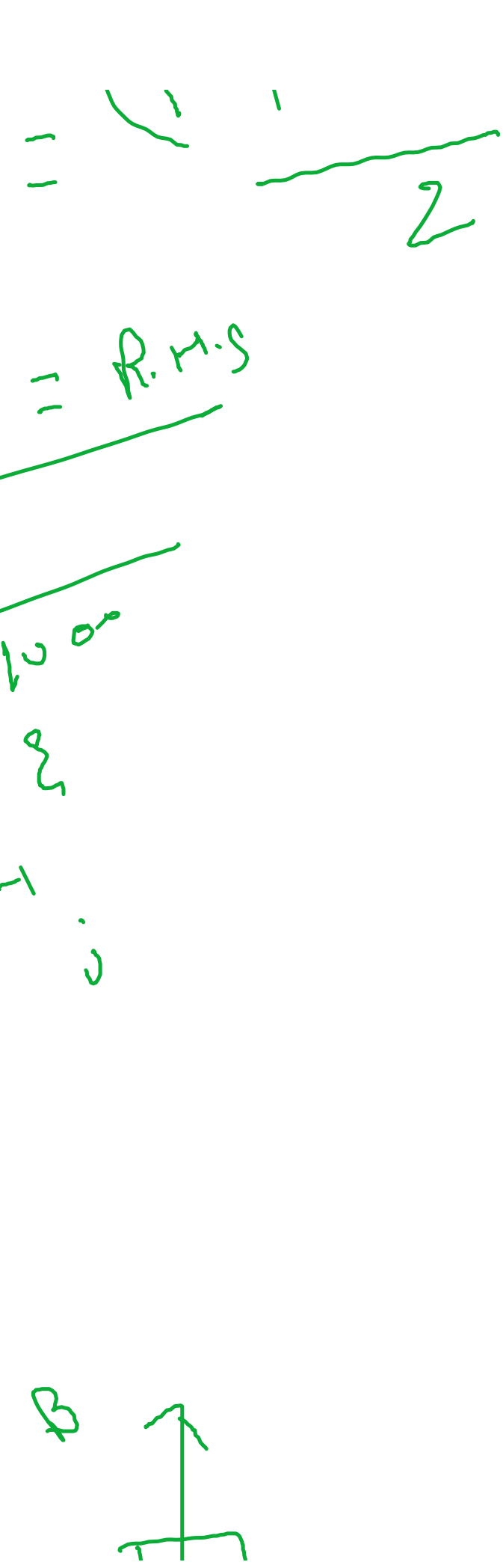
$$\frac{k \times (k+1)}{2} + (k+1)$$

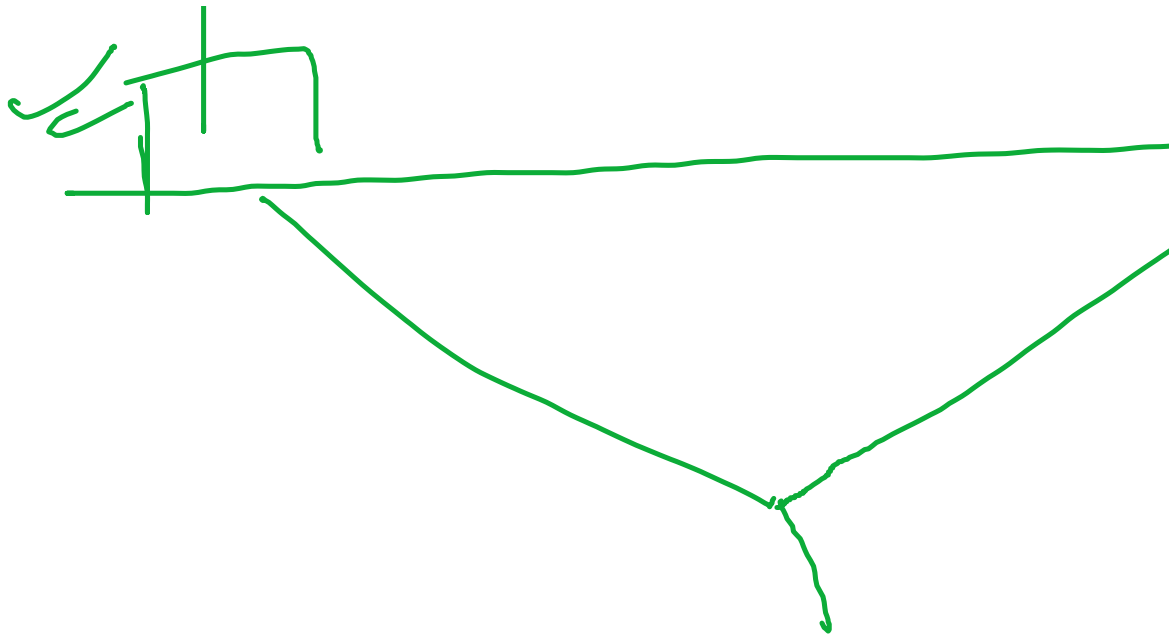
$$(k+1)\left(\frac{k}{2} + 1\right)$$









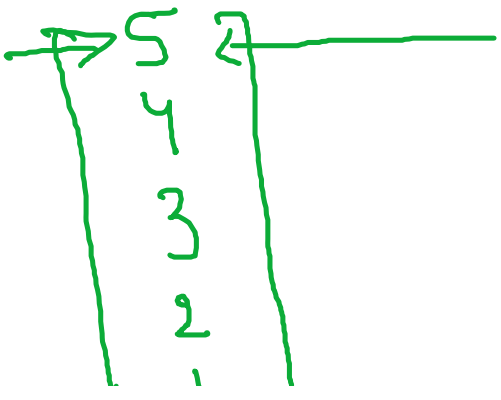


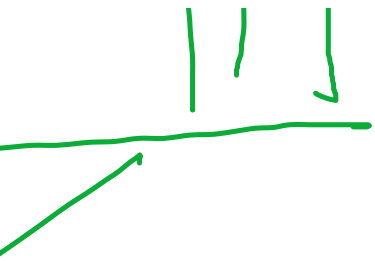
(1) Big problem

→ smaller problem

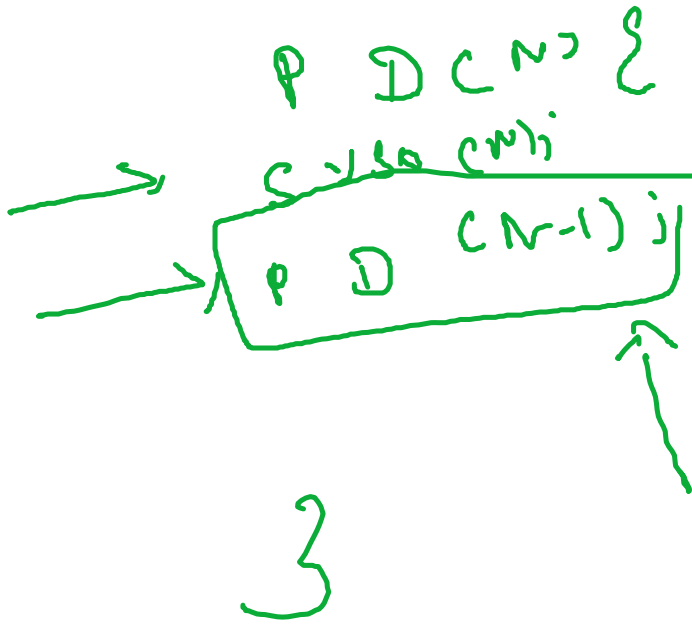
