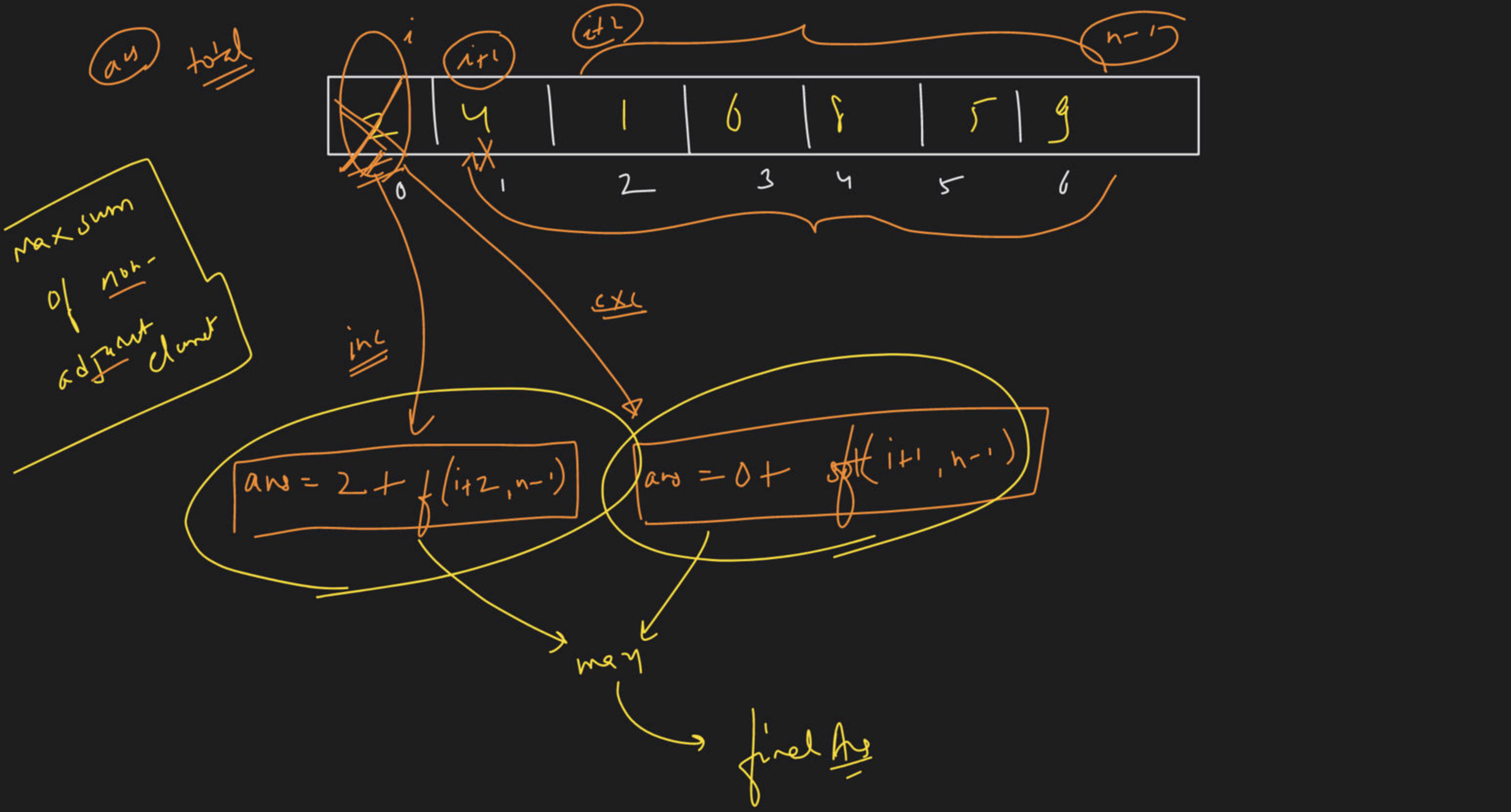
Recursion Marathon [Extra Class] [Join Here]

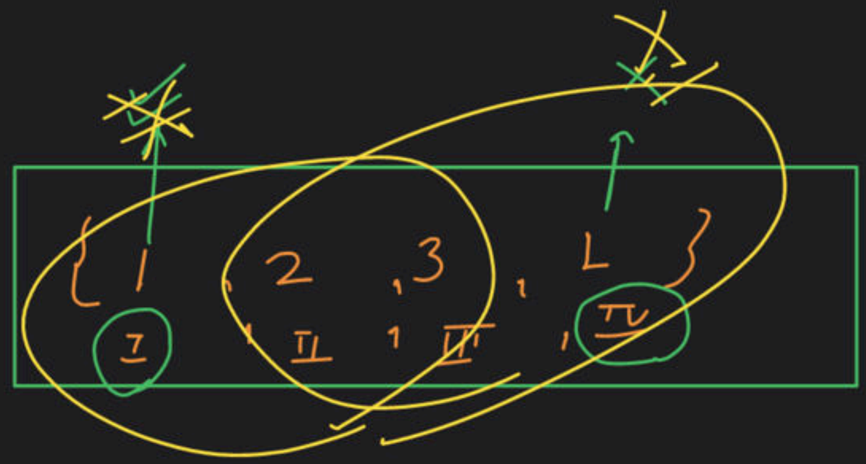
Special class

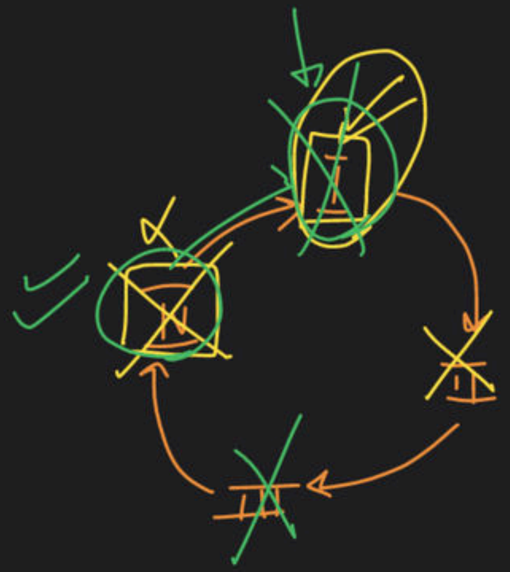
Love Babbar • Oct 22, 2023

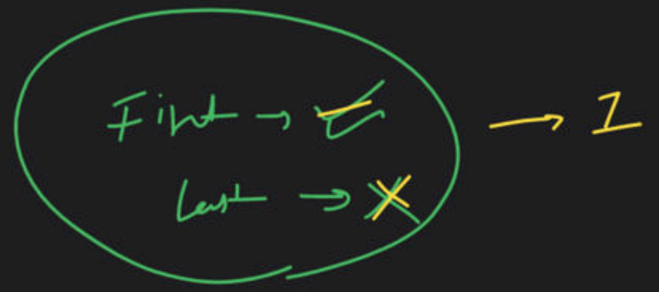

ans
total
i
i+1
i+2
n-1
4
1
6
8
5
9
0
1
2
3
4
5
6
Max sum of non-adjacent elements
incl
excl
ans = 2 + f(i+2, n-1)
ans = 0 + f(i+1, n-1)
max
final Ans

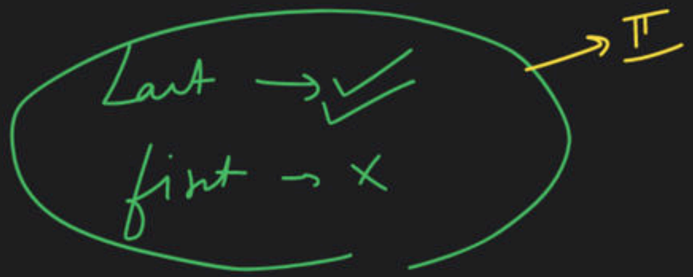
House Robber II

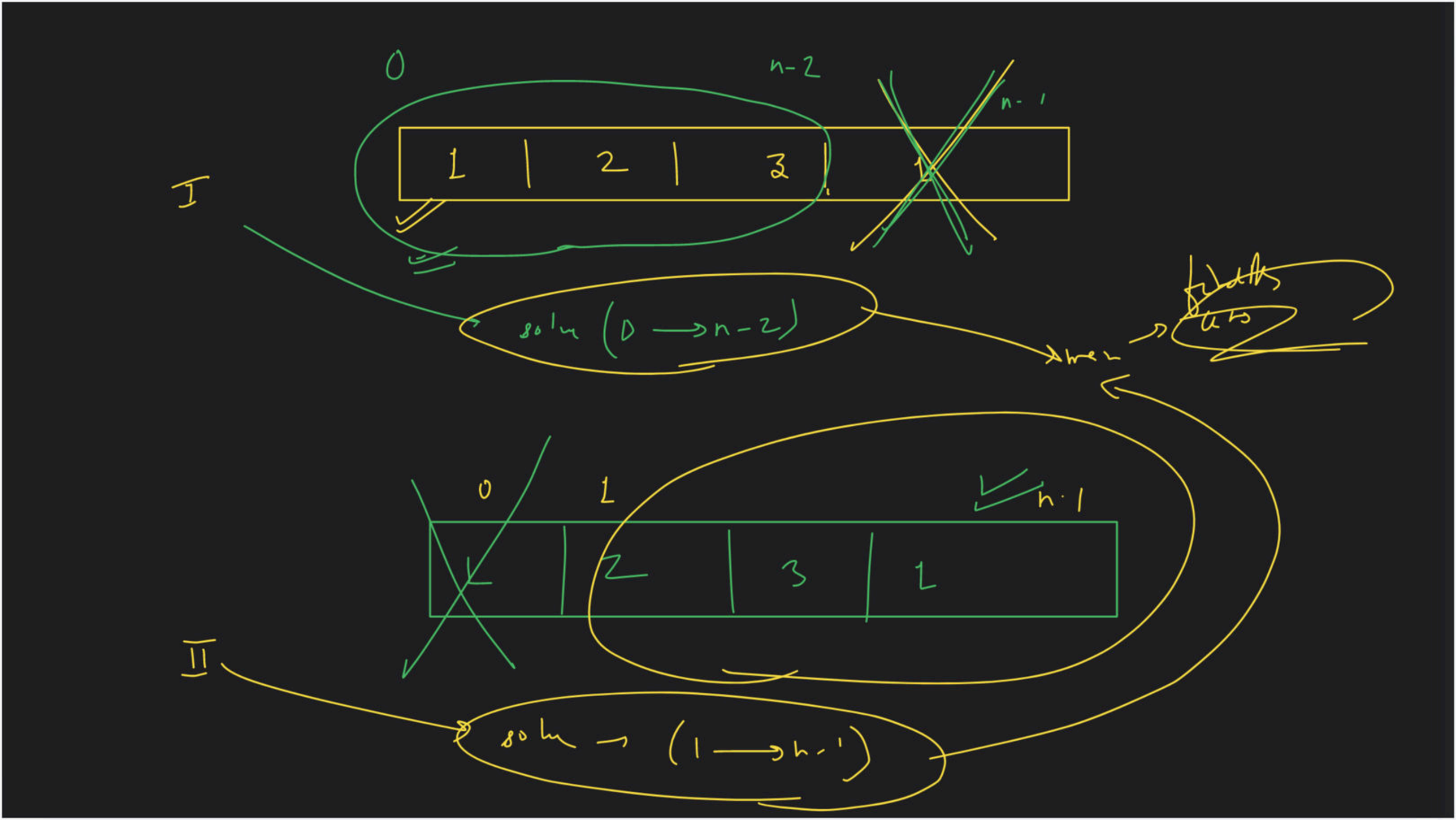
4 house → money →



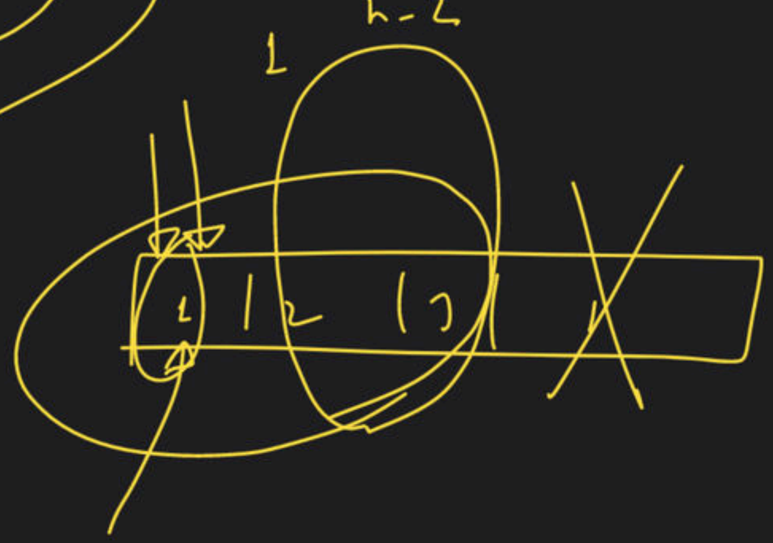






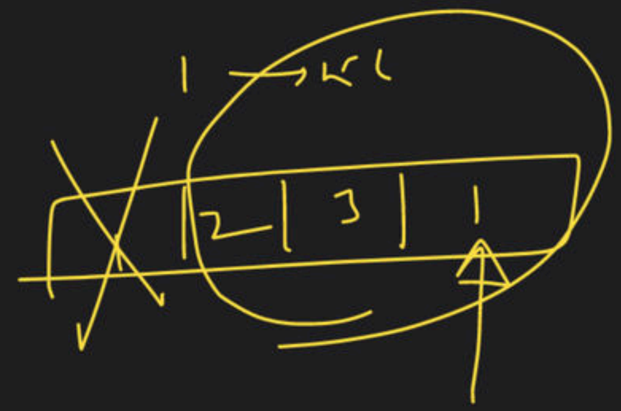

0
n-2
n-1
1
2
3
1
I
soln (0 → n-2)
0
1
n-1
1
2
3
1
II
soln → (1 → n-1)

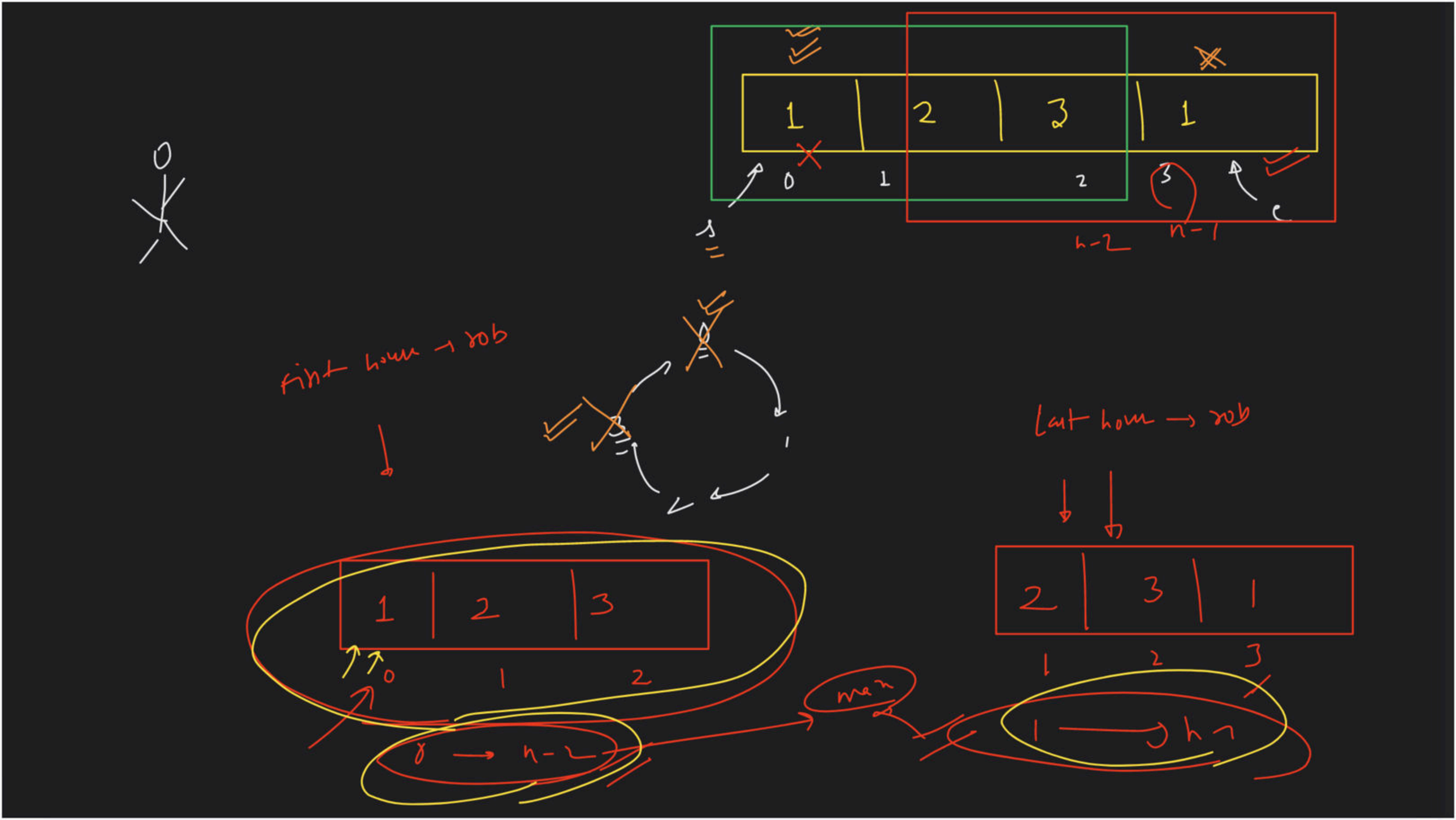
option1 = Solve(nums, 0, n-2)