→ Self work

→ N = 5

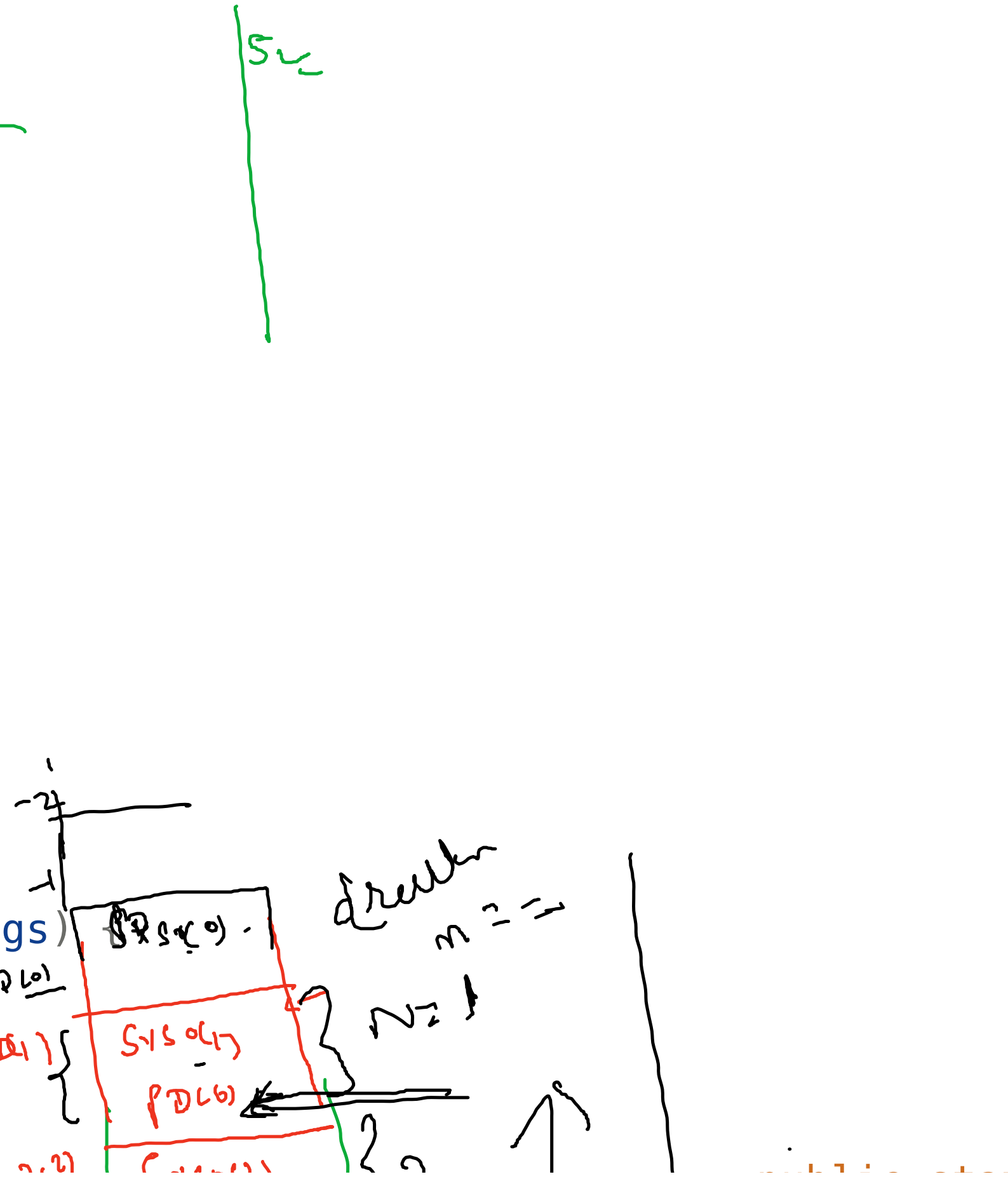




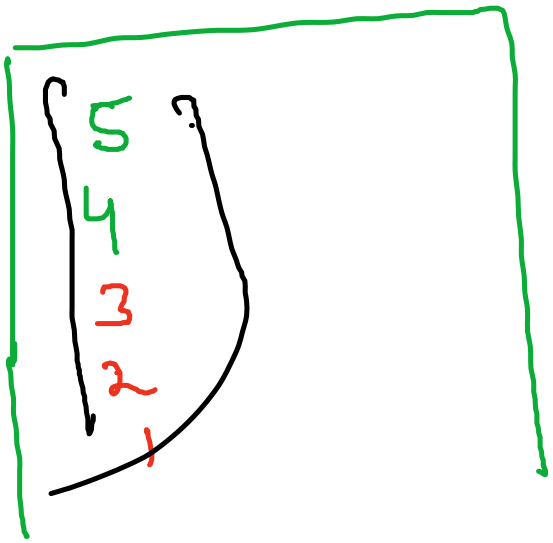
1) Base case



```java
public class Print_Dec {

public static void main(String[] ar
// TODO Auto-generated method stub
PD(5);

}
public static void PD(int n) {
```



```
System.out.println(n);
PD(n-1);
}

}
```

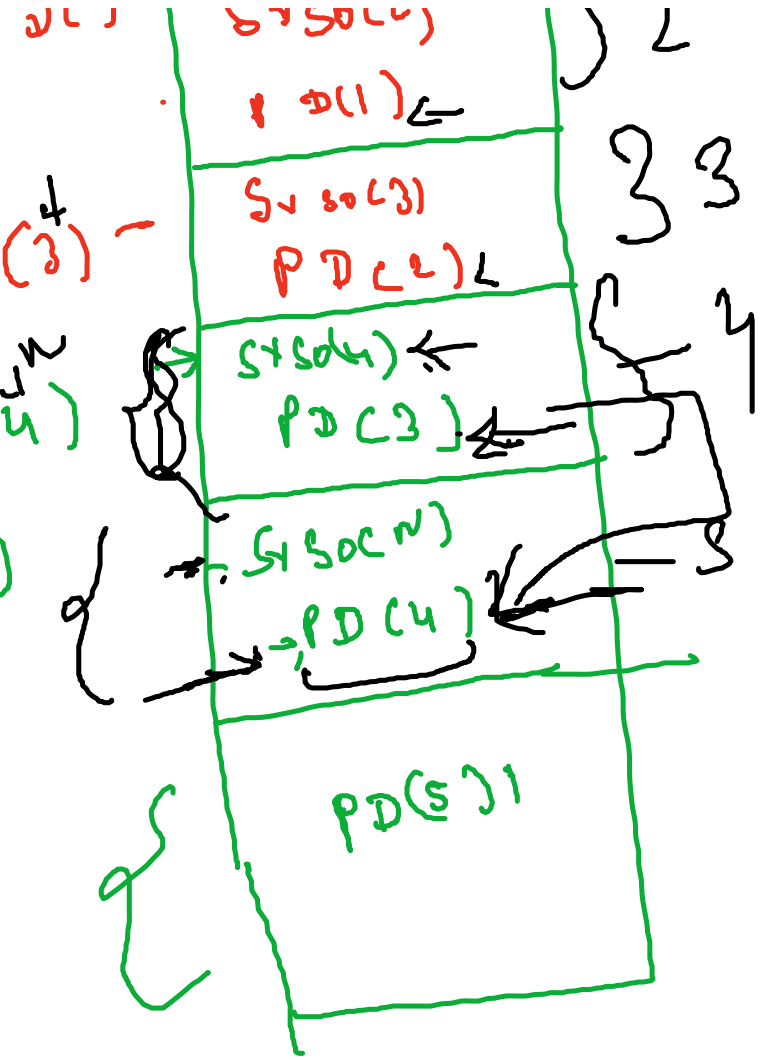


main

=> N=5

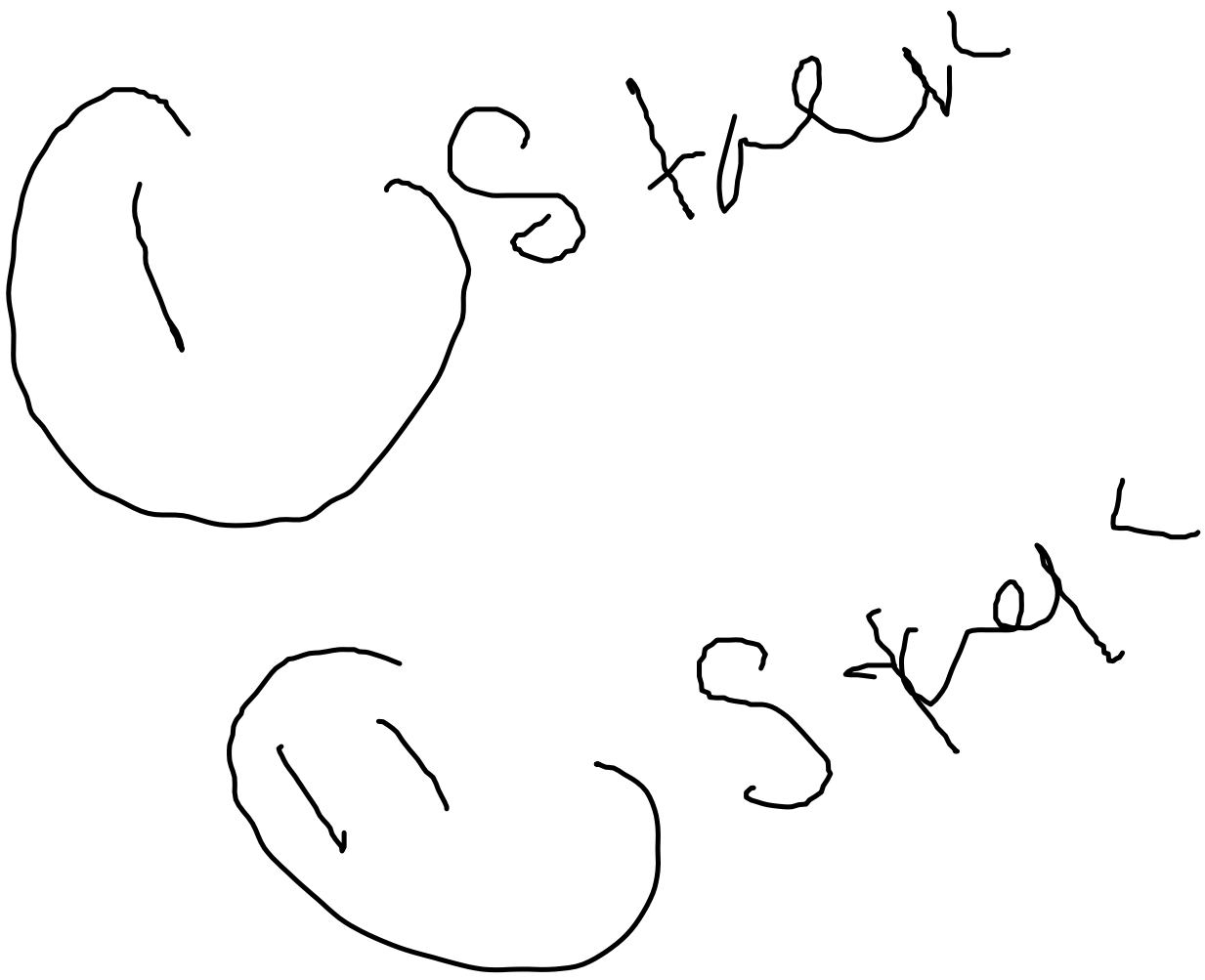
1
2
3
4
5

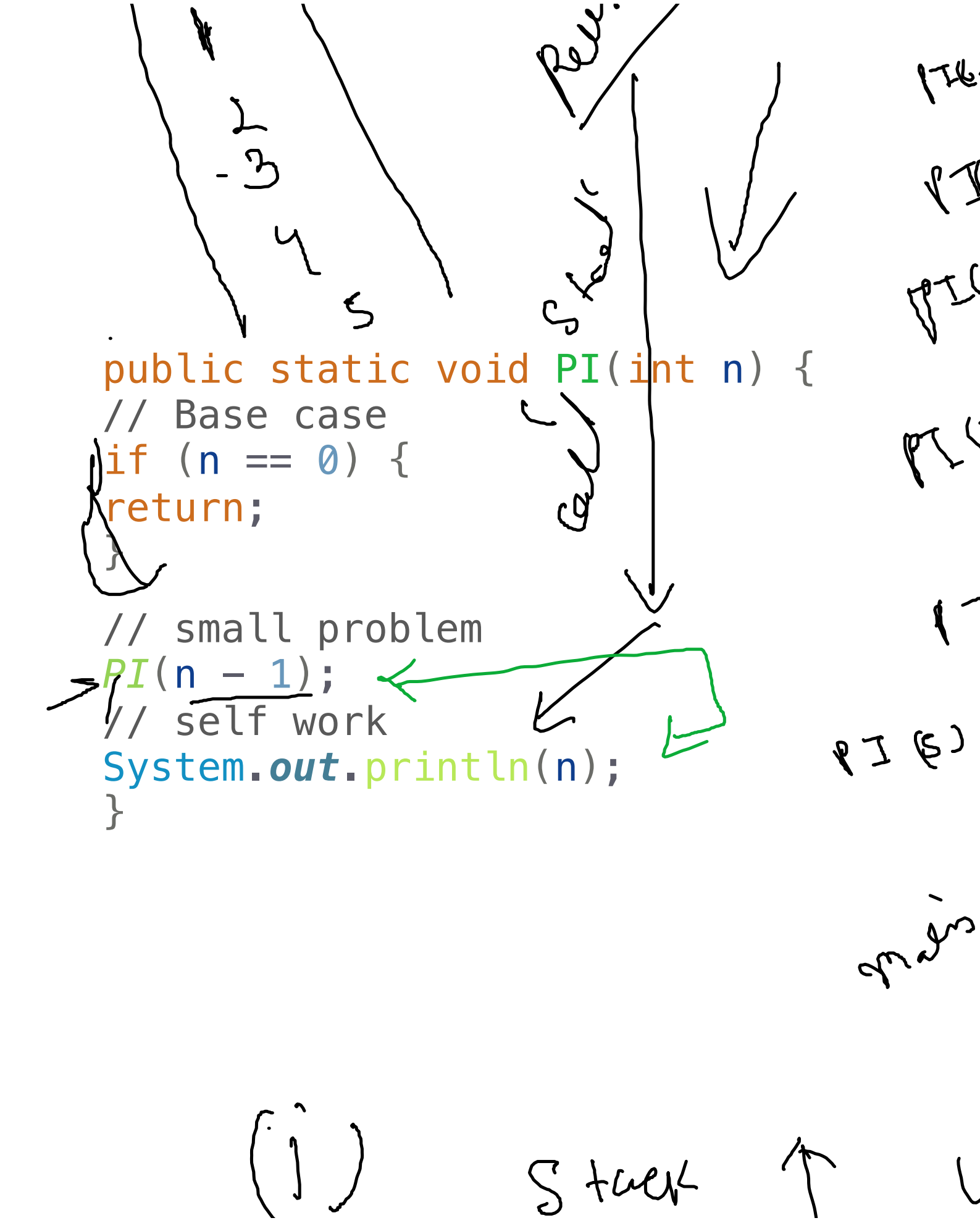
1
2
3
4
5



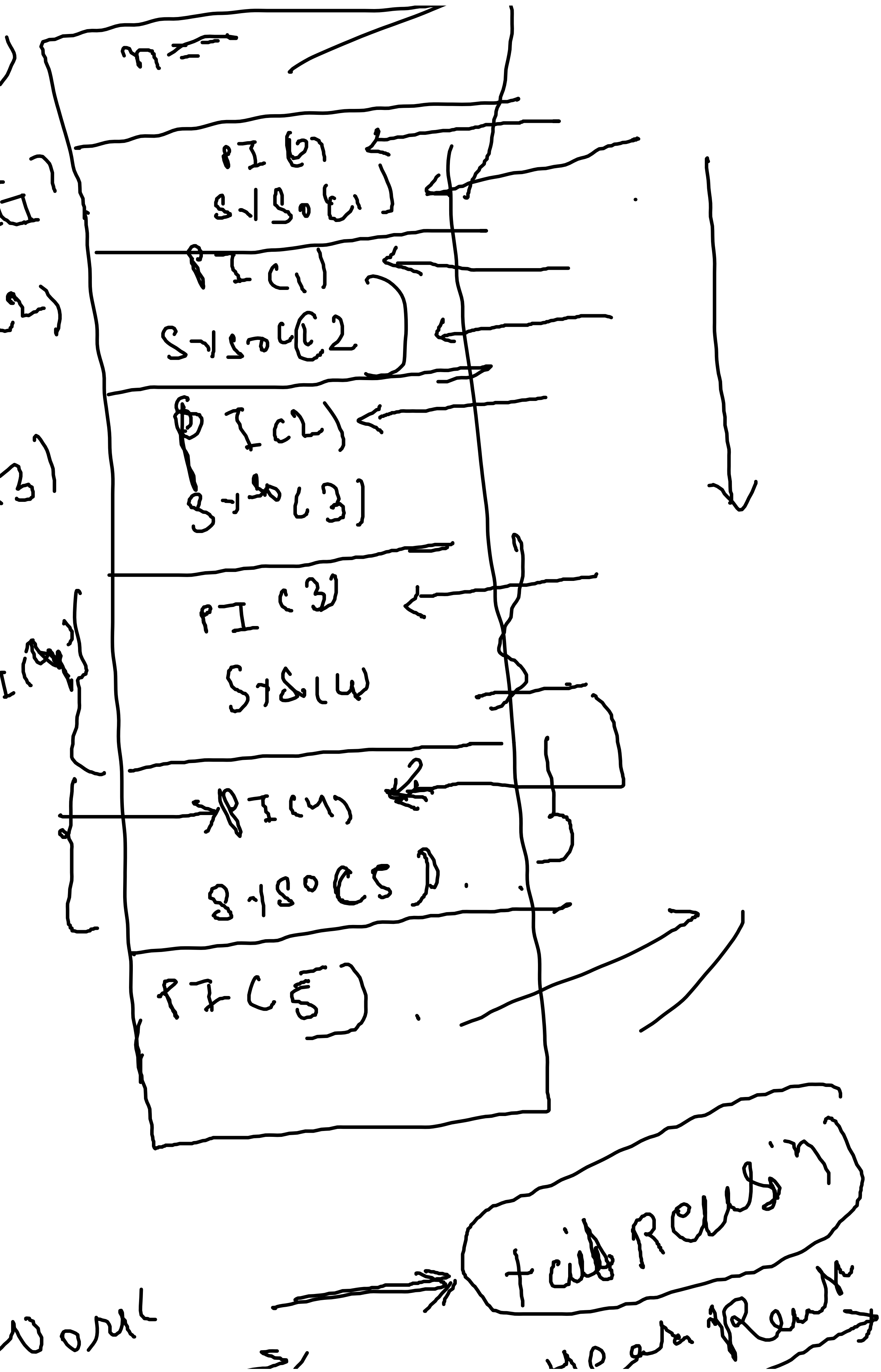