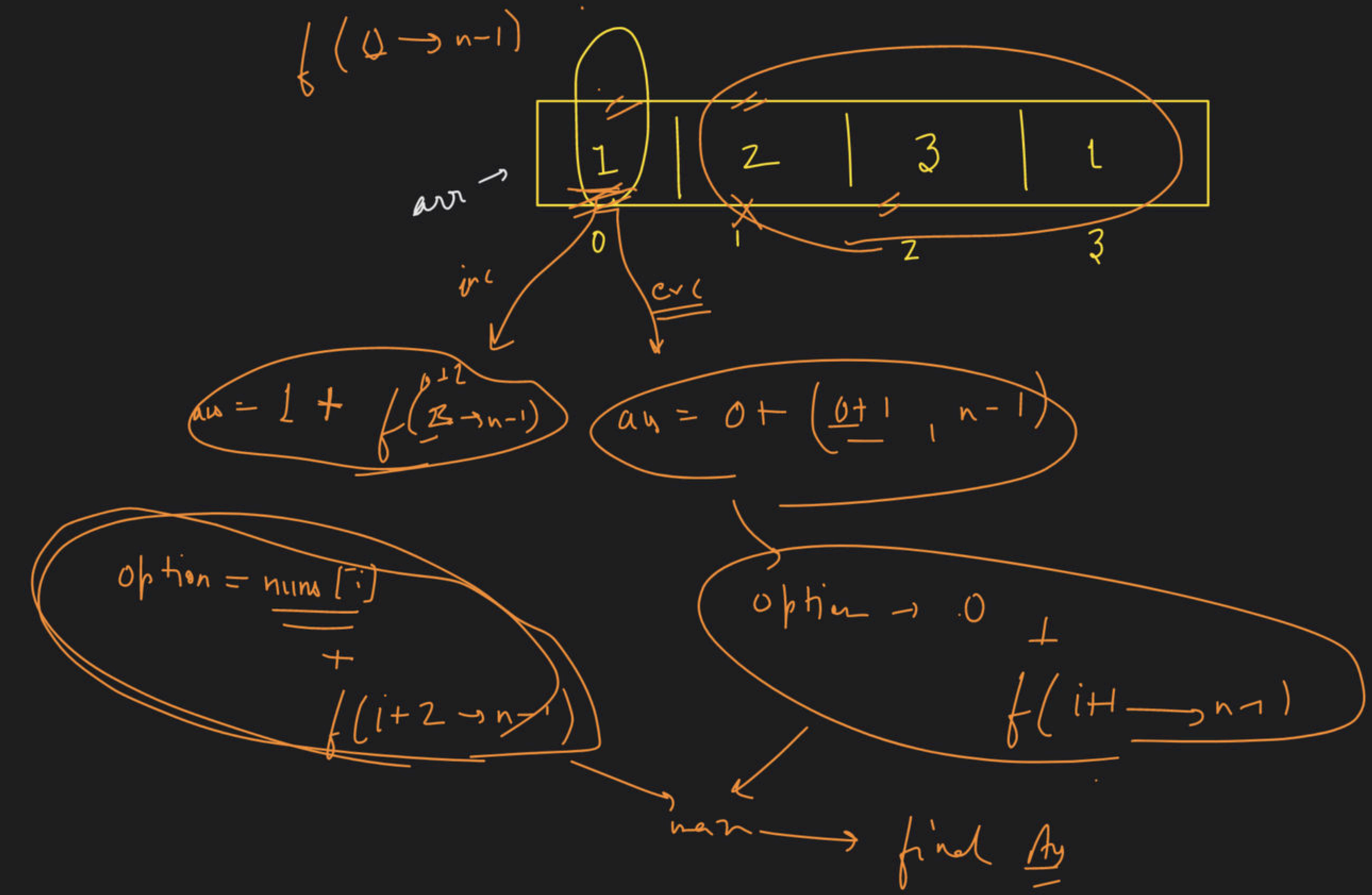


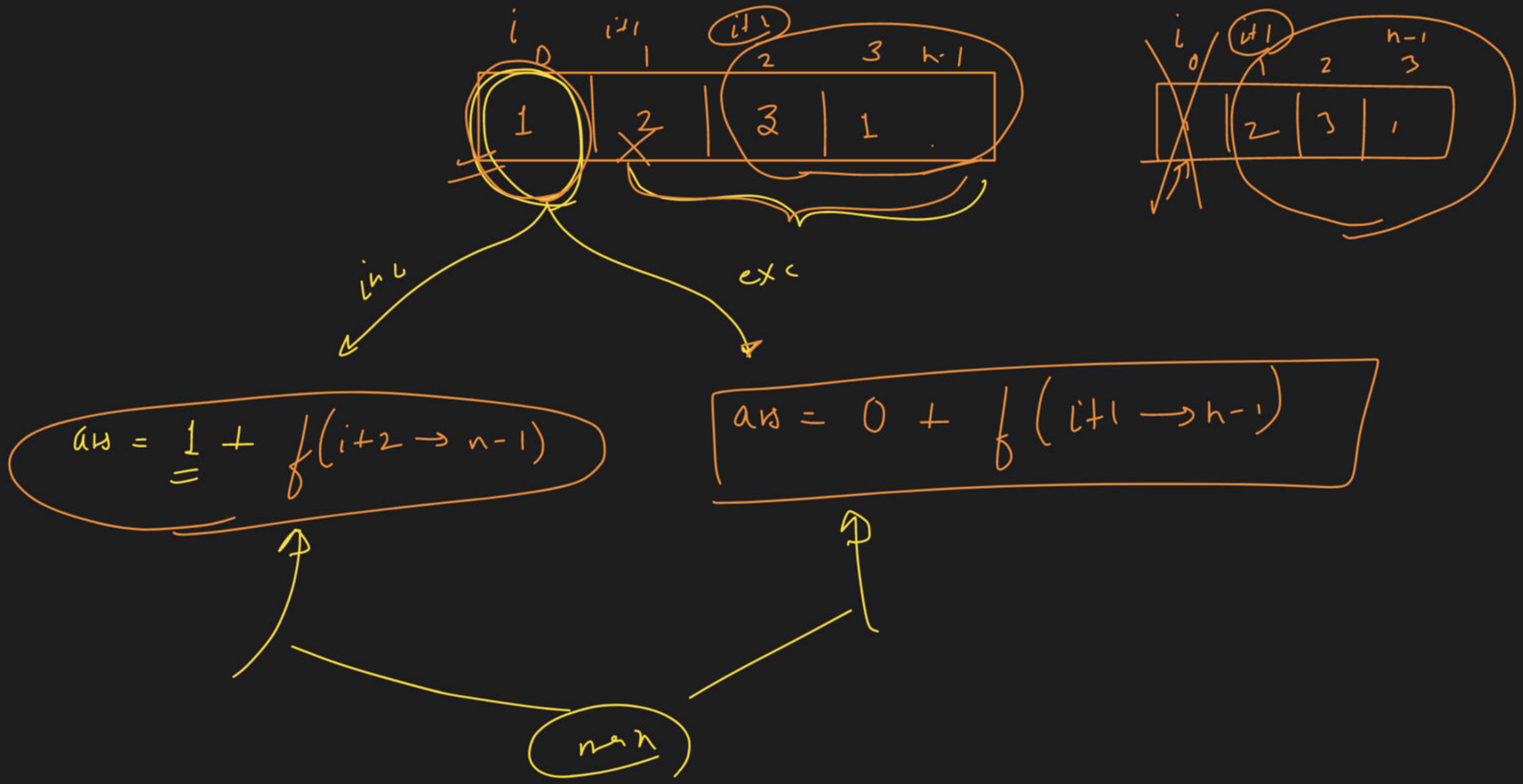
option1 = nums[0] + f(1 -> n-2)

option2 = nums[n-1] + f(1 -> n-2)



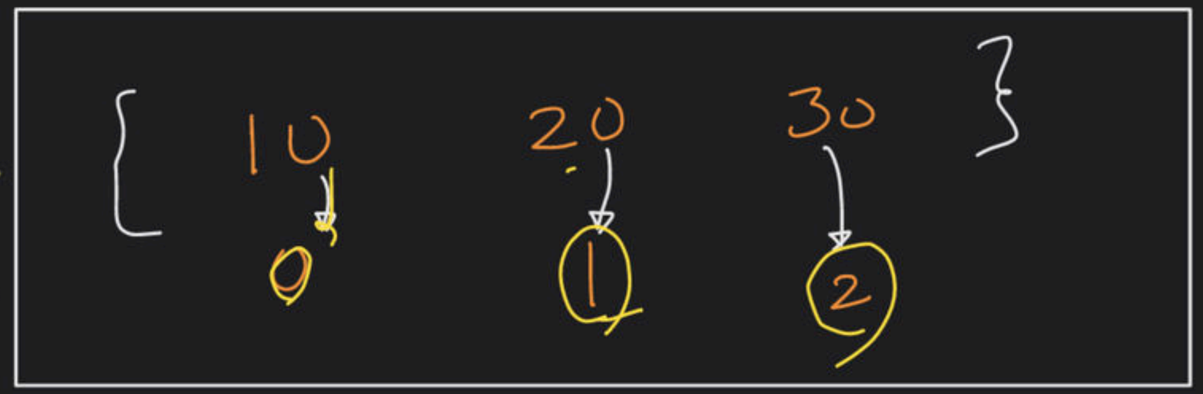

1
2
3
1
0
1
2
3
n-2
n-1
first house → rob
last house → rob
1
2
3
2
3
1
0
1
2
max
1 → n-1


f(0 → n-1)
arr →
1
2
3
1
0
1
2
3
incl
excl
ans = 1 + f(2 → n-1)
ans = 0 + (0+1 , n-1)
option = nums[i]
+
f(i+2 → n-1)
option → 0
+
f(i+1 → n-1)
max → find Ans


i
i+1
i+1
0
1
2
3
n-1
1
2
3
1
inc
exc
ans = 1 + f(i+2 → n-1)
ans = 0 + f(i+1 → n-1)
main

Count derangement

arr



Catalan no.

$n = \{\}$

$n = 1$

$\{1\} \rightarrow 0$

$n = 2$

$\{1, 2\}$

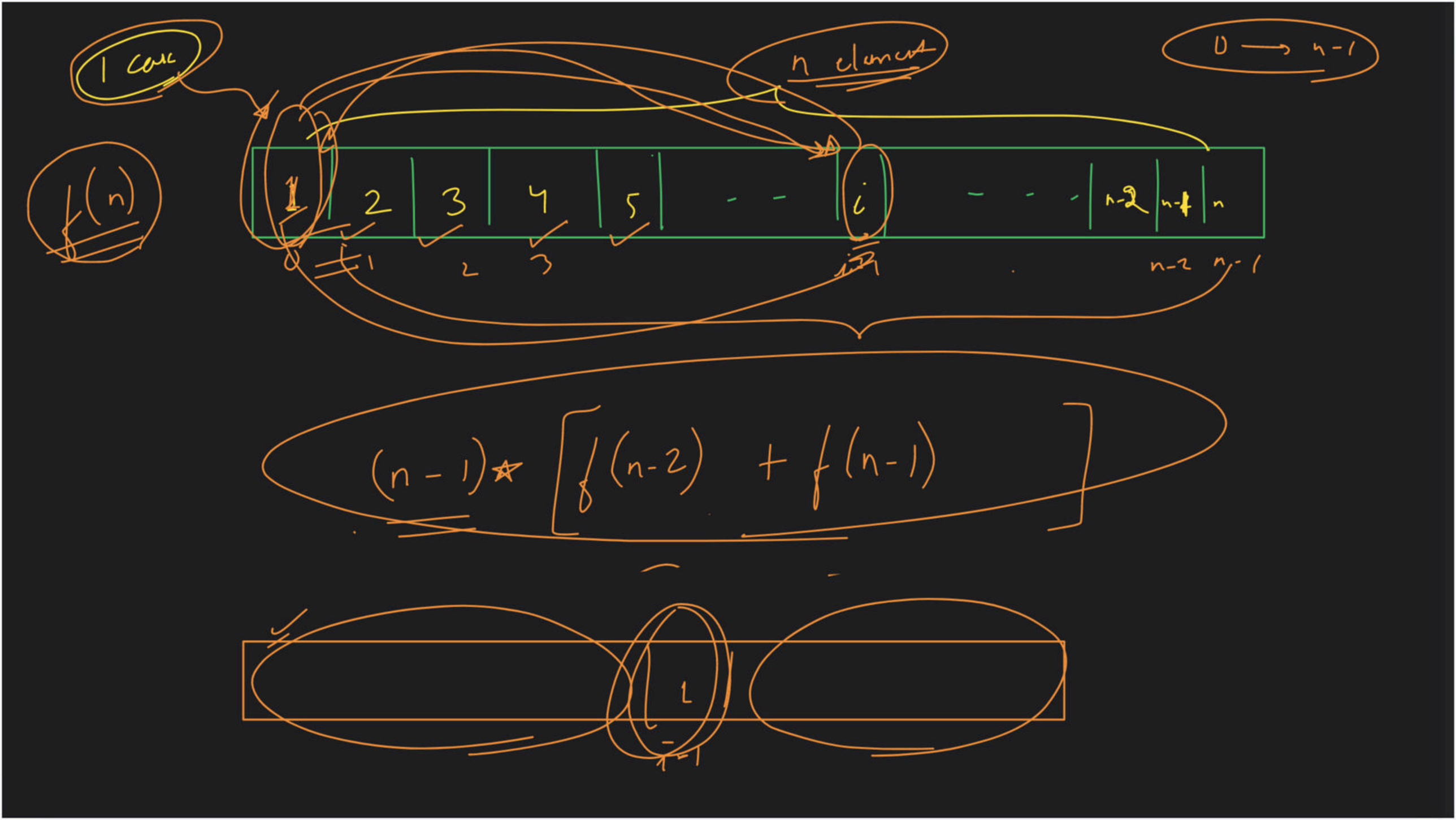
$\{2, 1\} \rightarrow 1$

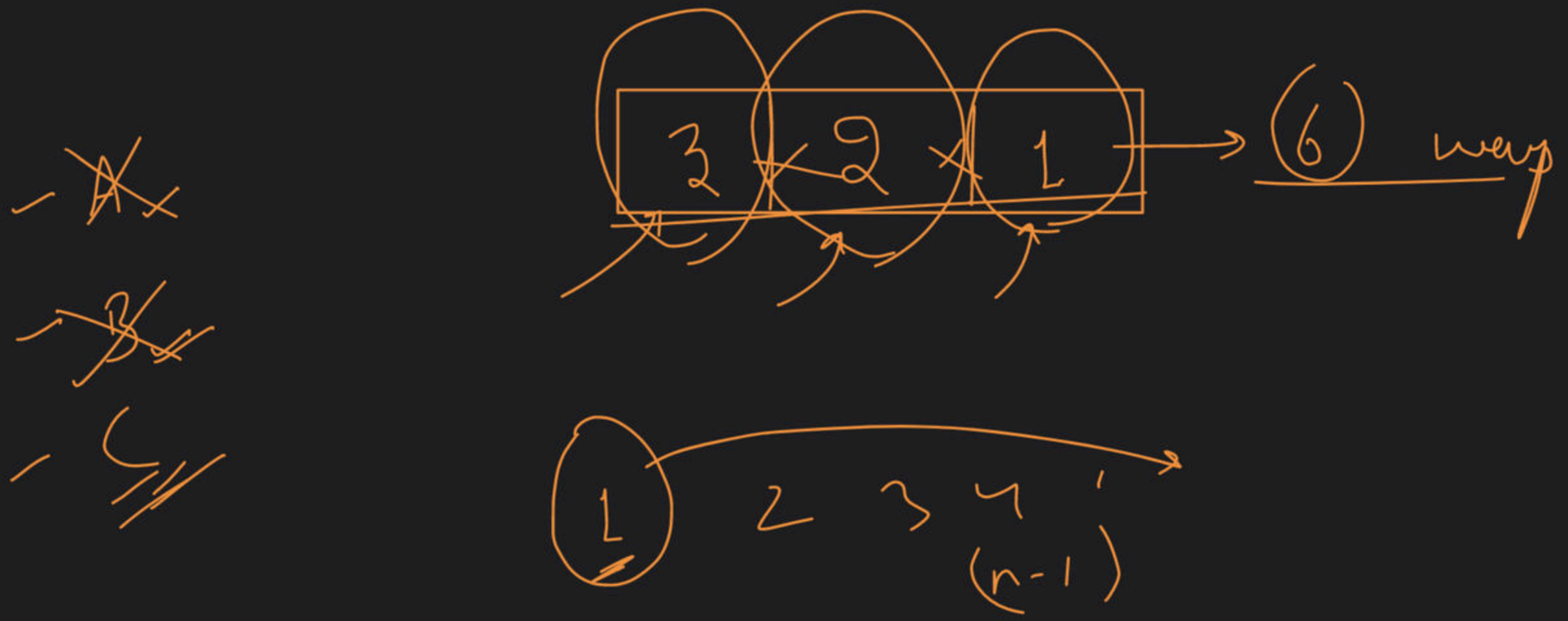
$n = 3 \quad \{1, 2, 3\}$

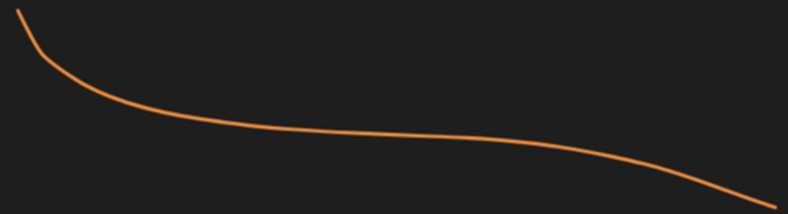
$\{3, 1, 2\}$

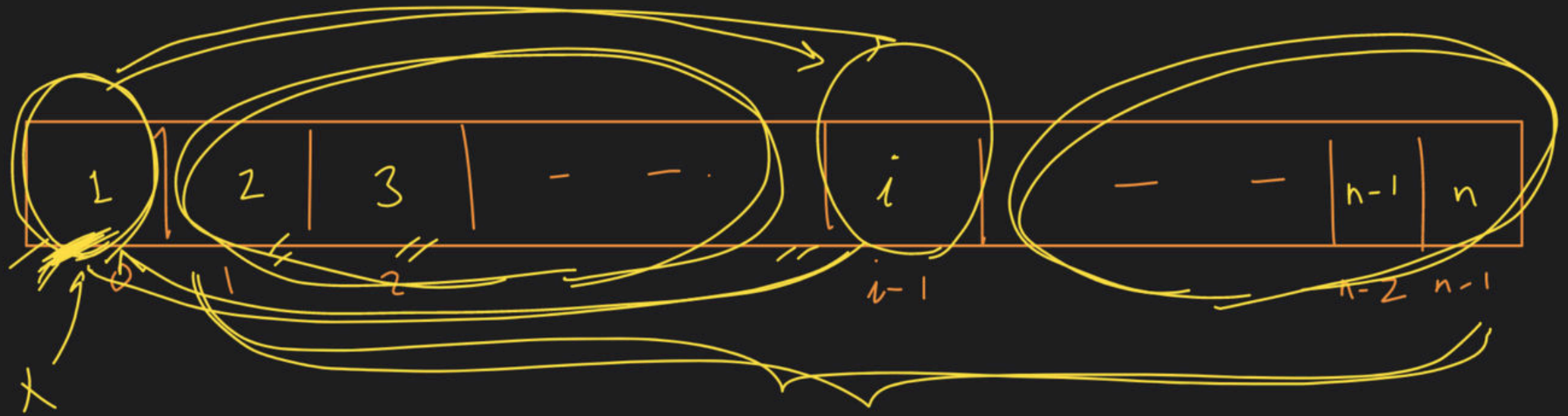
$\{2, 3, 1\}$ $\rightarrow$ (2)

0, 1, 2, 9 - -


1 comc
n elements
0 ⟶ n-1
f(n)
1
2
3
4
5
i
n-2
n-1
n
1
2
3
i-1
n-2
n-1
(n-1)☆ [f(n-2) + f(n-1)]
L

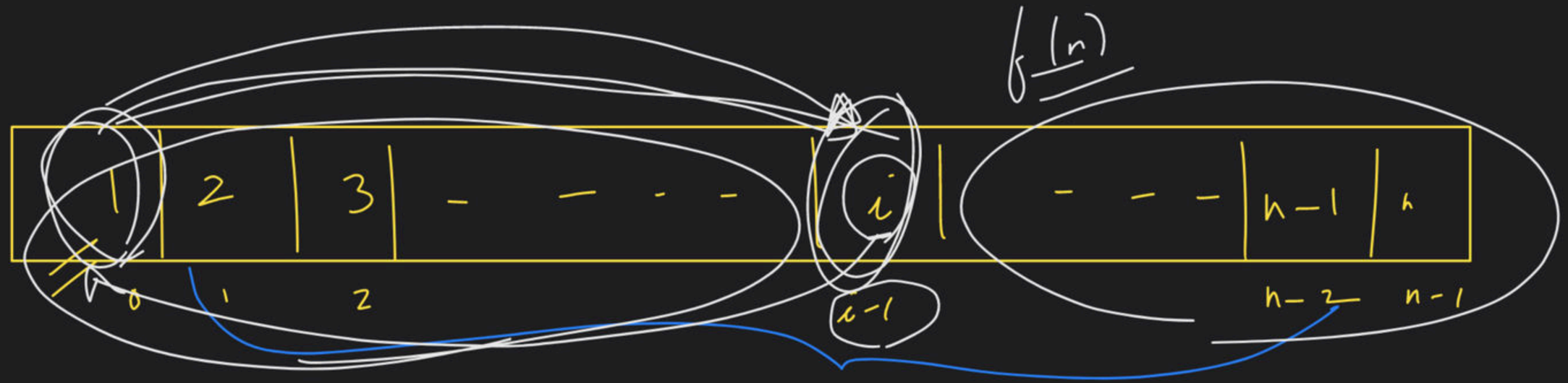

3
2
1
6 ways
1
2 3 4 ... (n-1)