```
public sta
// Base cas
if (n == 0
return;
}

// small p
PI(n - 1);
// self wo
System.out
}
```

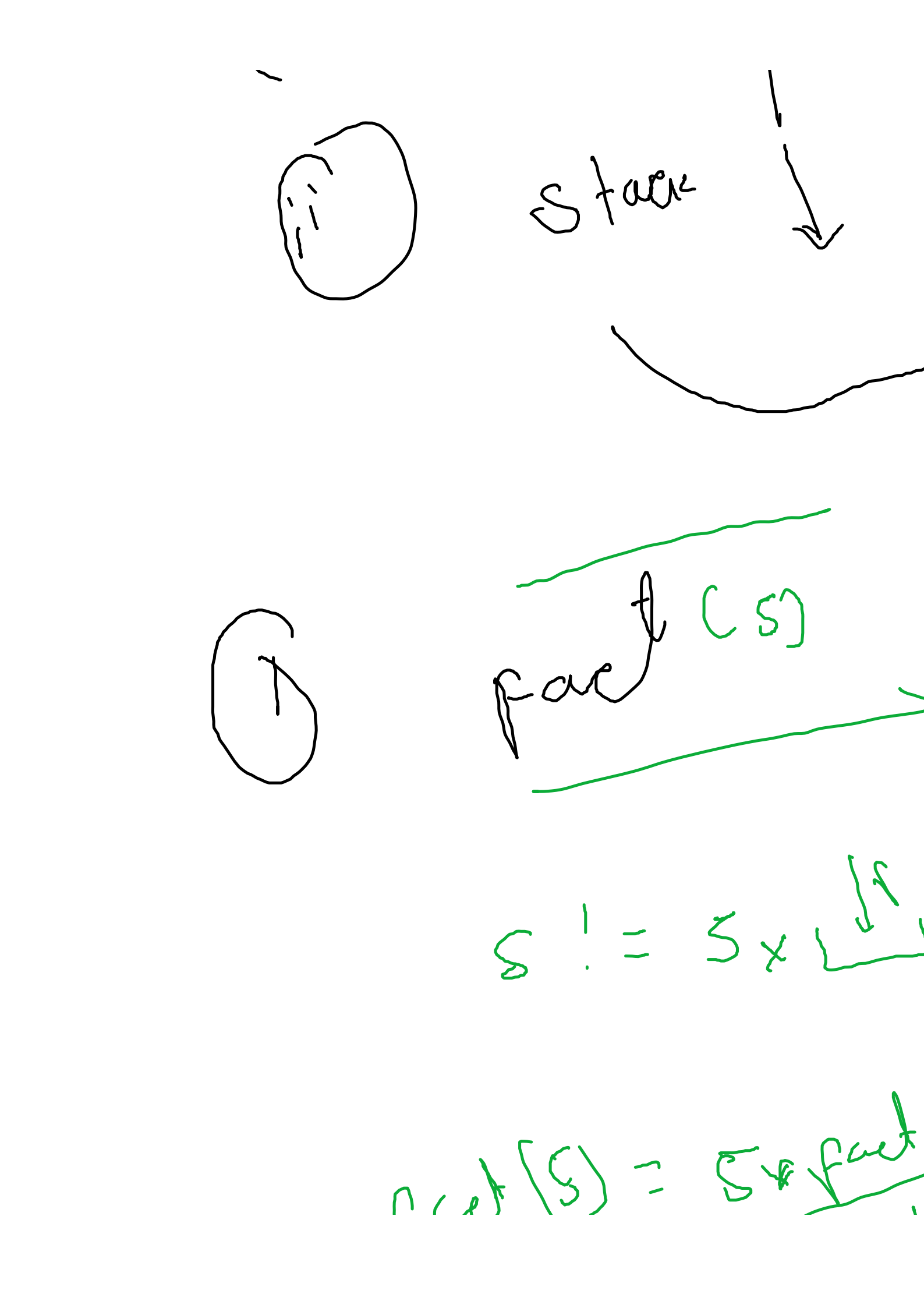
```
tic void P1(int n) {
se
) {



roblem

rk
.println(n);
```