$= (n-1) * f(n-2)$

when we swap
$i \& 1$ we
consider $i \& 1$'s
position as find



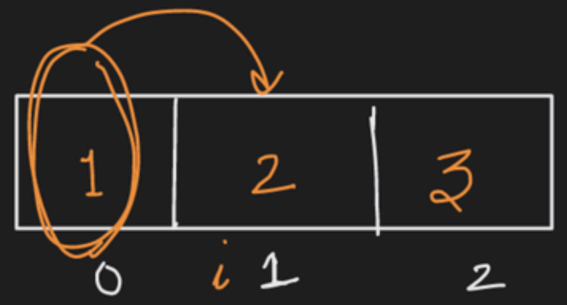
$(n-1) \star f(n-1)$

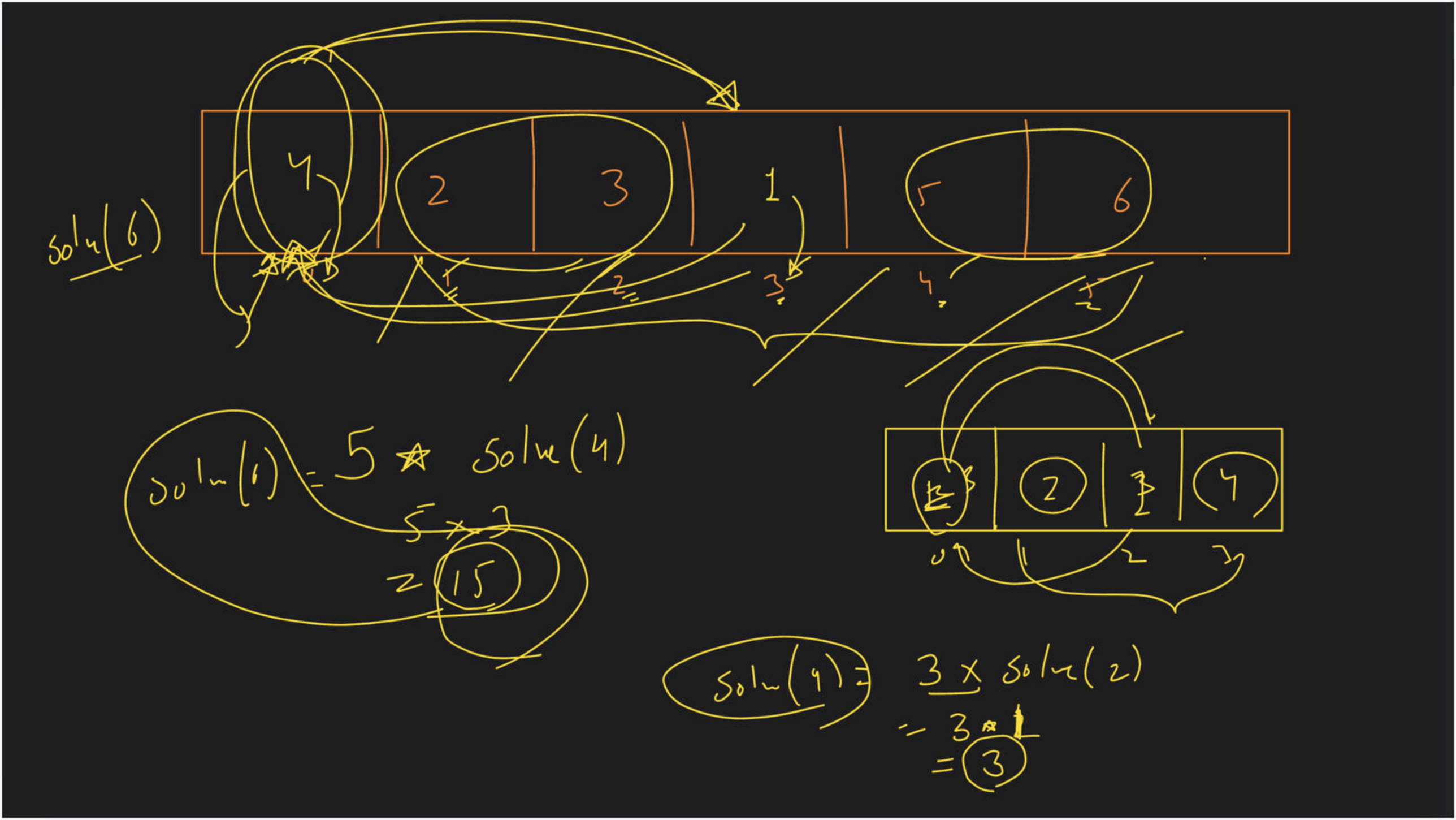
solve $(n-1)$

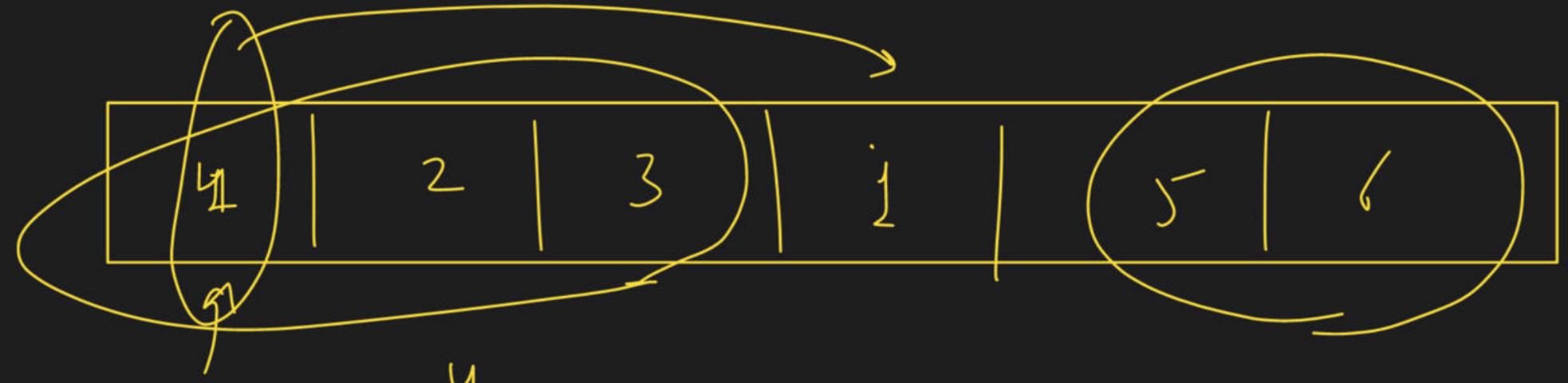
solve $(n-2)$

$(n-1) \star f(n-1) + (n-1) \star (f(n-2))$

$(n-1) \star (f(n-1) + f(n-2))$


1
2
3
0
i 1
2


Solve(6)
4
2
3
1
5
6
0
1
2
3
4
5
Solve(6) = 5 * Solve(4)
5 * 3
= 15
Solve(4) = 3 * Solve(2)
= 3 * 1
= 3

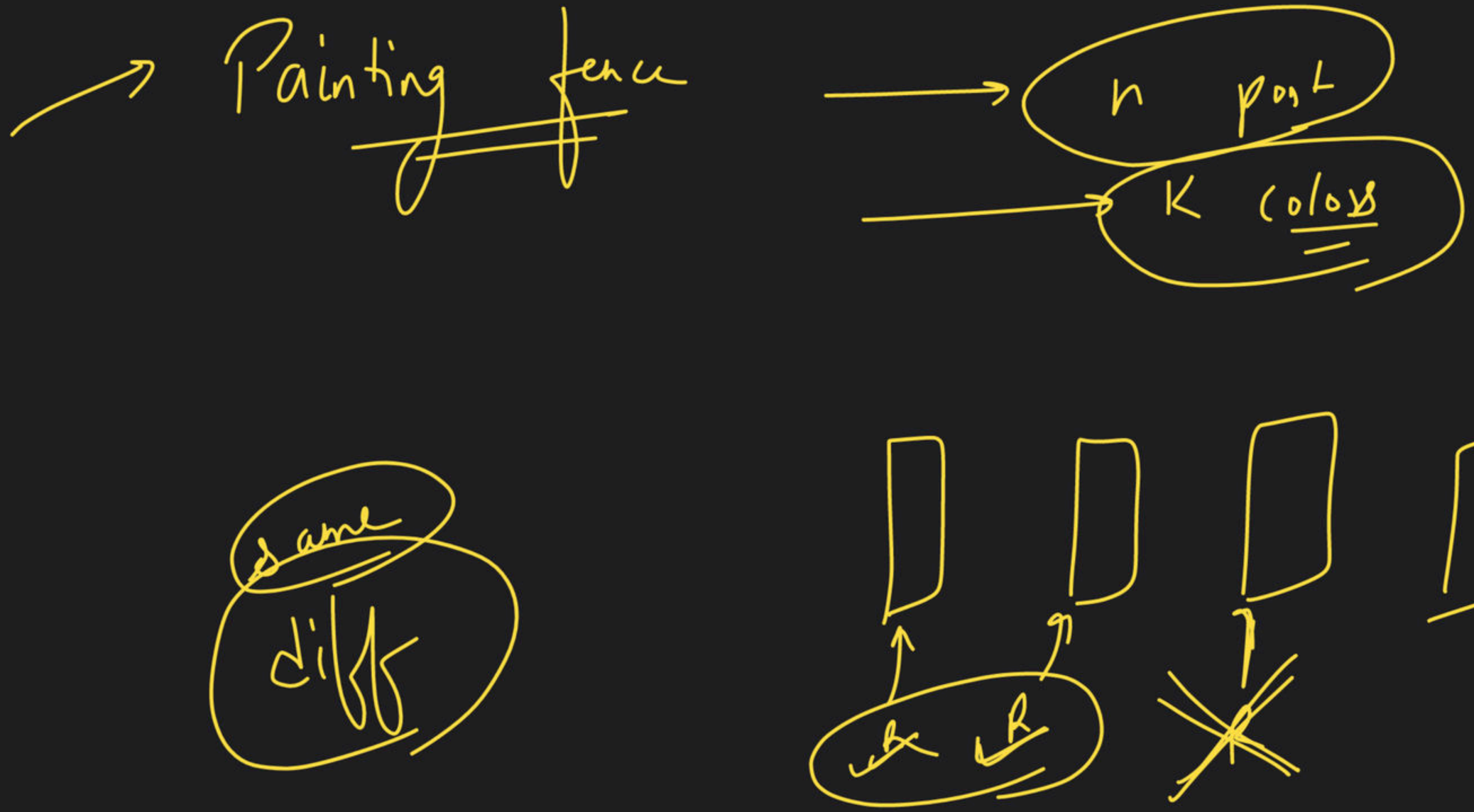


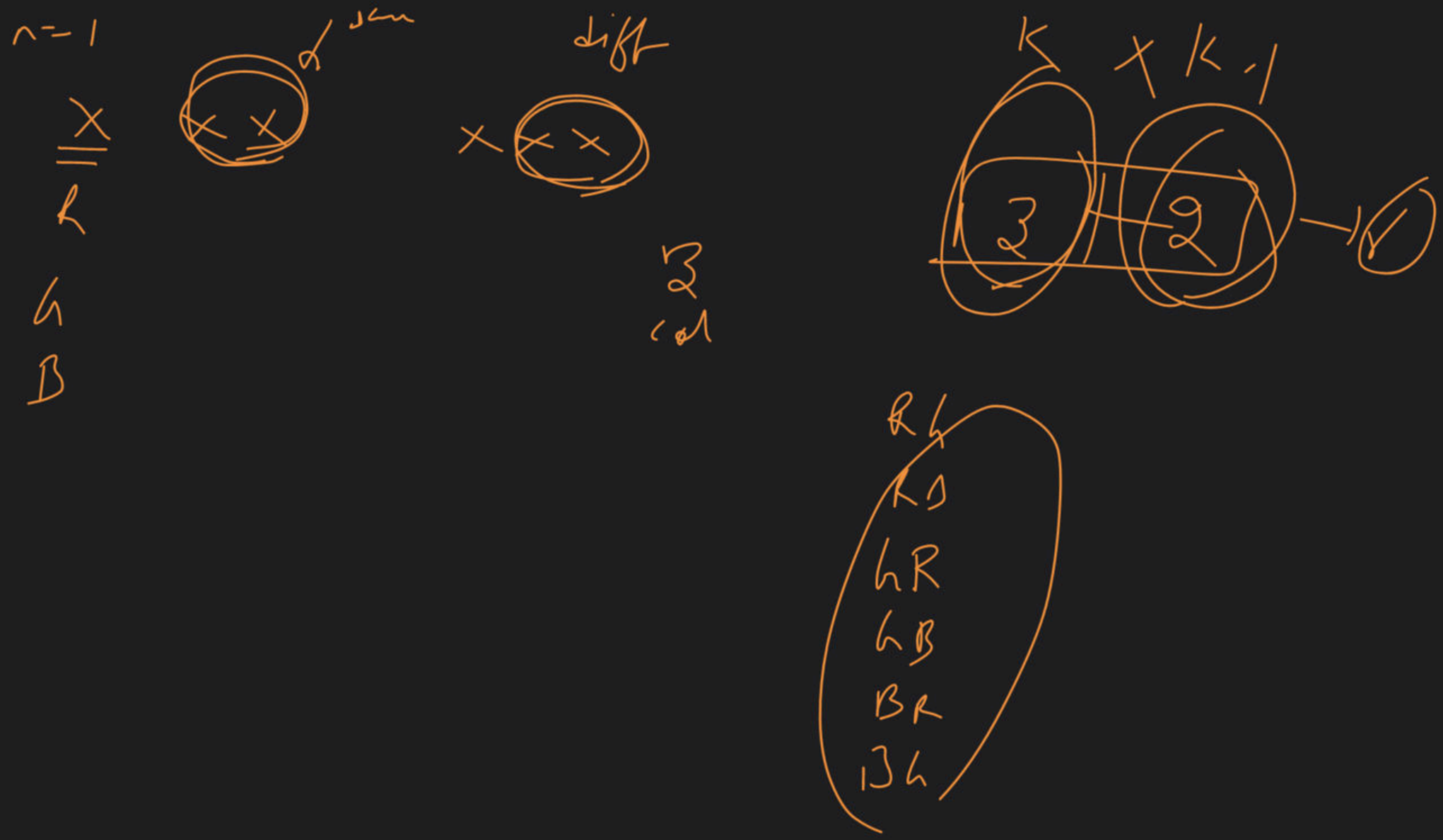
y

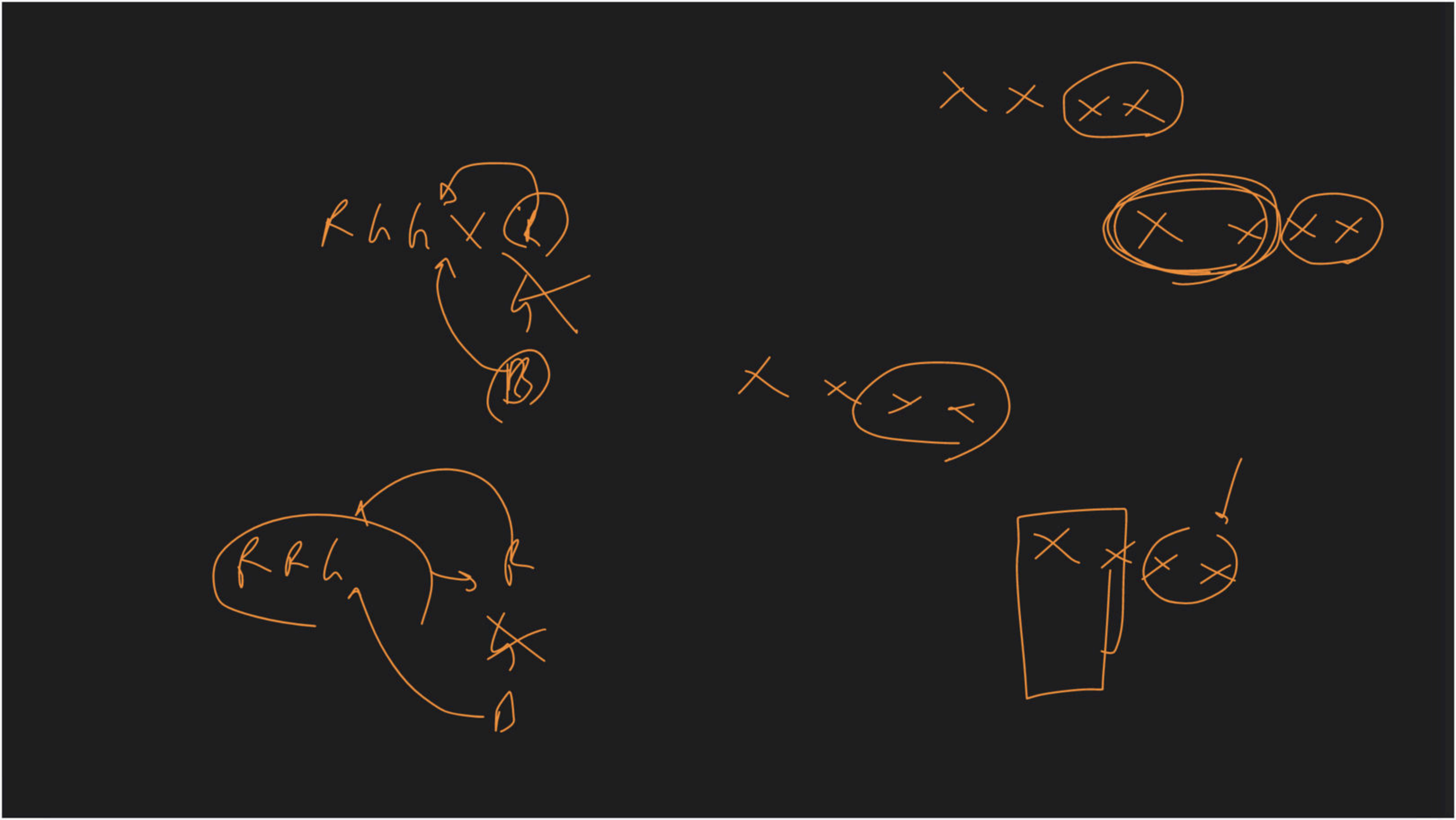
soln(1) = 5 * (soln(5

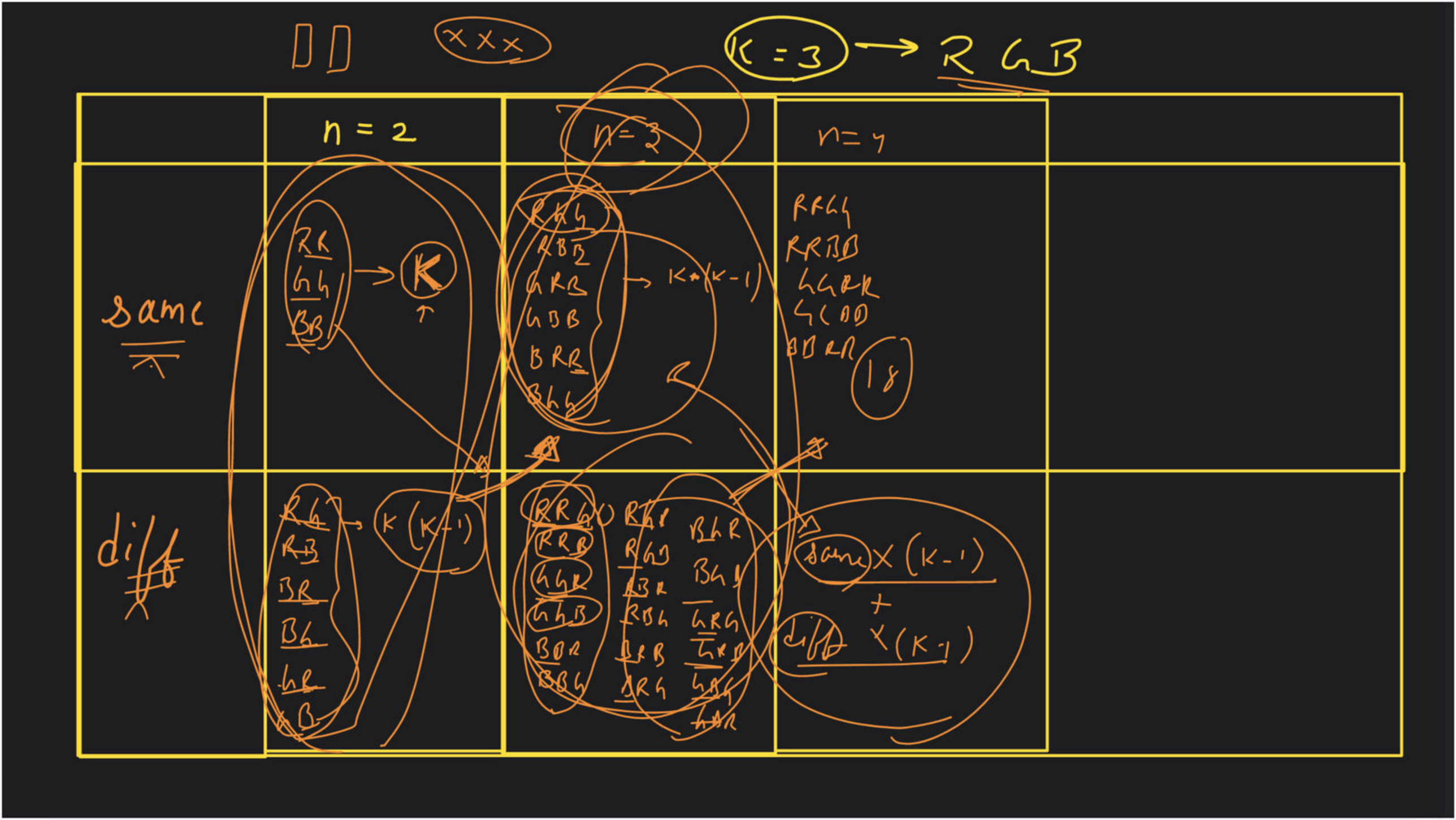
=

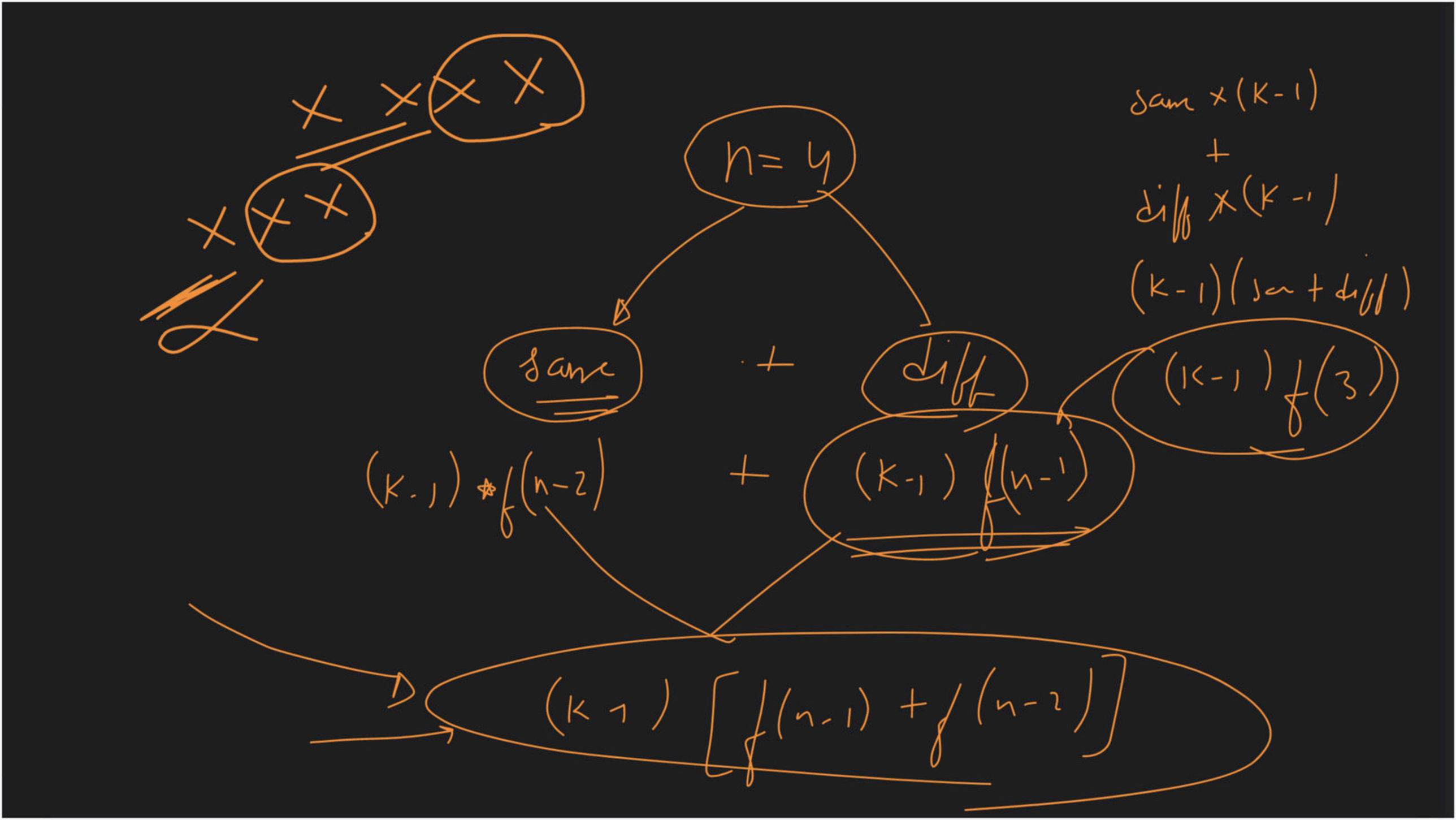
$$(n-1) * (f(n-1) + f(n-2))$$


Painting fence
n post
K colors
same
diff
RGB
XX
RR
GG
BB





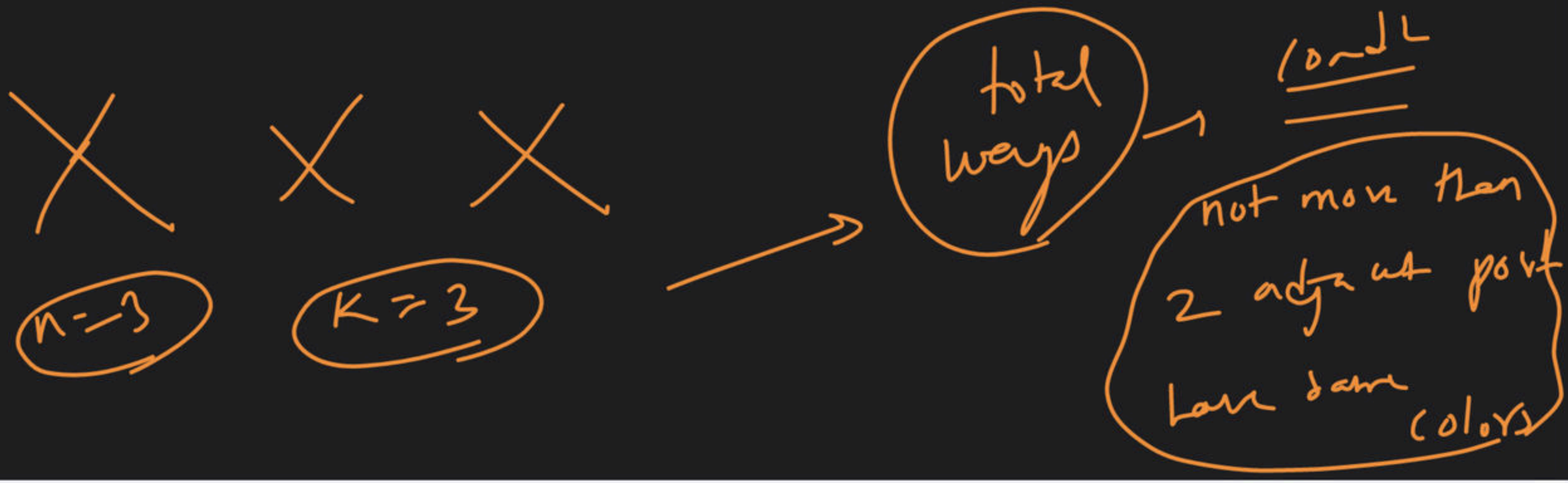

n = 2
n = 3
n = 4
same
diff
K
K*(K-1)
same × (K-1)
+
diff × (K-1)

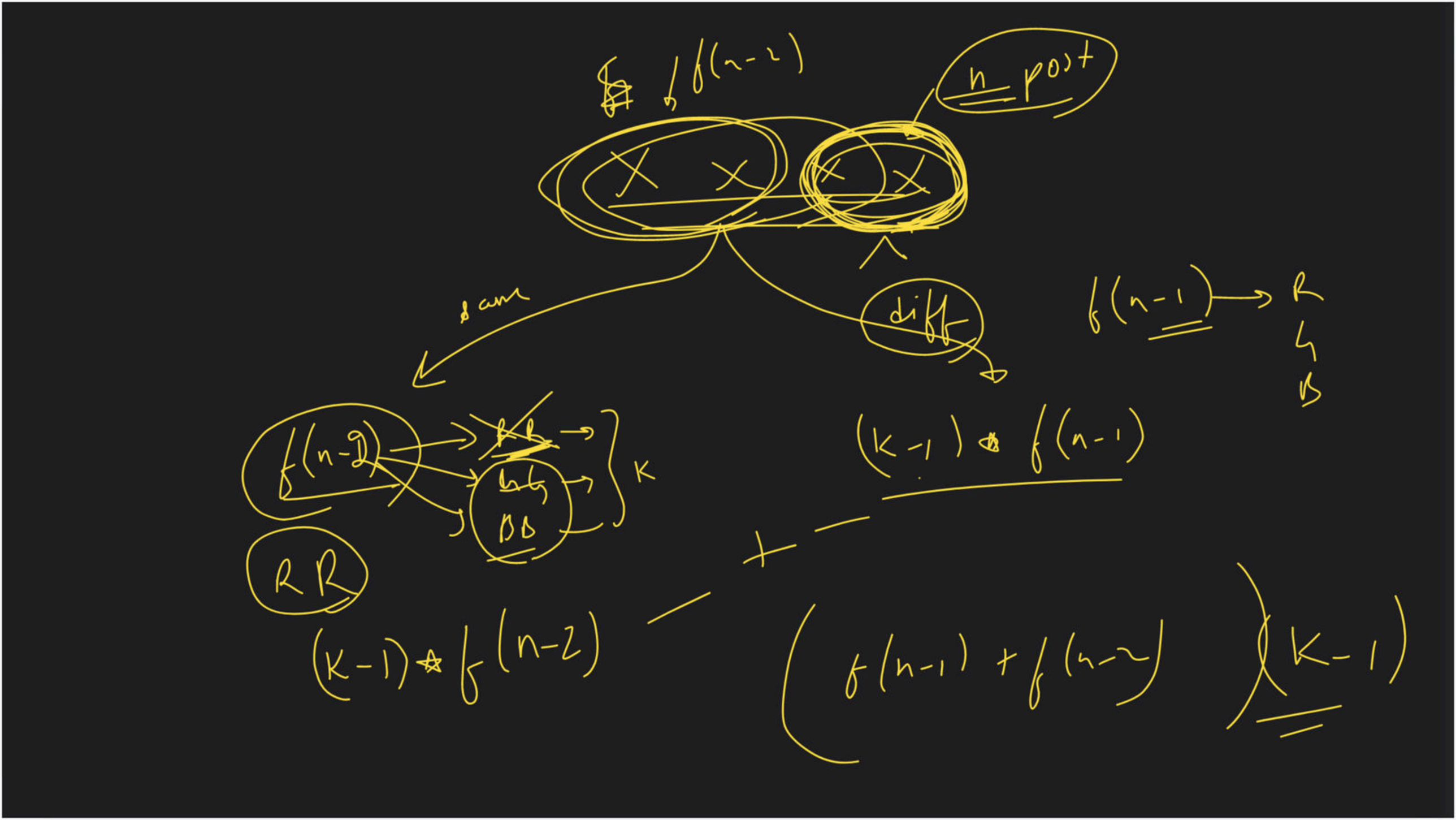

same x(K-1)
+
diff x(K-1)
(K-1)(same + diff)
n = 4
same
+
diff
(K-1) f(3)
(K-1) * f(n-2)
+
(K-1) f(n-1)
(K-1) [f(n-1) + f(n-2)]