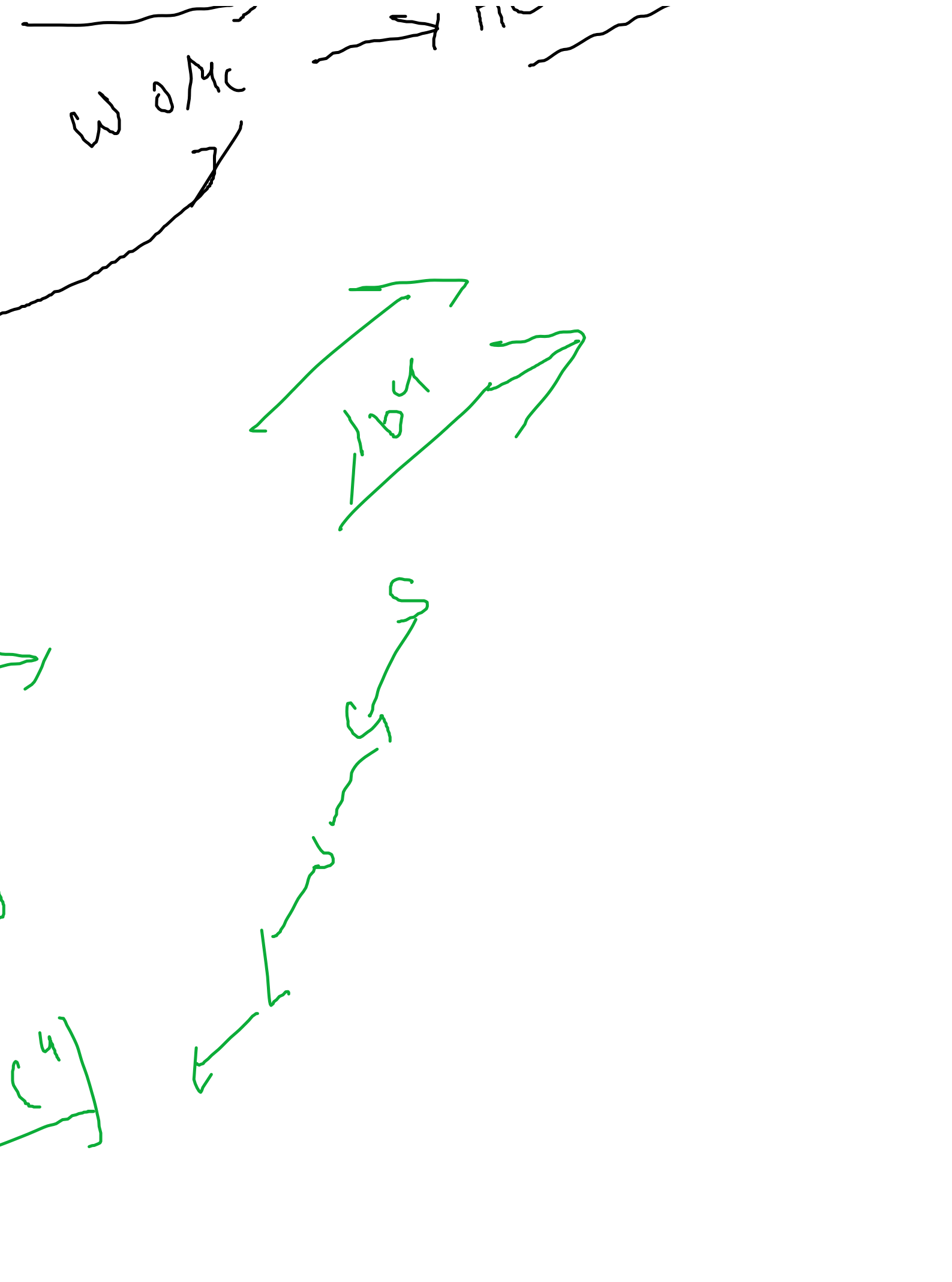


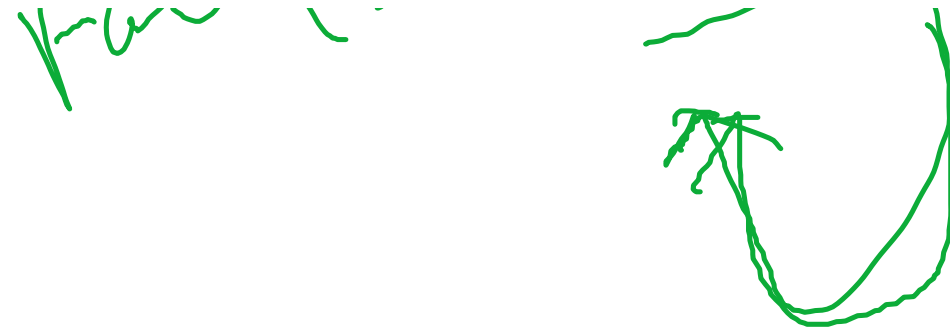


```java
public static void PI(int n) {
// Base case
if (n == 0) {
return;
}

// small problem
PI(n - 1);
// self work
System.out.println(n);
}
```