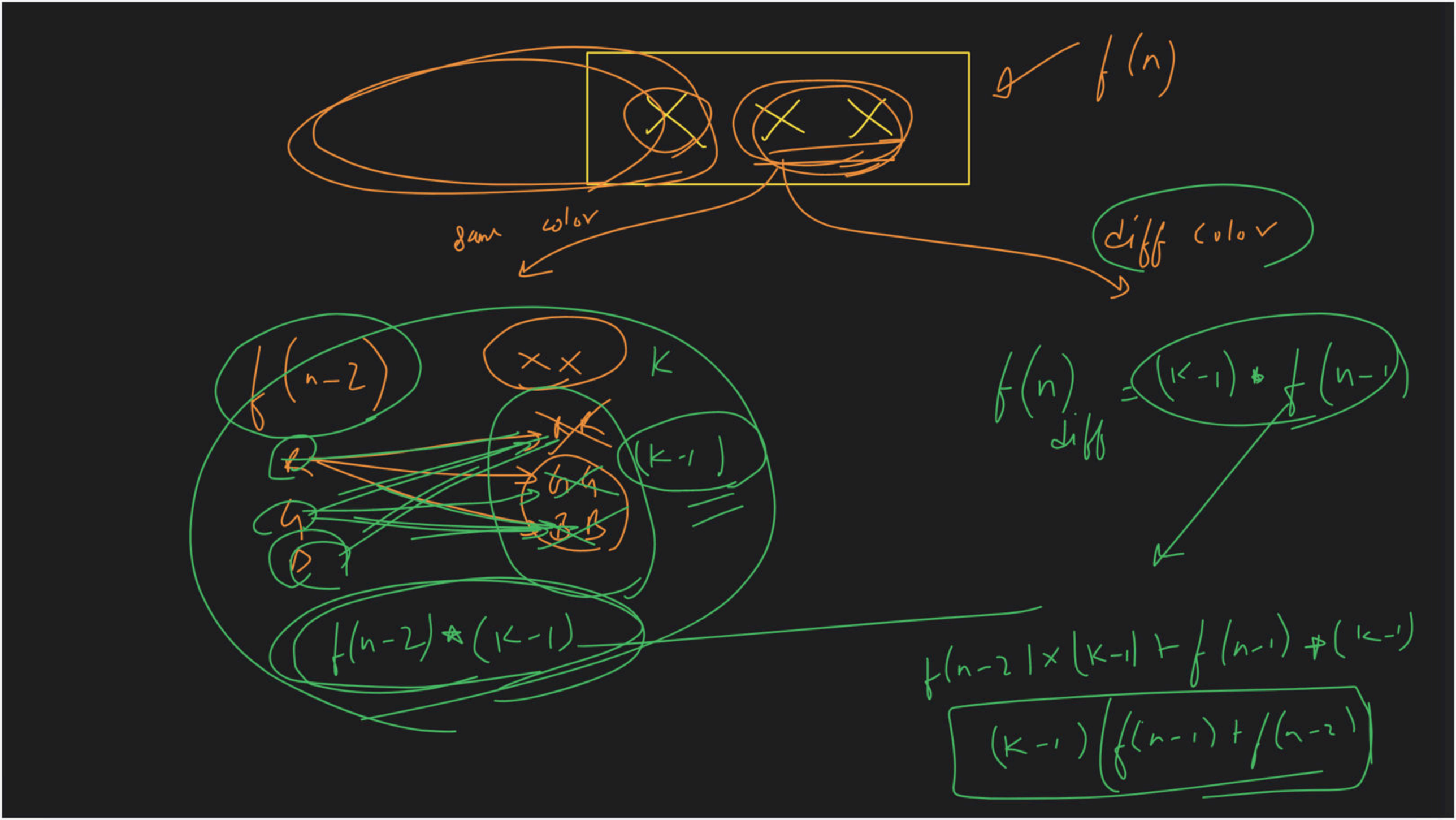
n → post / pillars

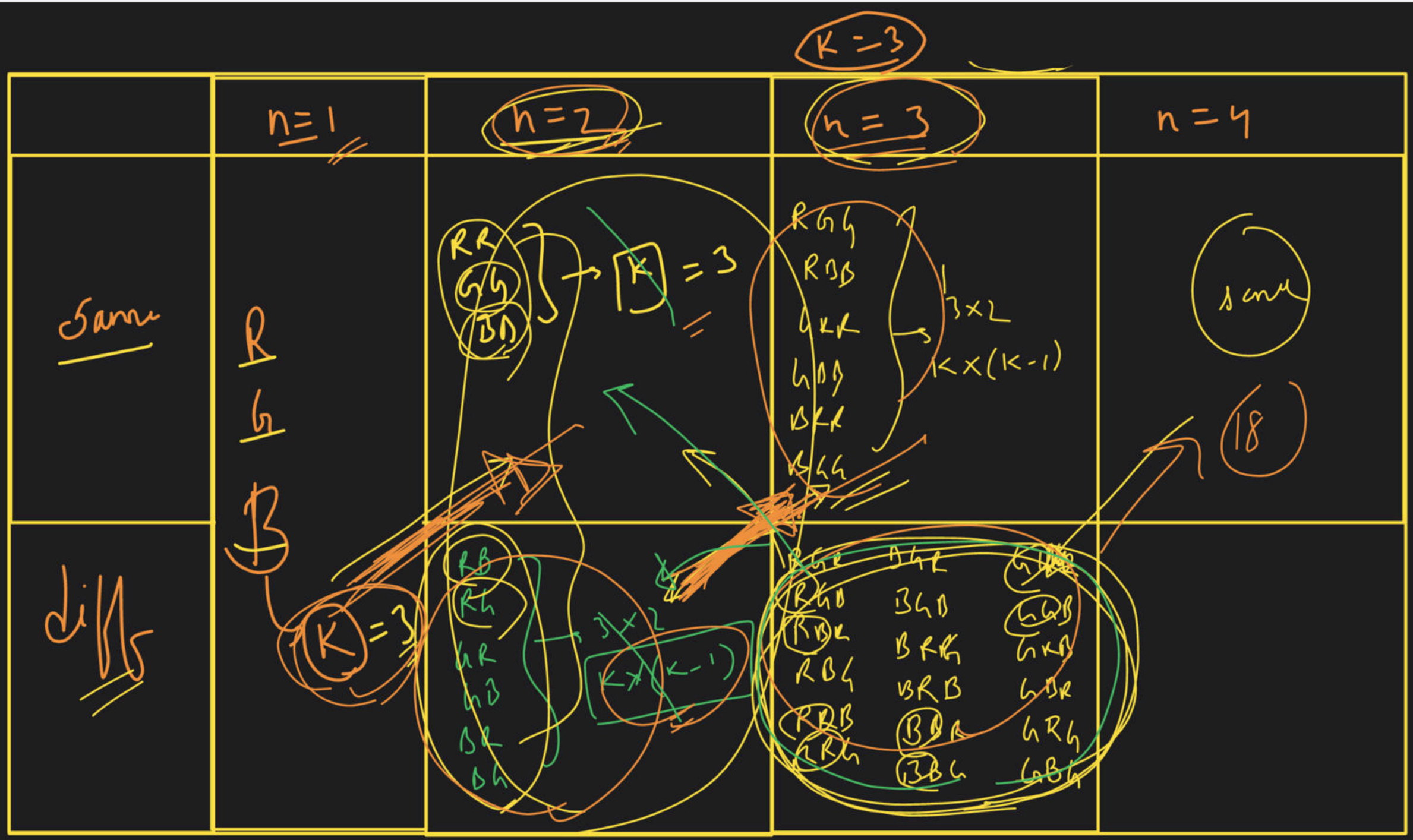
paint

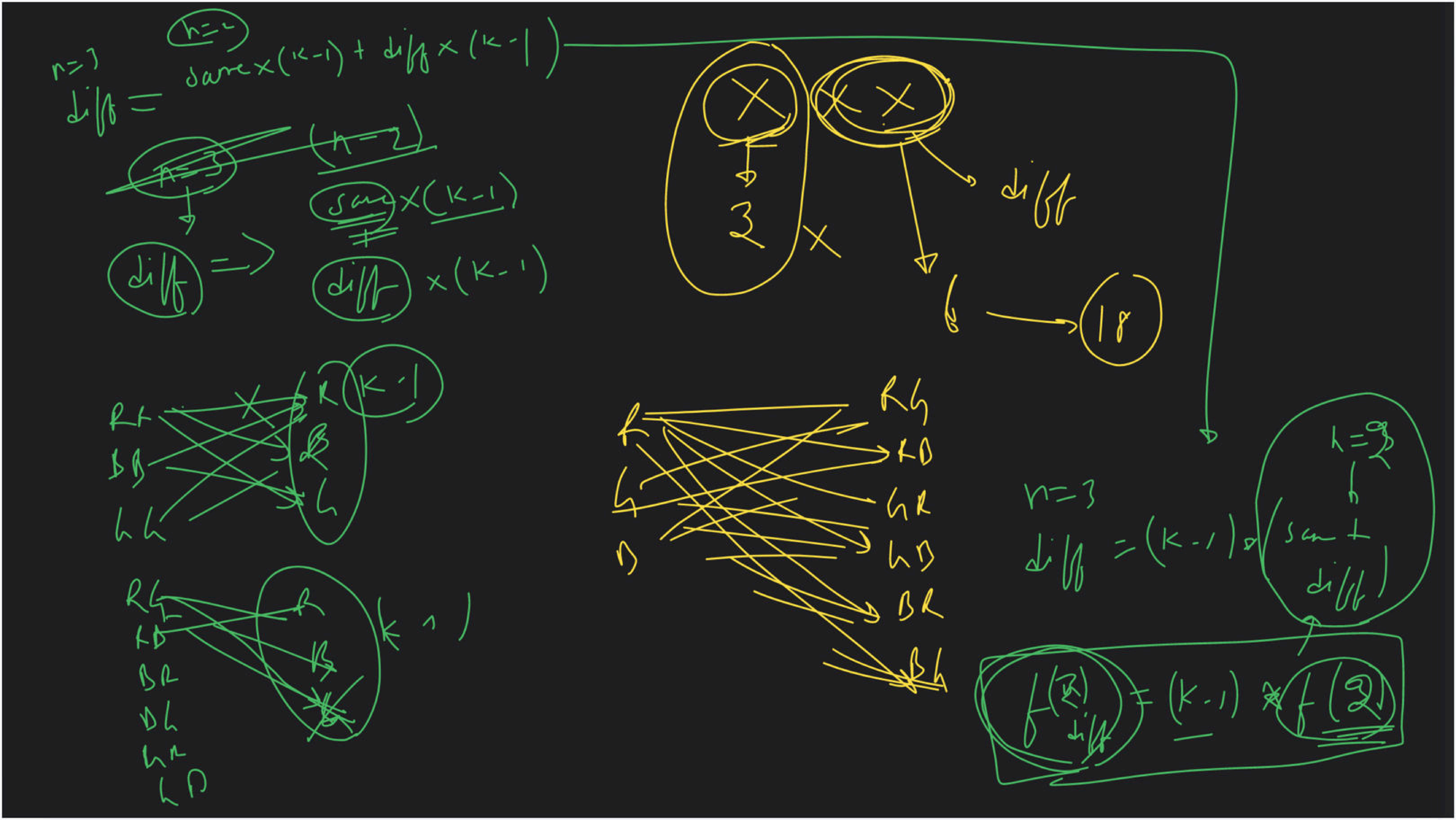
K → colors



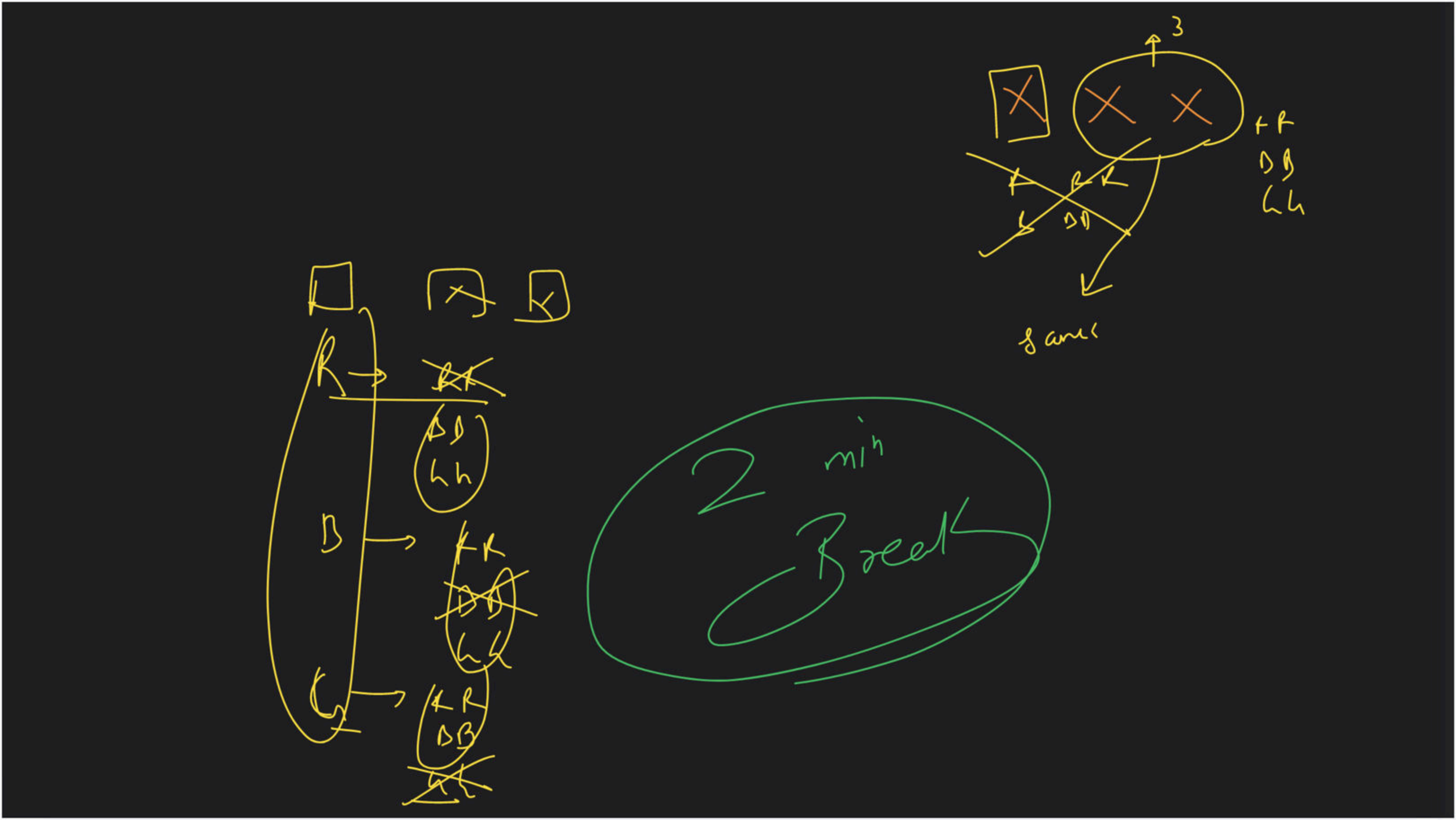

f(n-2)
n post
X X X X
same
diff
f(n-1) → R
(k-1) * f(n-1)
f(n-2)
RR
K
(k-1) * f(n-2) — + — (f(n-1) + f(n-2)) (k-1)

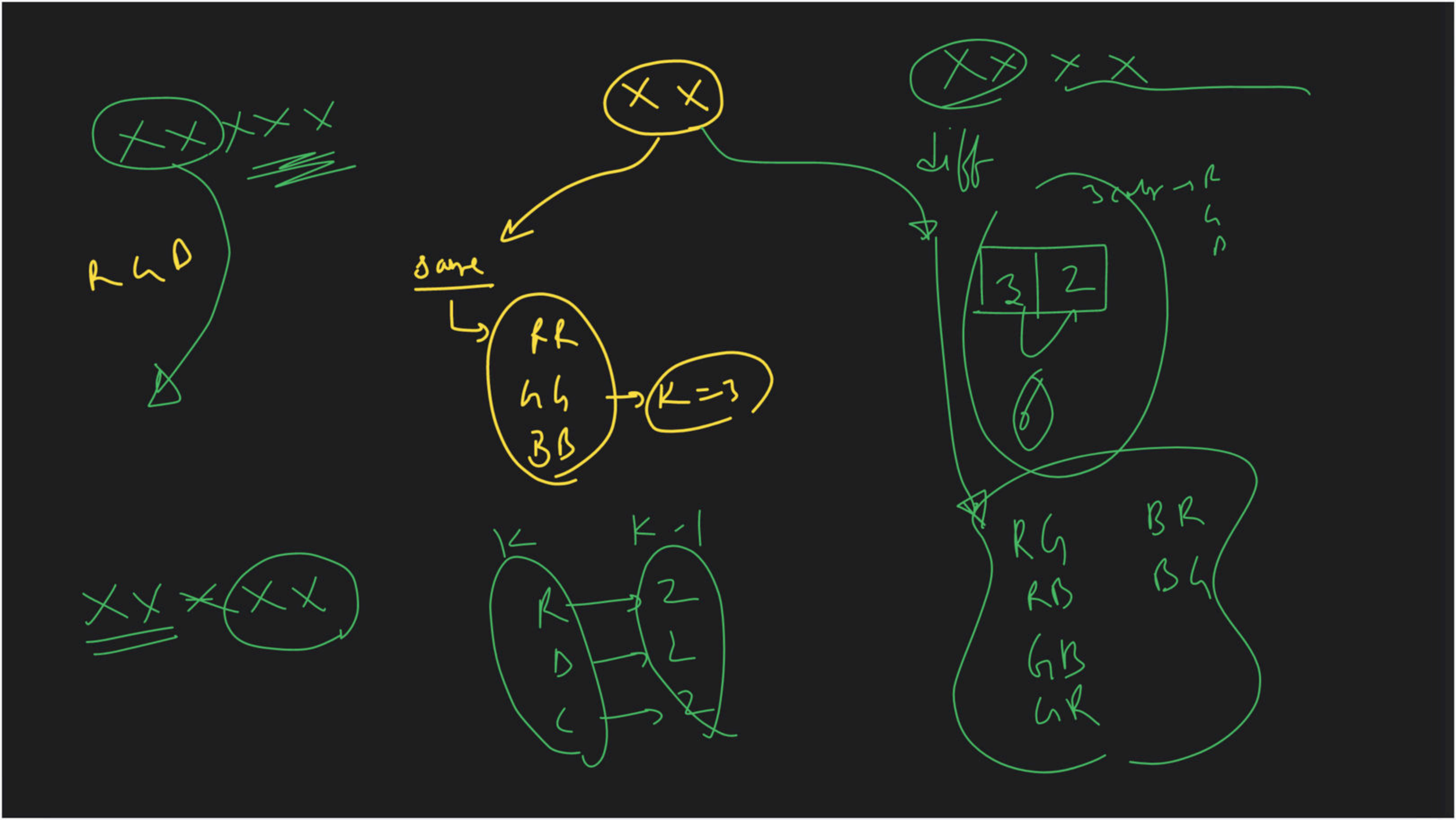

f(n)
same color
diff color
f(n-2)
xx
K
(K-1)
f(n-2)*(K-1)
f(n) diff = (K-1) * f(n-1)
f(n-2)x(K-1) + f(n-1)*(K-1)
(K-1) f(n-1) + f(n-2)


K=3
n=1
n=2
n=3
n=4
same
R
G
B
diffs
K=3
3×2
K×(K-1)
same
18

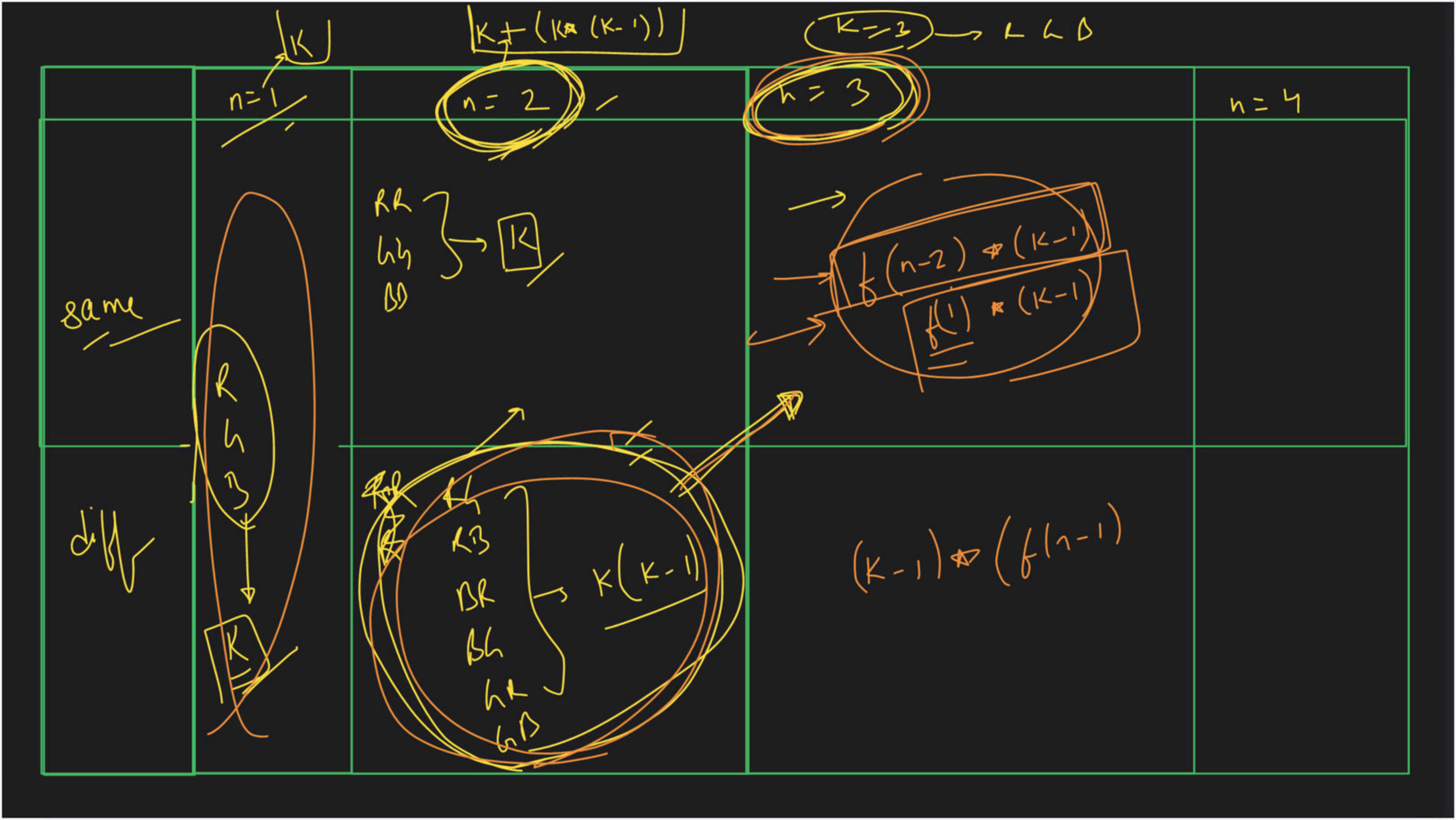


n=3
n=2
diff = same×(k-1) + diff×(k-1)
(n-2)
same×(k-1)
+
diff => diff×(k-1)
(k-1)
RR
BB
GG
(k-1)
RG
RB
BR
BG
GR
GB
3
diff
18
RG
RB
GR
GB
BR
BG
n=3
diff = (k-1)×(same + diff)
n=3
f(3) diff = (k-1) × f(2)


3
2 min
Break


same
RR
GG
BB
K=3
K
K-1
R
D
C
2
2
2
diff
3
2
RG
RB
GB
GR
BR
BG

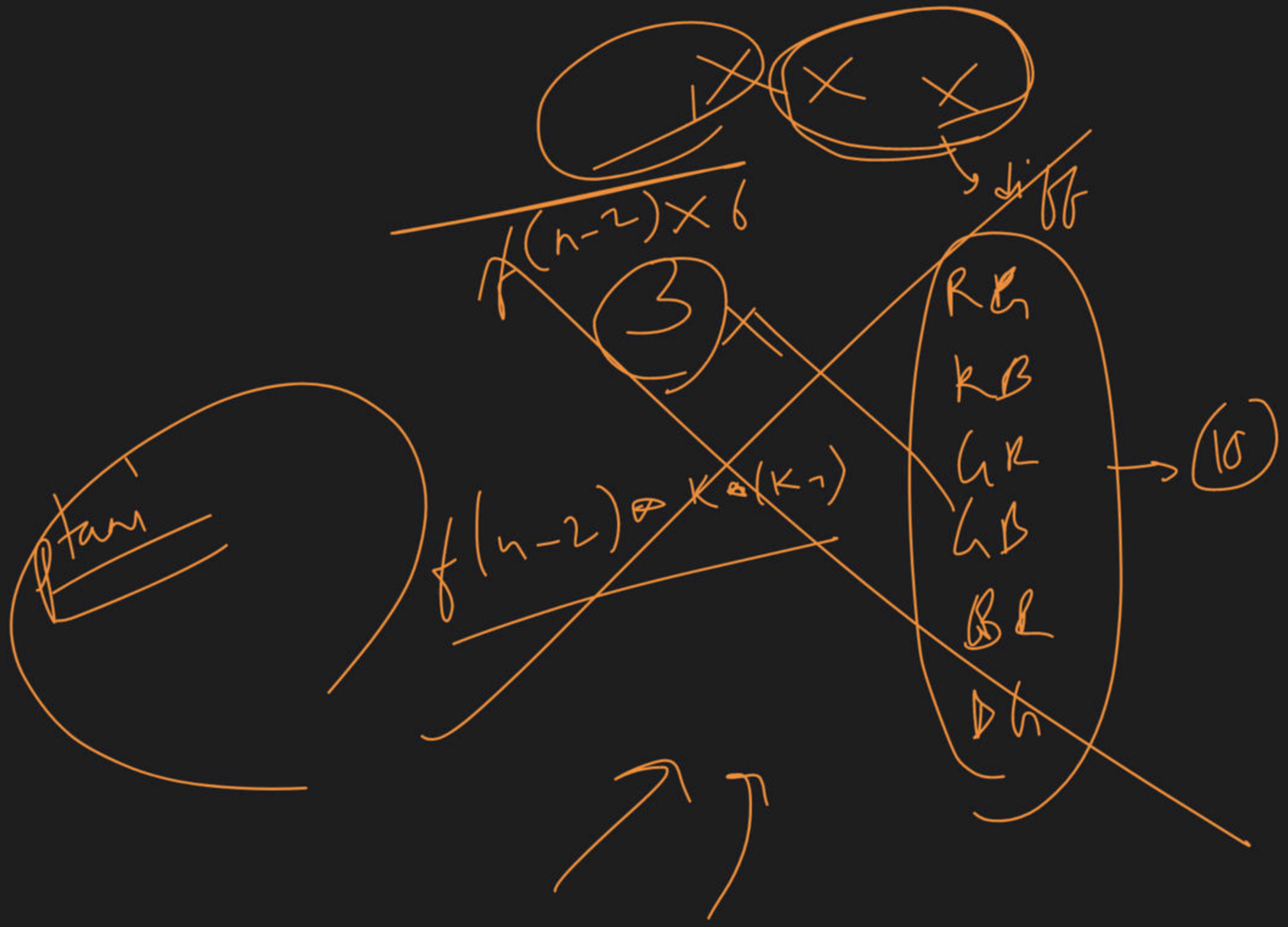

X
R
G
B

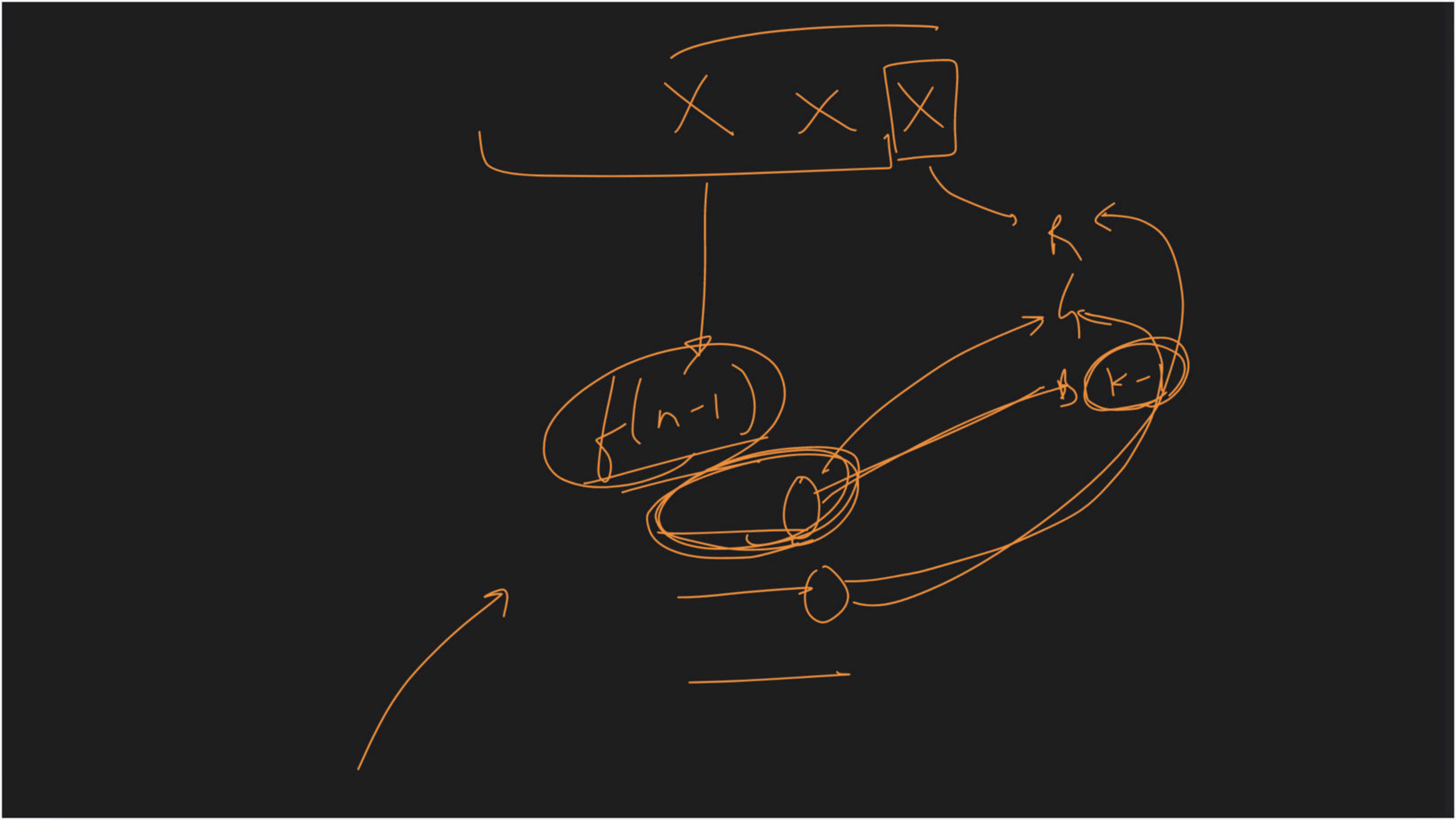

K
K + (K * (K-1))
K = 3
n = 1
n = 2
n = 3
n = 4
same
diff
K
f(n-2) * (K-1)
f(1) * (K-1)
K(K-1)
(K-1) * (f(n-1)

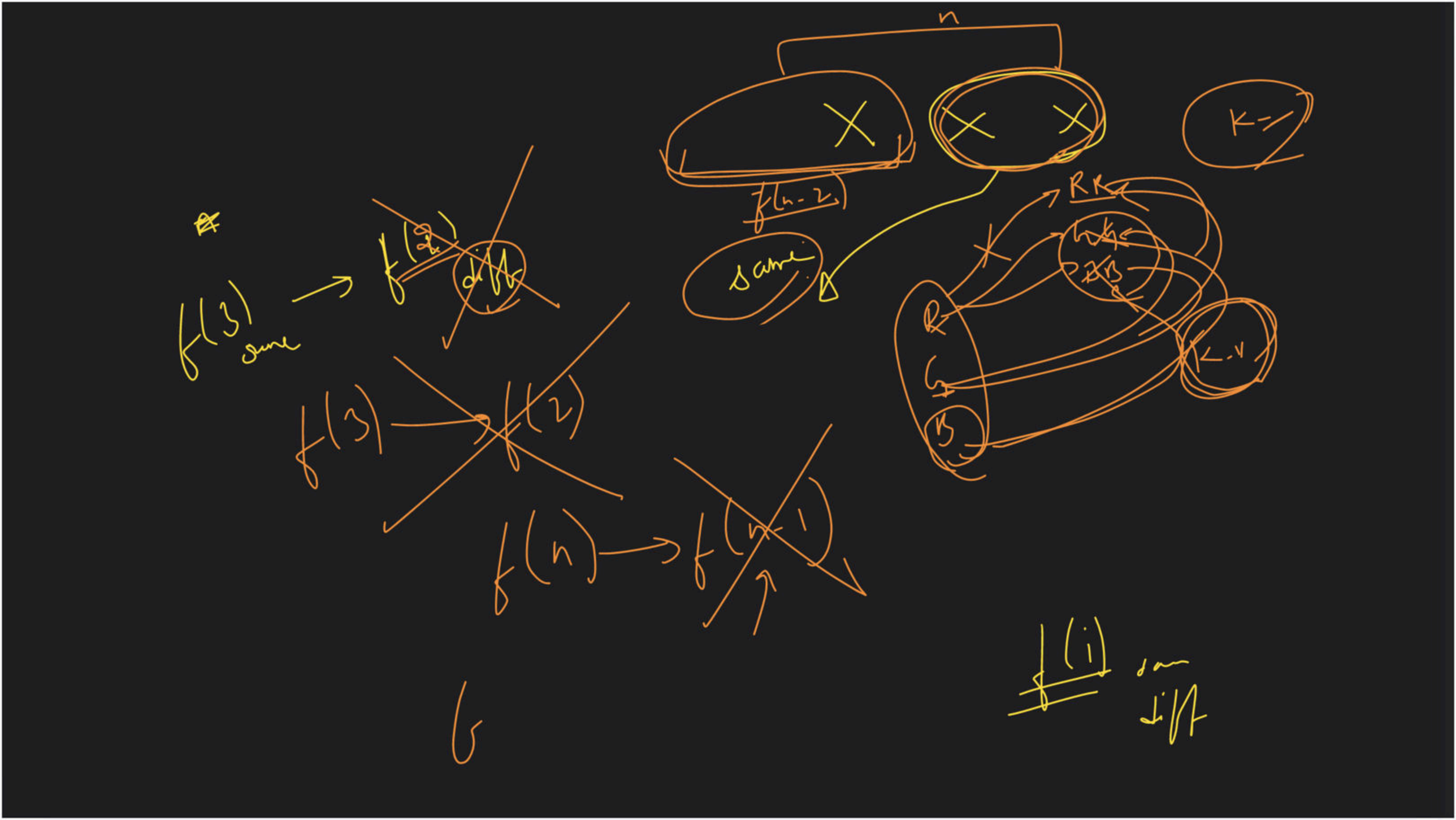
$f(3) \longrightarrow \underbrace{f(3)_{sum}} + f(3)_{diff}$

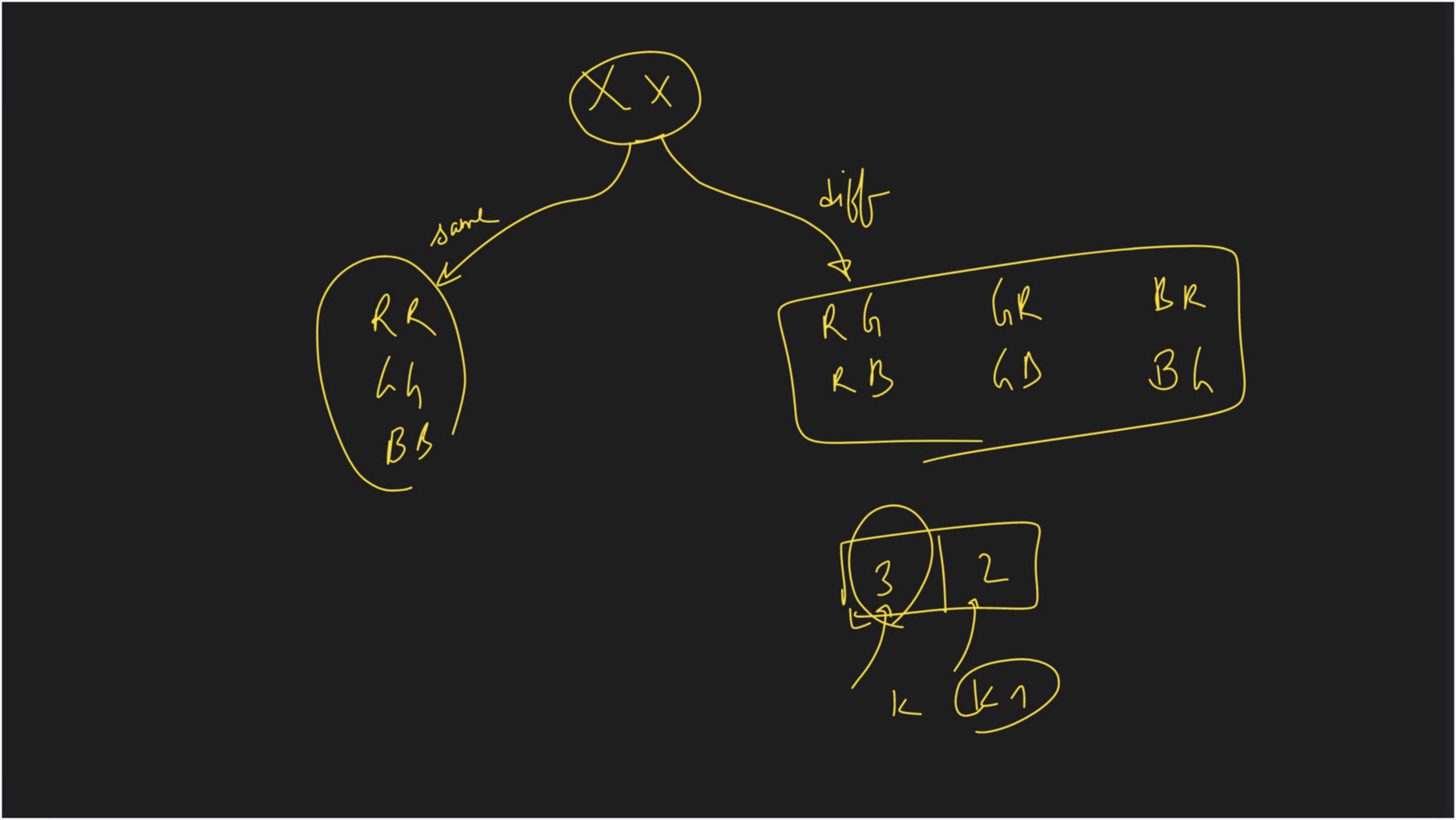
$\Longrightarrow (K-1) * \left(f(n-1) + (K-1) f(n-1)\right)$

$f(n) = \left[f(n-1) + f(n-2)\right](K-1)$

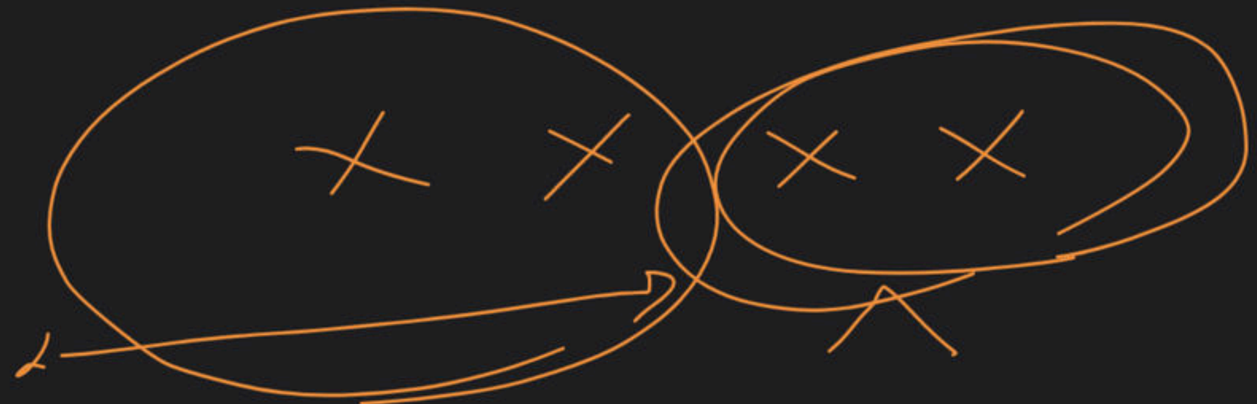

f(n-2)×6
3
f(n-2)×K×(K-1)
(10)

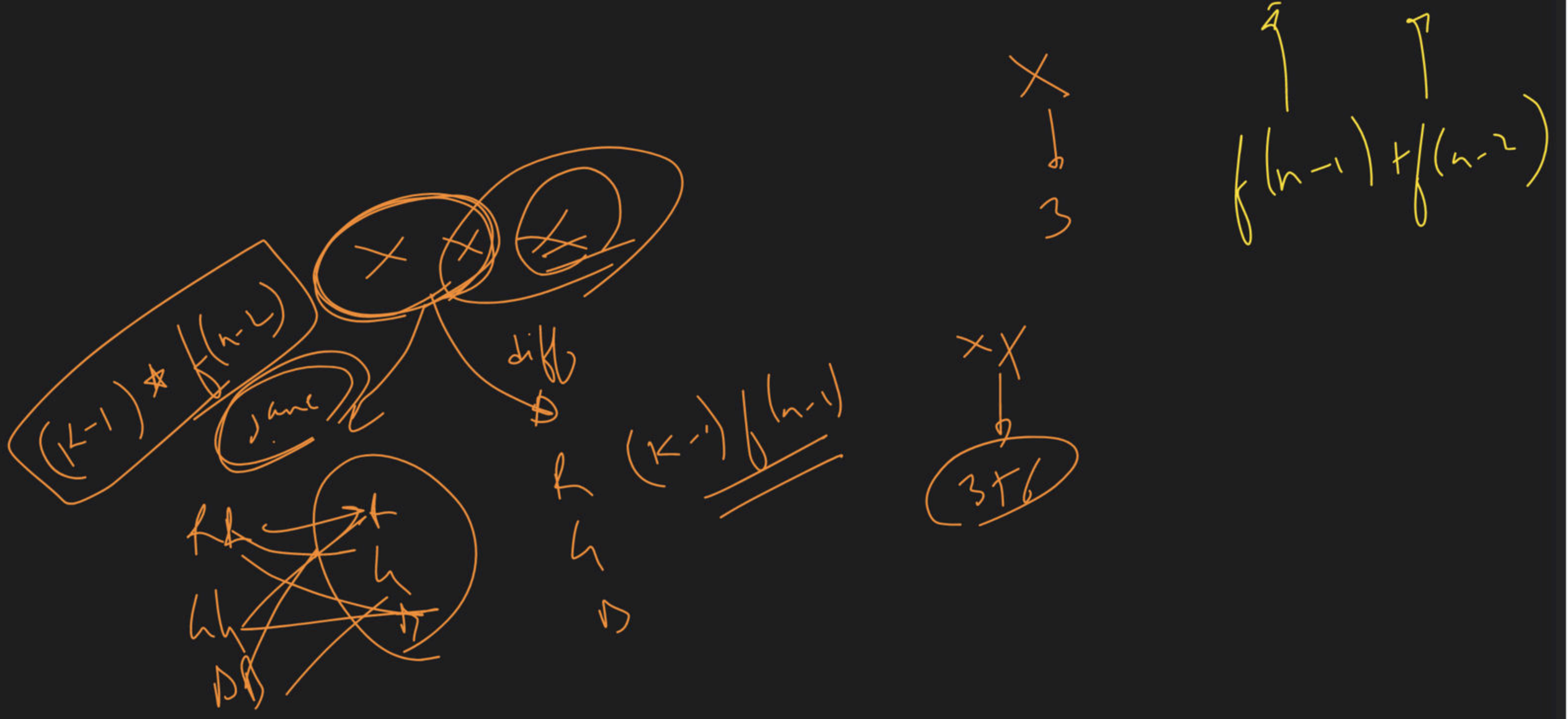

X X X
f(n-1)


n
X
X
X
K-1
f(n-2)
same
RK
K-1
f(3)
same
f(2)
diff
f(3)
f(2)
f(n)
f(n-1)
f(i)
same
diff


X X
same
diff
RR
GG
BB
RG
RB
GR
GB
BR
BG
3
2
k
k+1


X
R
S
D




f(n-1) + f(n-2)
same
diff
3
3+6

Edit distance

op → insert ✓
→ remove ✓
→ replace ✓

word1 ⇒ h D r ≤ e

word2 ⇒ h o r s e

op

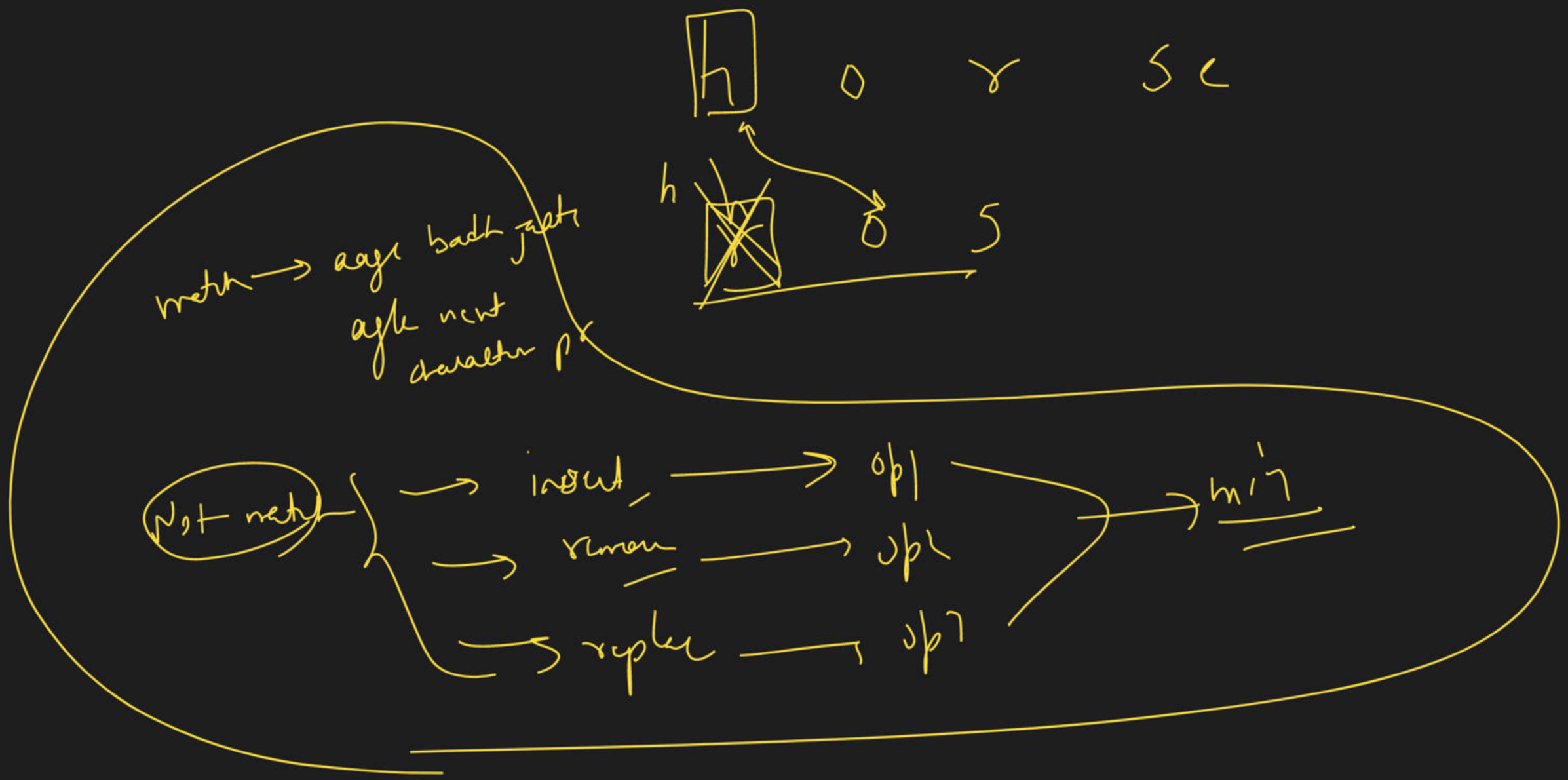
word[i] i

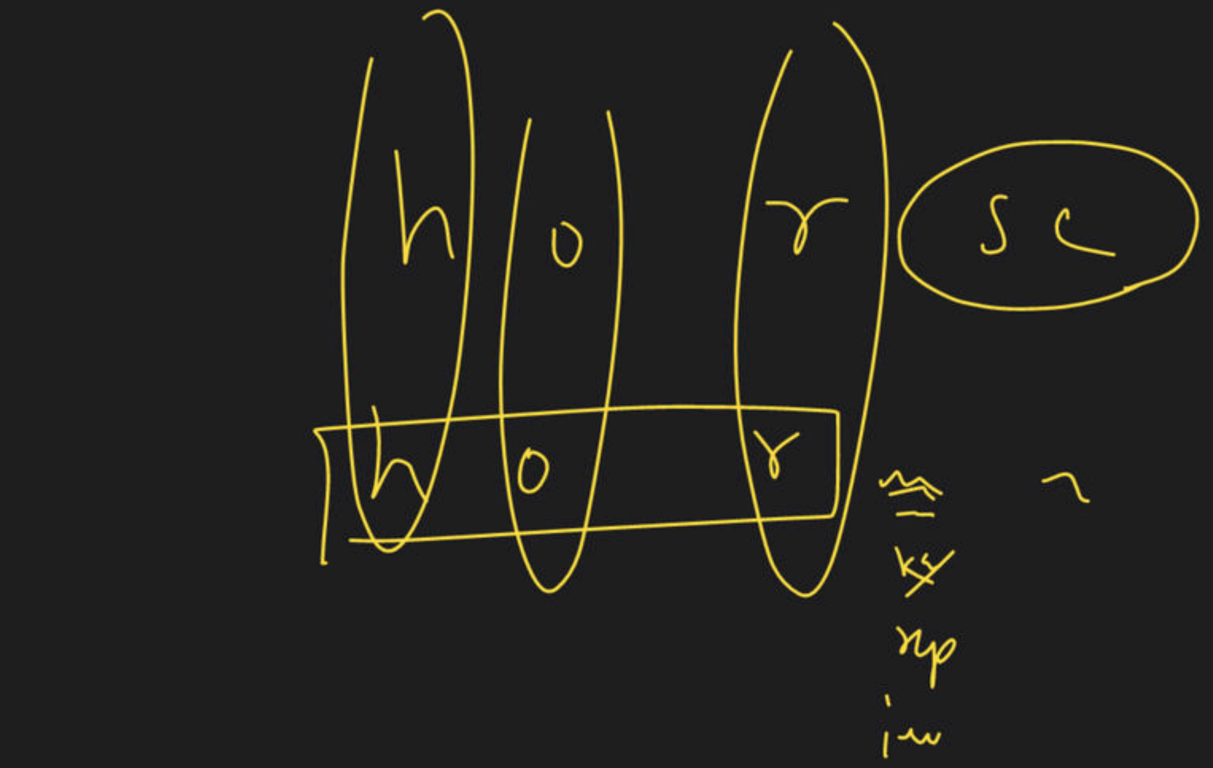
word2[ ]