PI(1)
PI(2)
PI(3)
PI(4)
PI(5)
Work

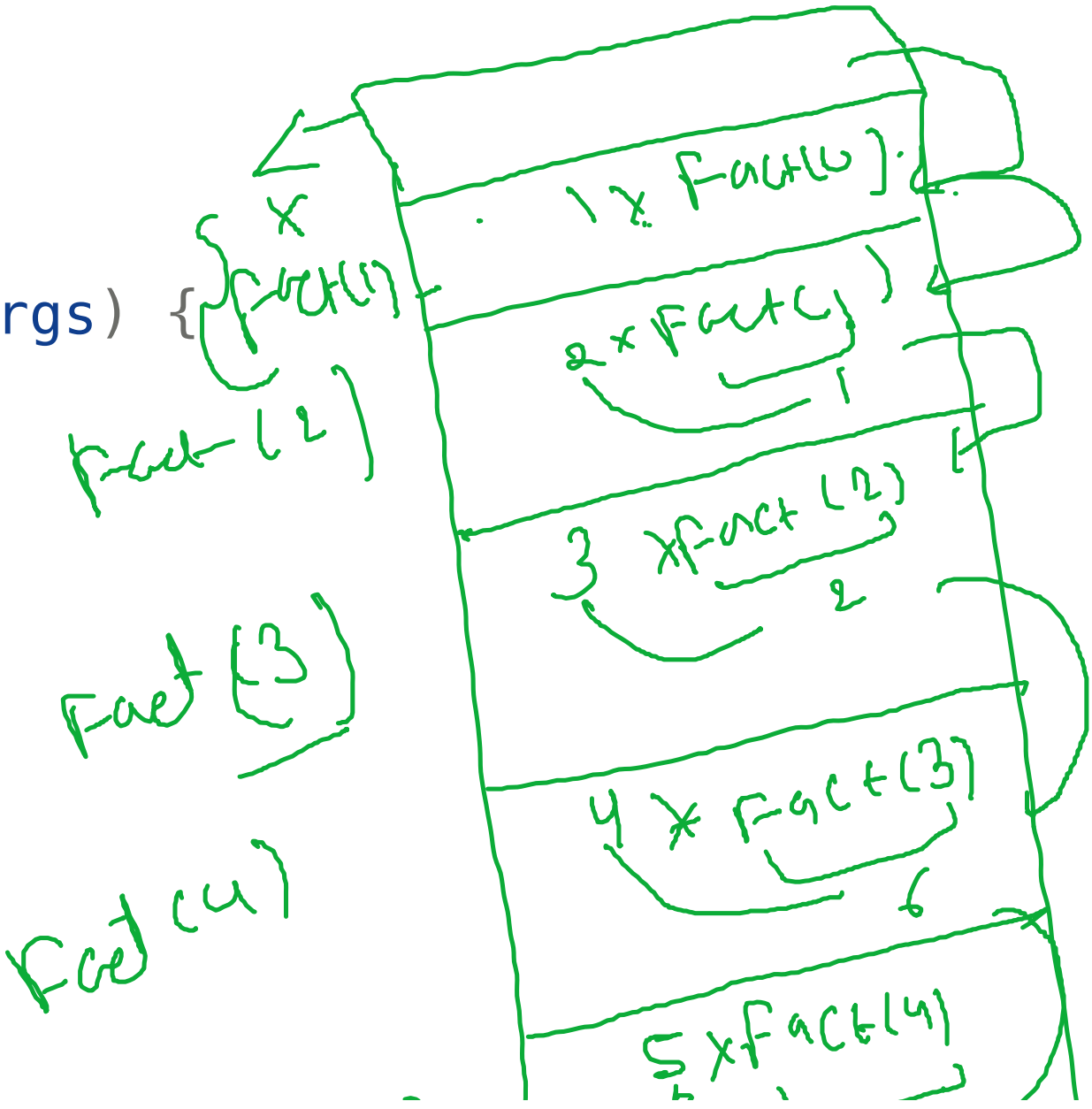

stack
fact(5)
5! = 5 x
fact(5) = 5 *





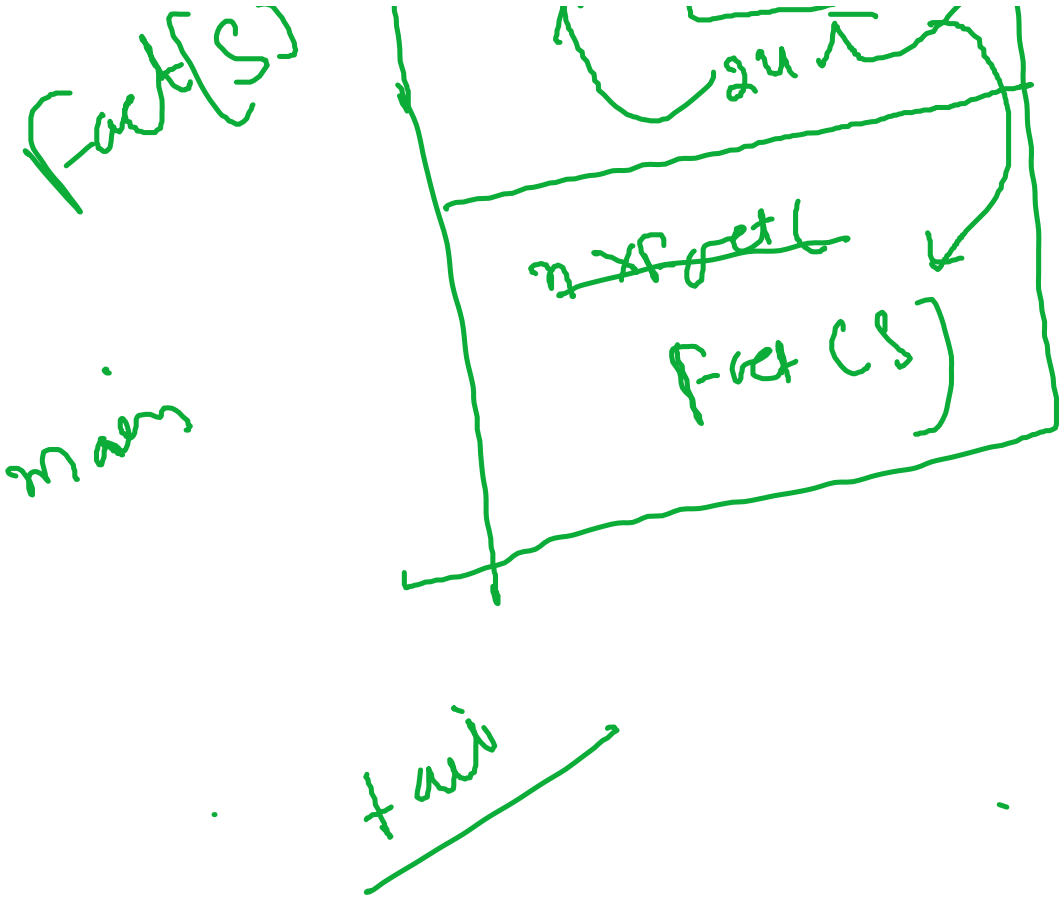
```java
public class Fact {

public static void main(String[]
// TODO Auto-generated method stu
System.out.println(fact(5));

}
public static int fact(int n) {
if(n==0) {
return 1;
}
// head
return n*fact(n-1);
}

}
```