same → Match

Not match → insert
→ remove
→ replace

min





insert

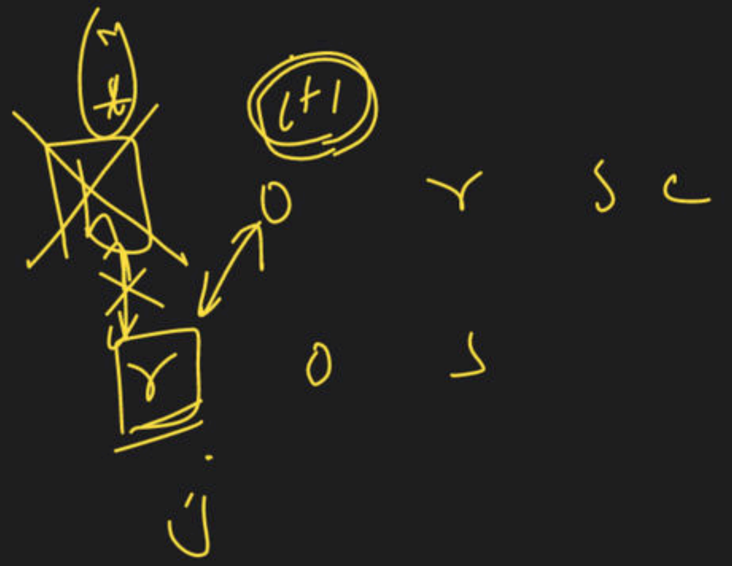
w1 →

w2 →

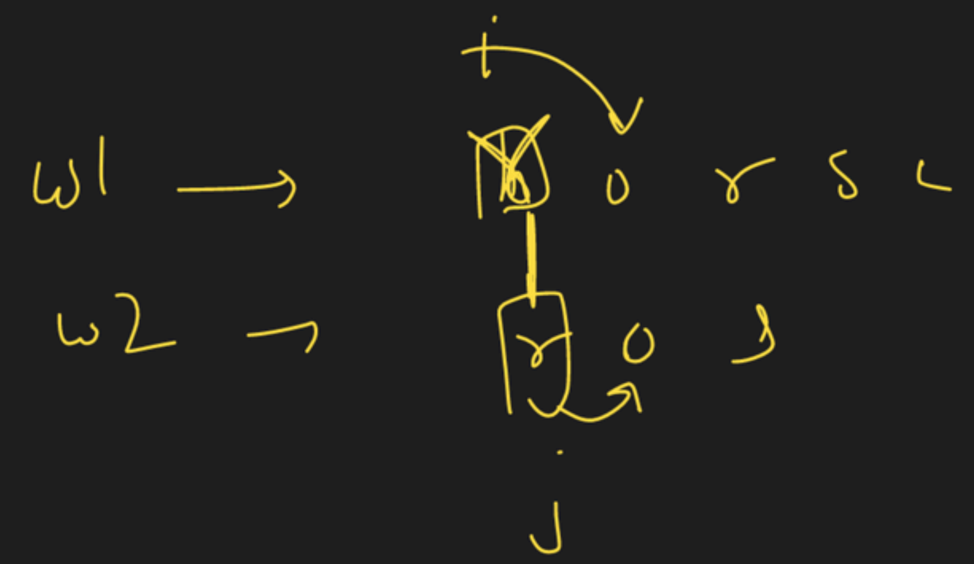
remove

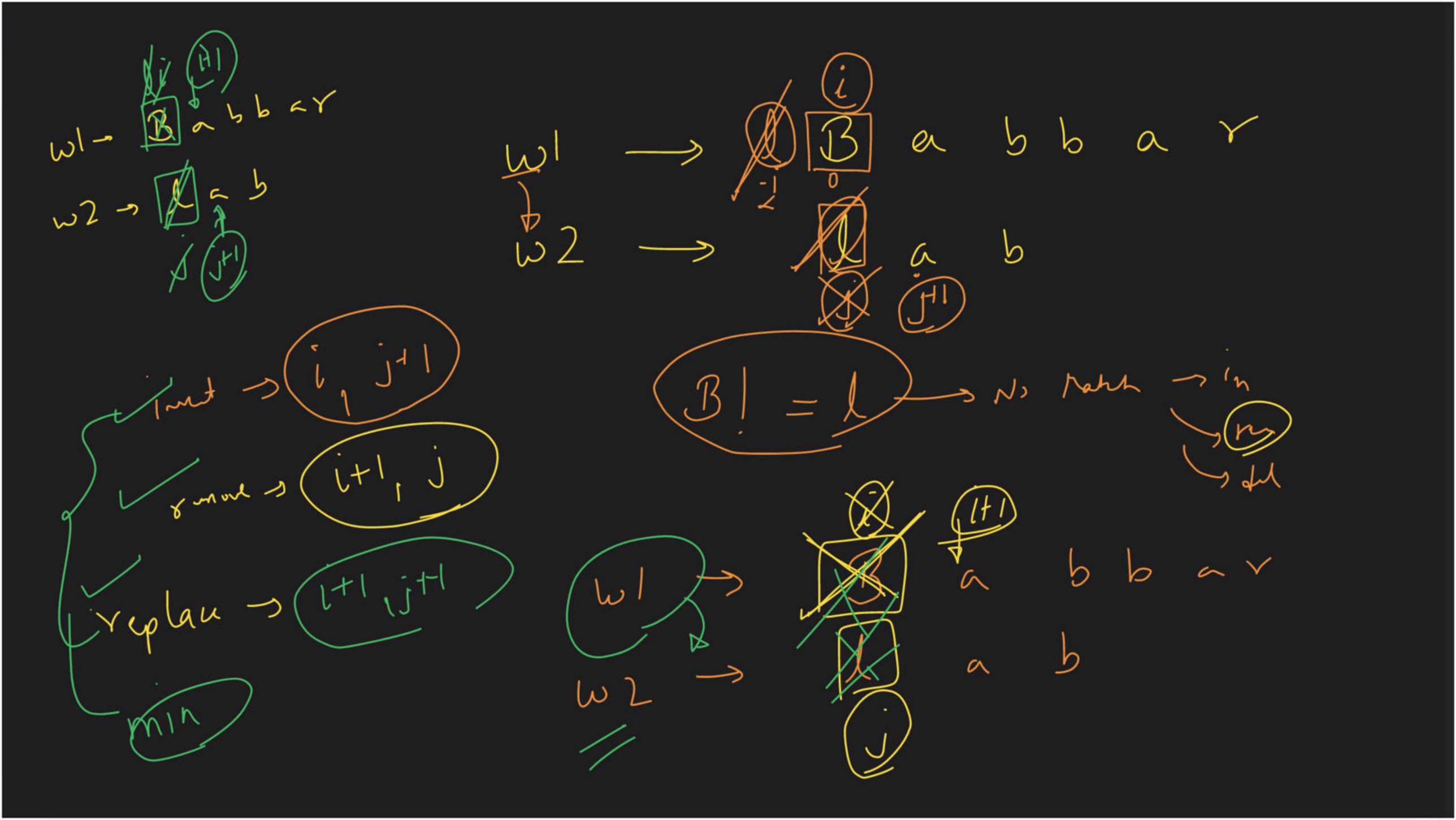
w1 →

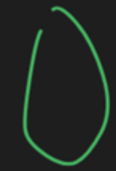
w2 →

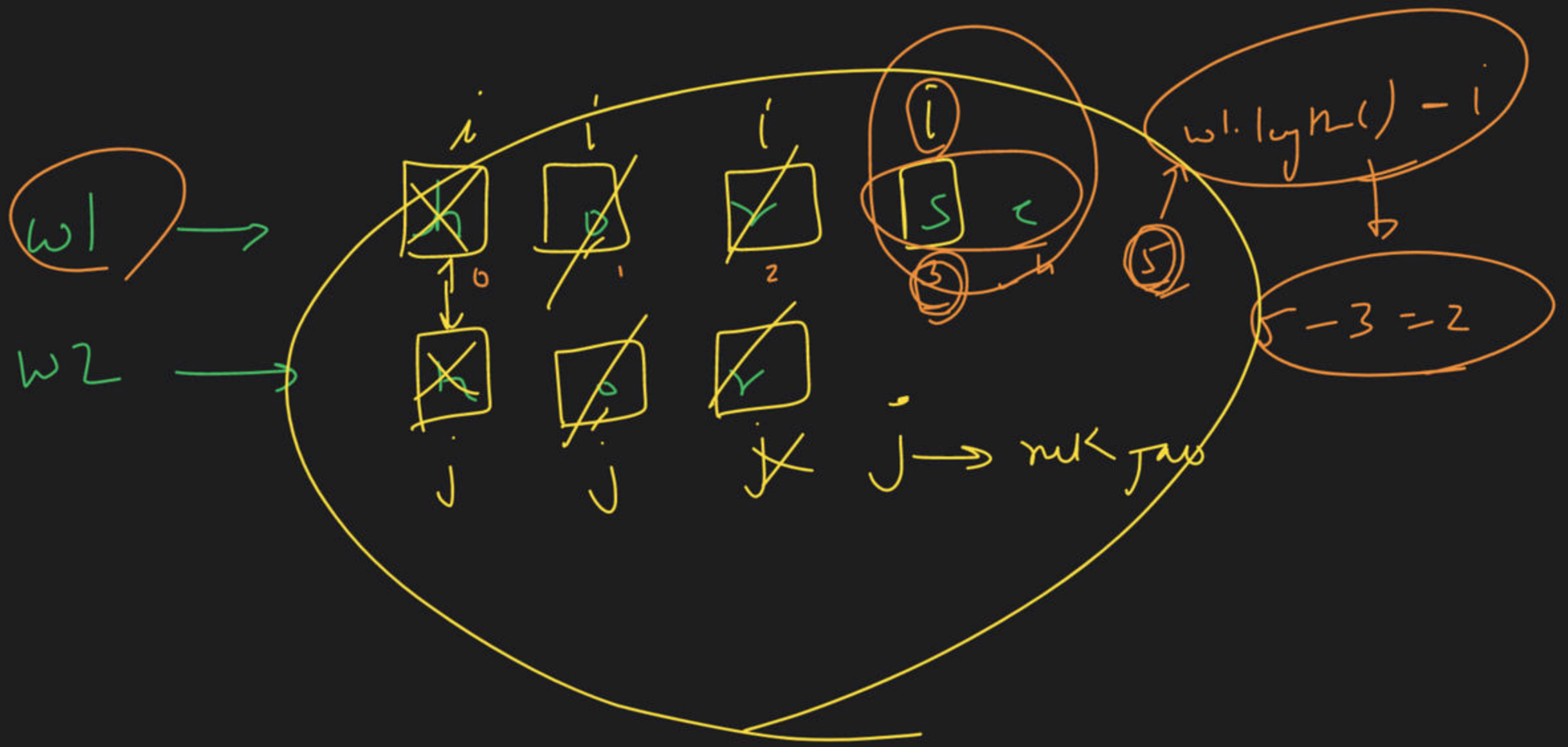


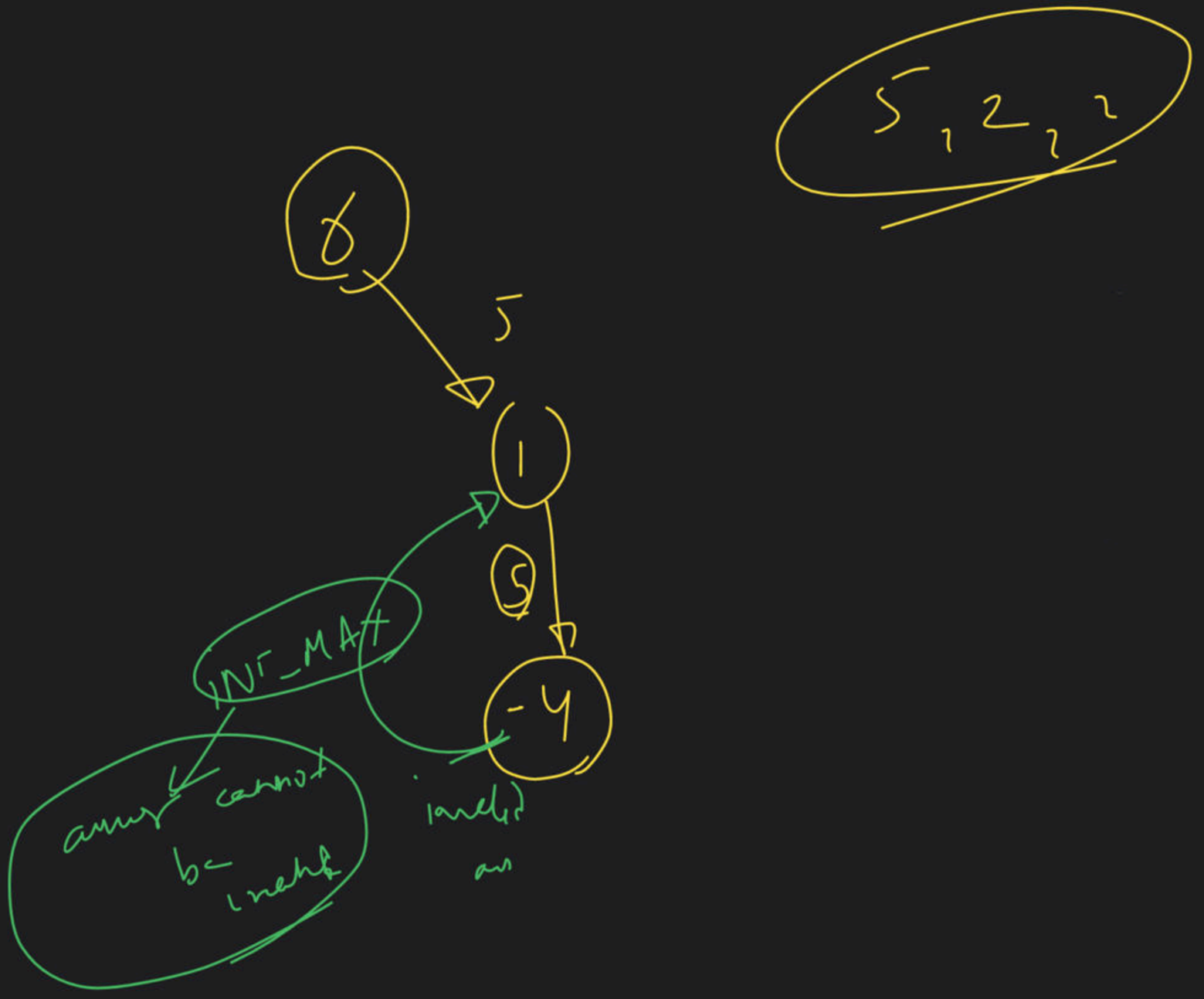
replace

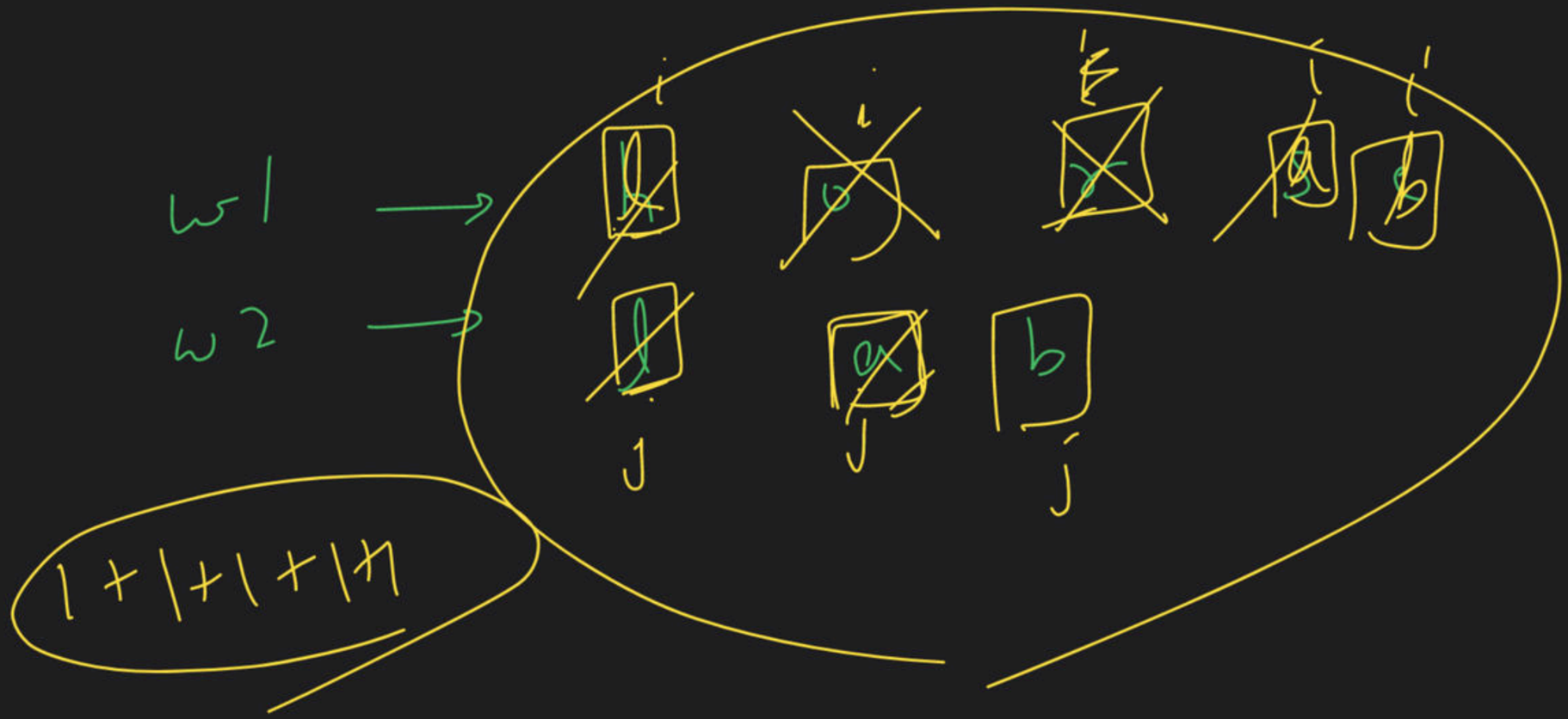


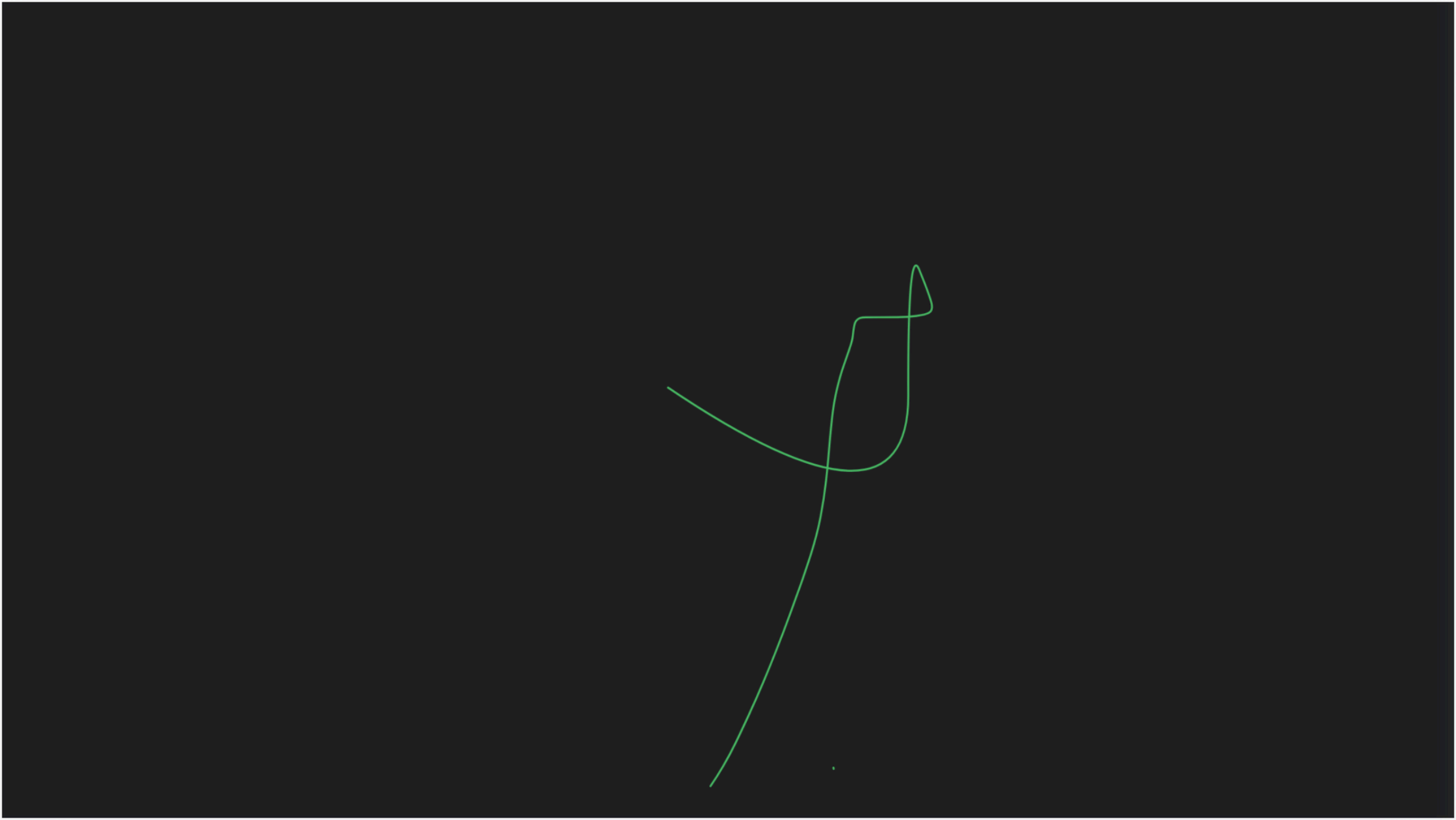

w1
w2
a b b a r
i
i+1
j+1
Insert
remove
replace
min
B! = l
No Match
in
del
w1
w2

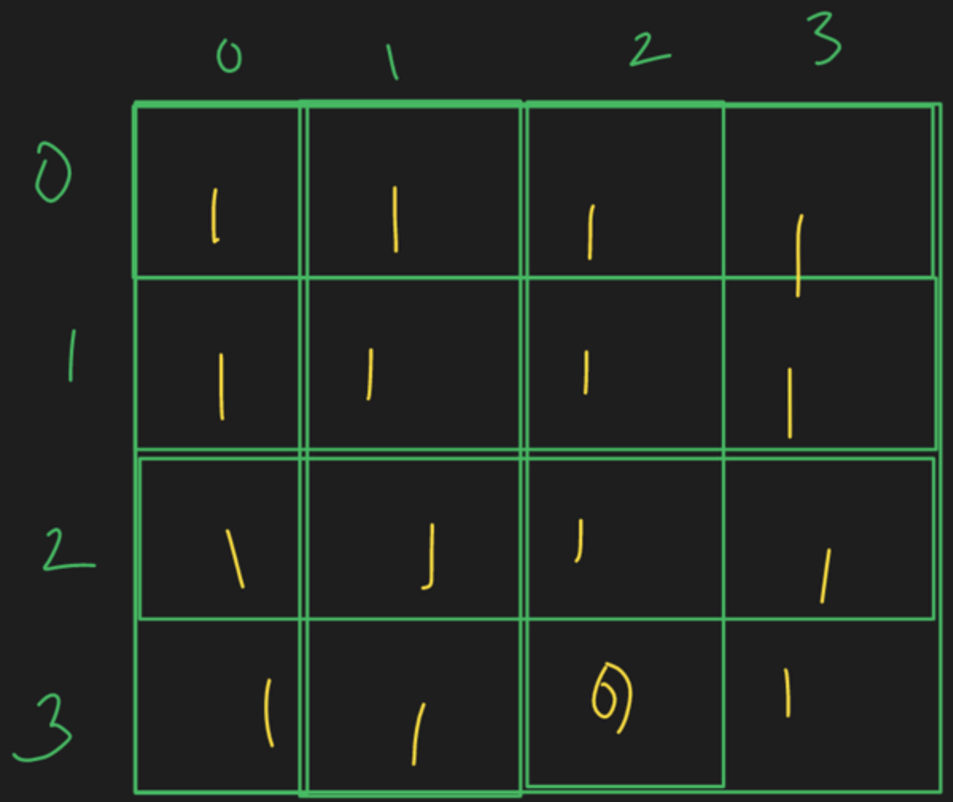



w1
w2
i
i
i
0
1
2
j
j
j
i
s
c
s
s
w1.length() - 1
i - 3 = 2