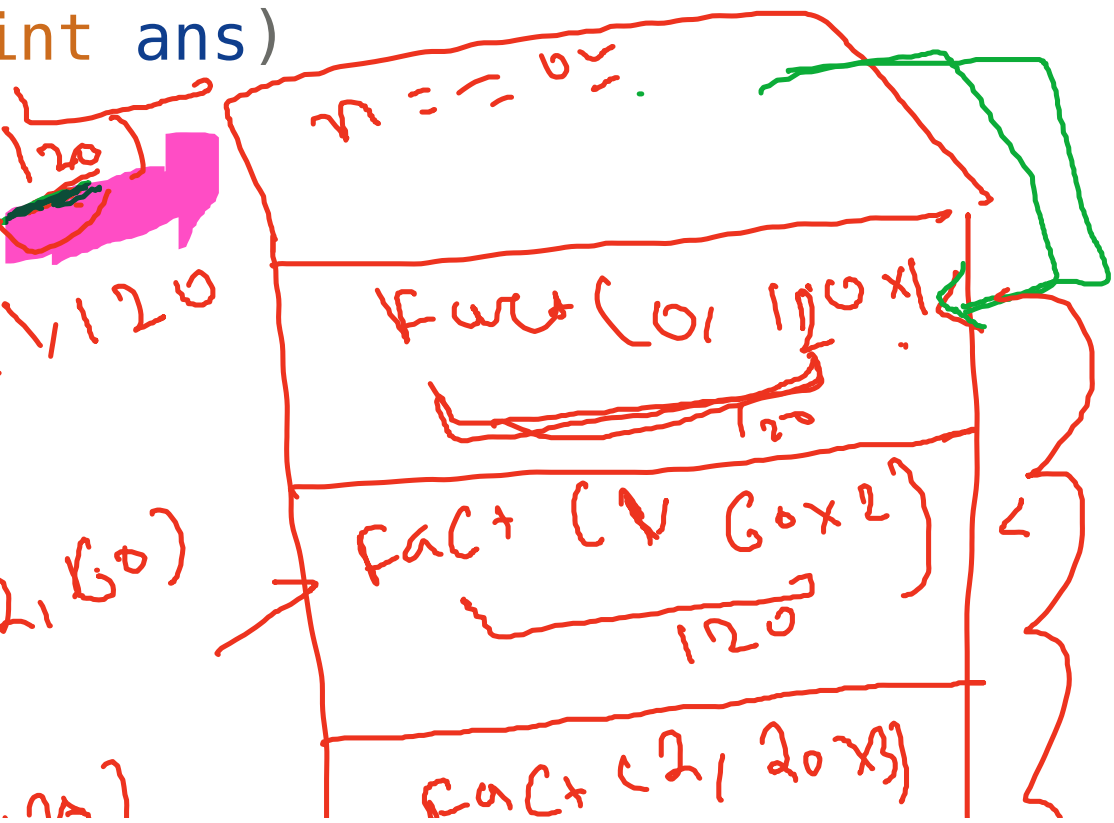
```
args) {
b
```

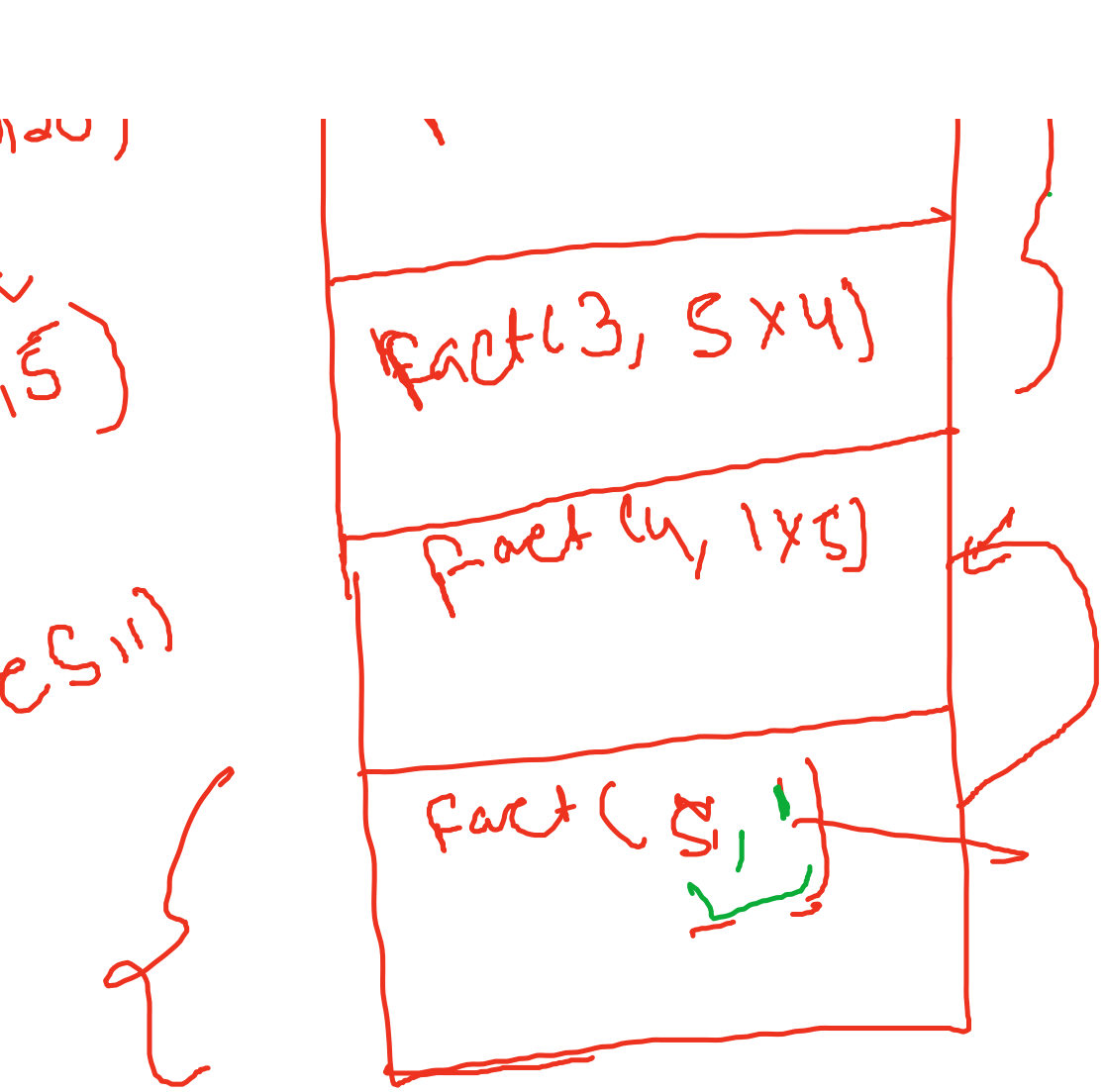

x
fact(4)
fact(3)
fact(2)
fact(1)
1 x fact(0)
2 x fact(1)
1
3 x fact(2)
2
4 * fact(3)
6
5 x fact(4)

```
}
```


```
public static int fact_tail(int n,i
{
if(n==0) {
return ans;
}
return fact_tail(n-1,ans*n);
}
```

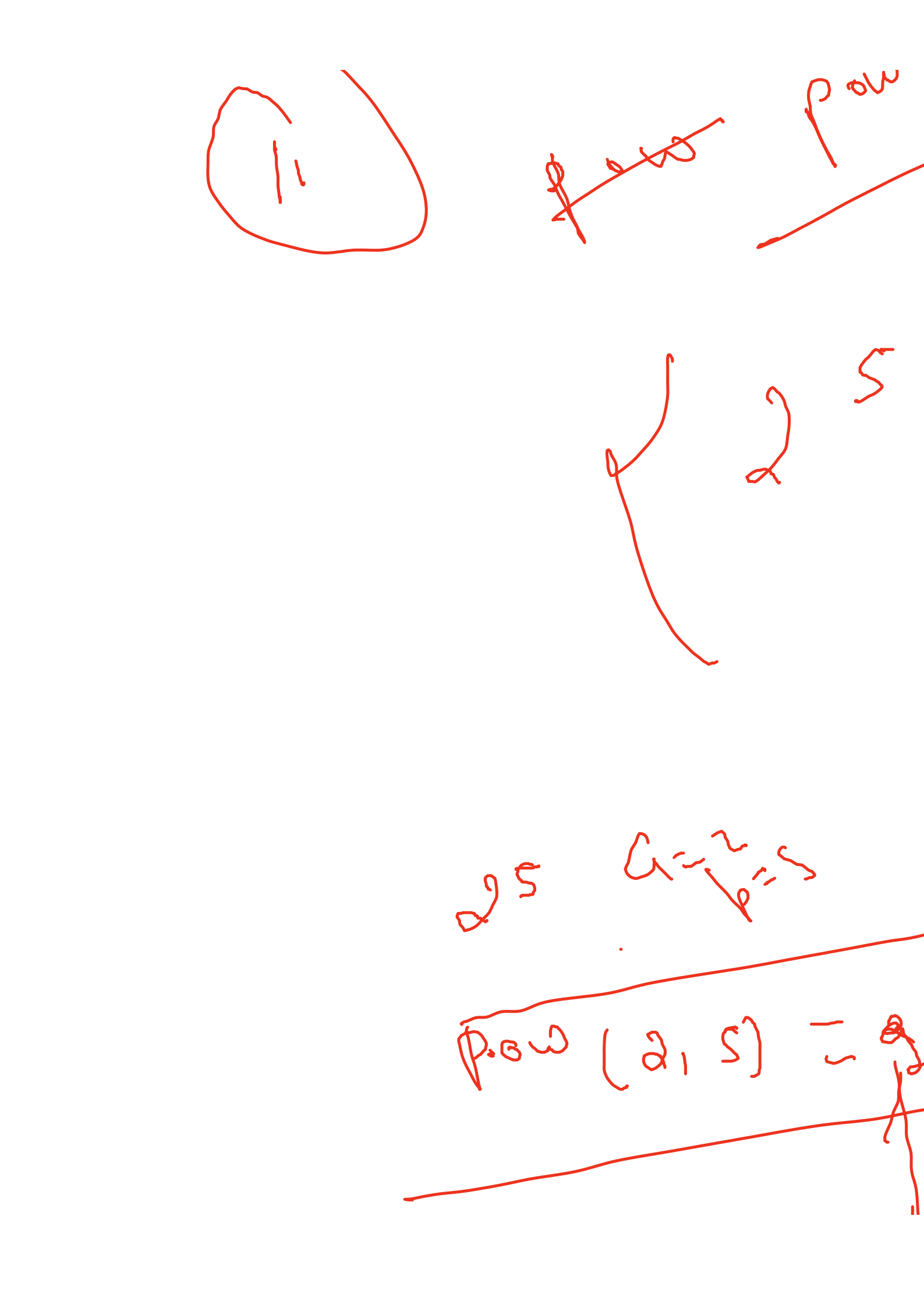

fact(5)
main
fact(5)
tail

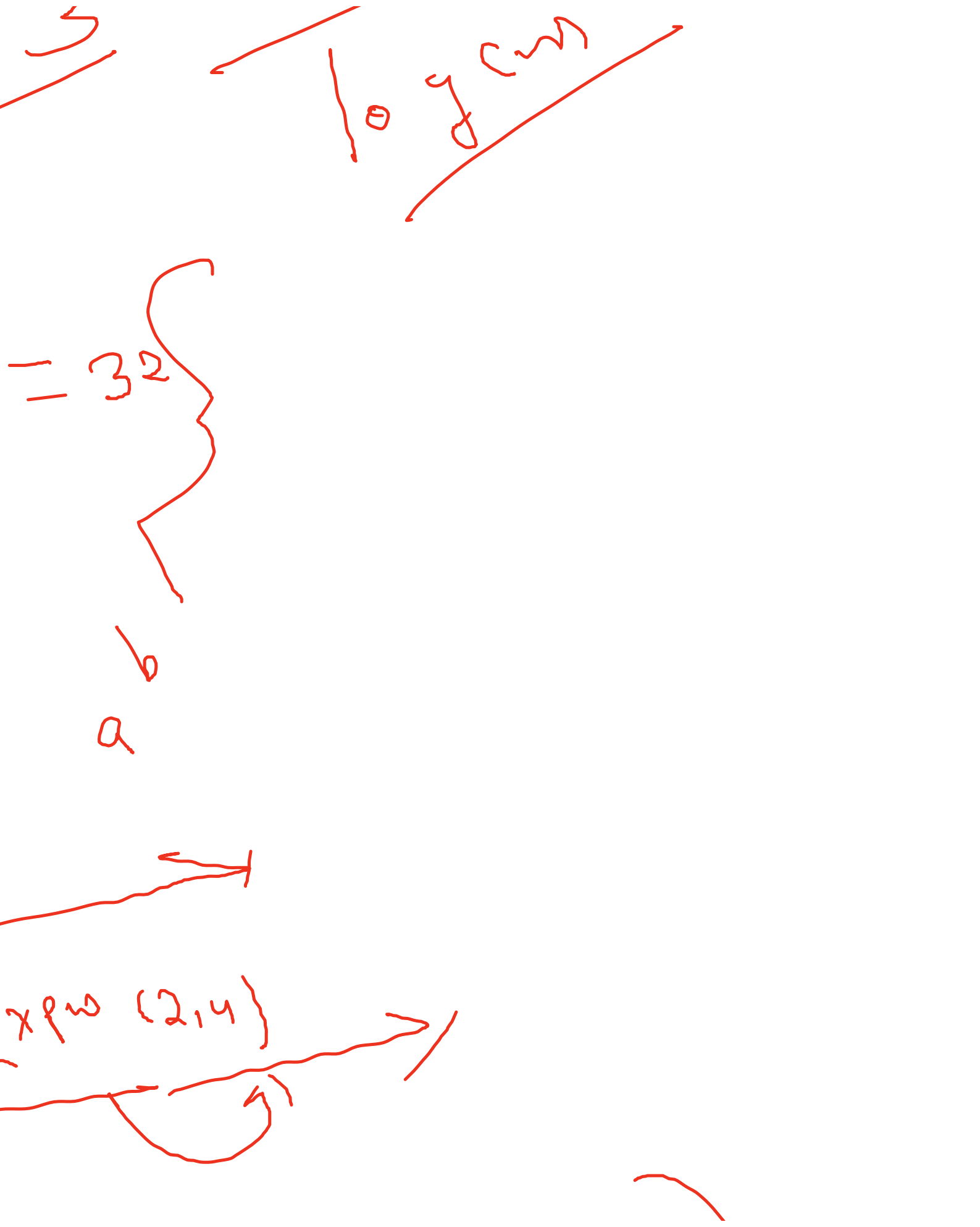

int ans)
n == 0
fact(0, 120)
fact(1, 60)
fact(2, 20)
120
120
120



1st

Recursive call




log (w)
= 32
b
a
xp(w (2,4)