j → out of bounds


0
5
1
5
INT_MAX
-4
array cannot be indexed
invalid an


w1
w2
1+1+1+1+1




0
1
2
3
0
1
2
3
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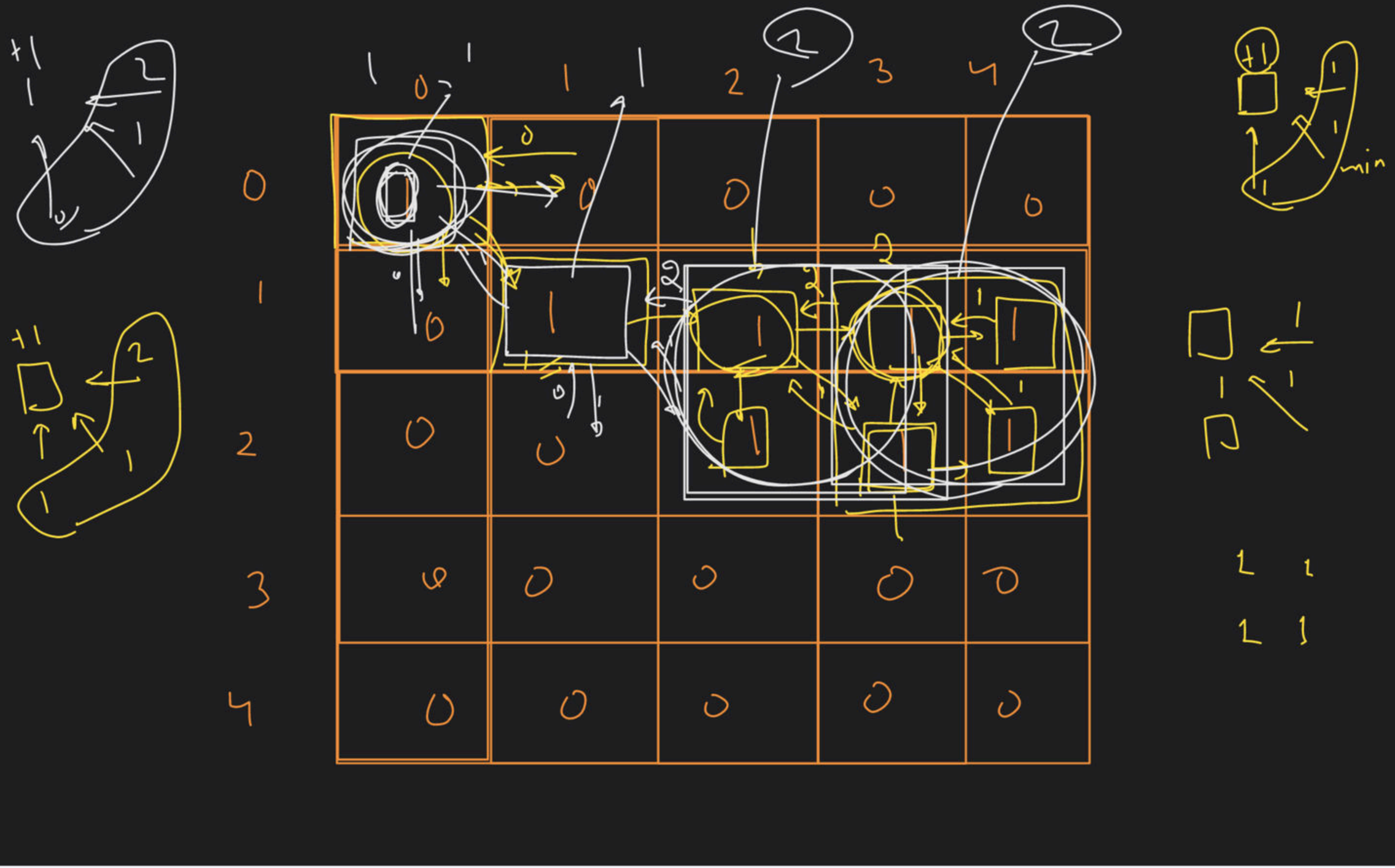
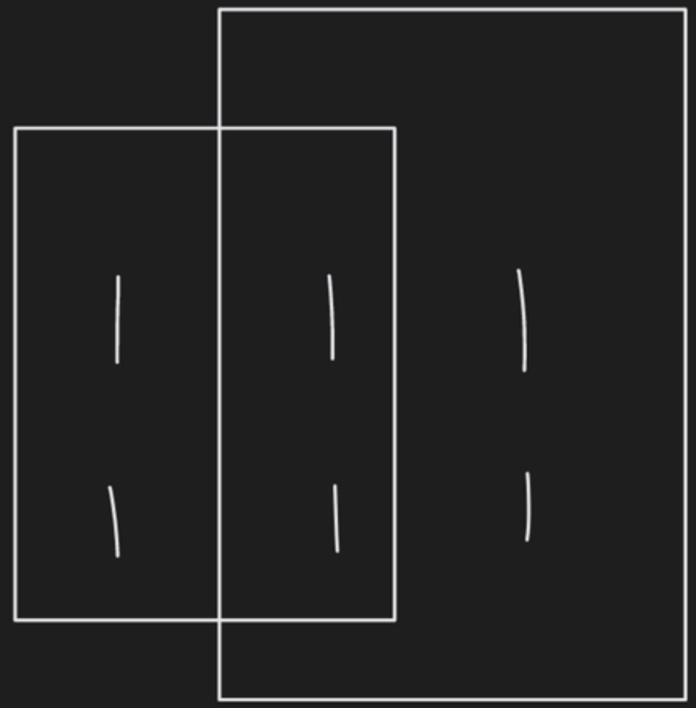
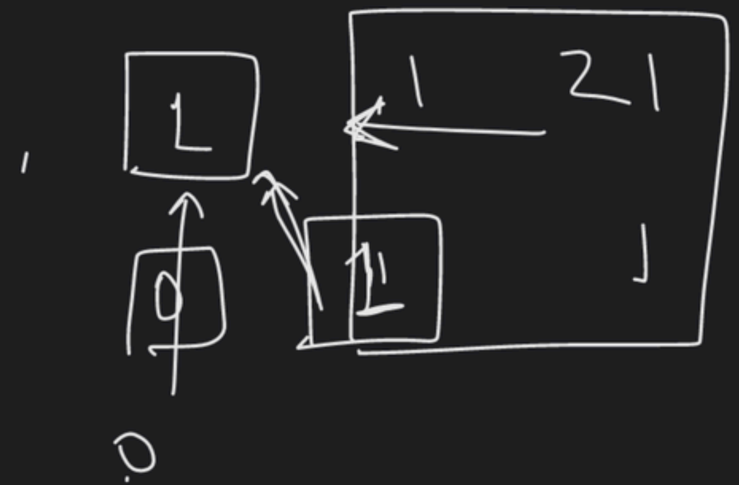
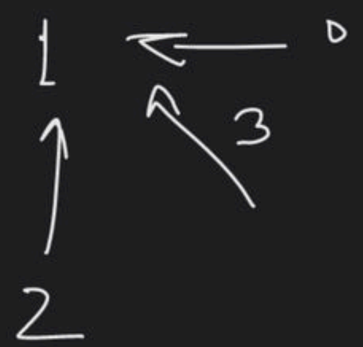
0
1


min



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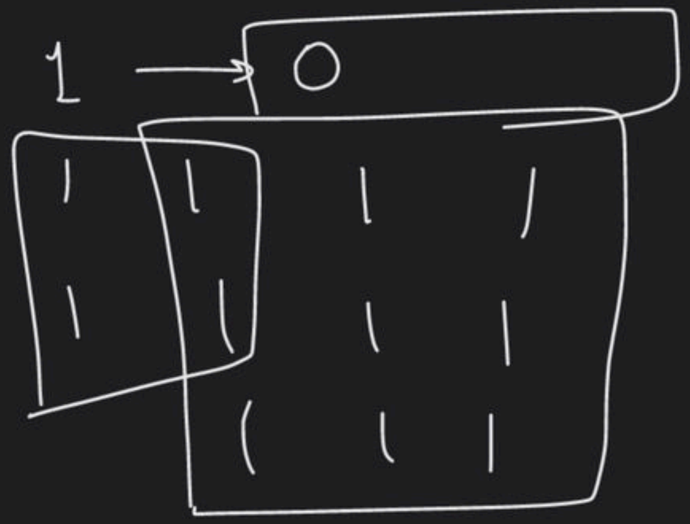
3
2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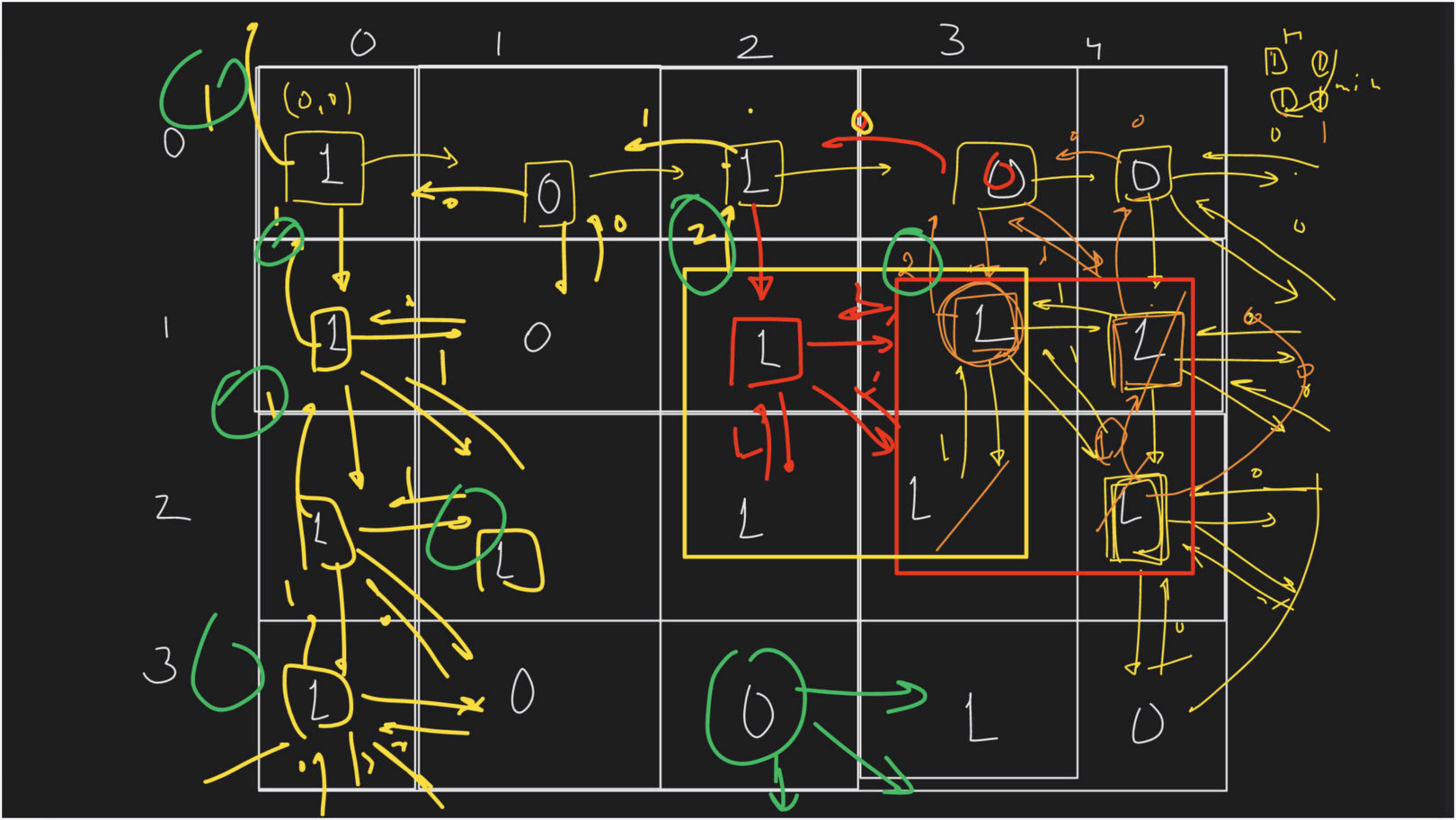

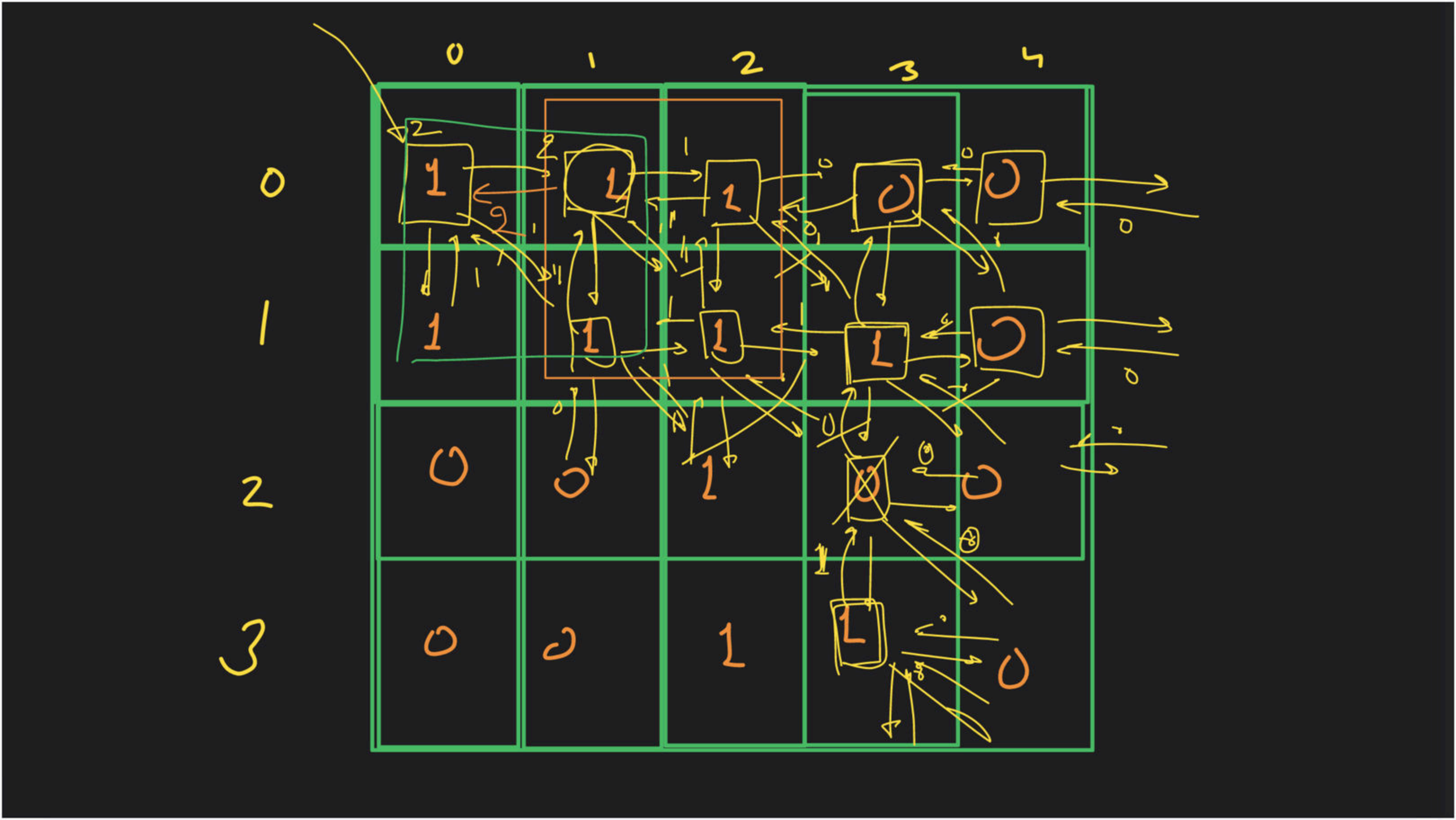
0 1 2 3 4
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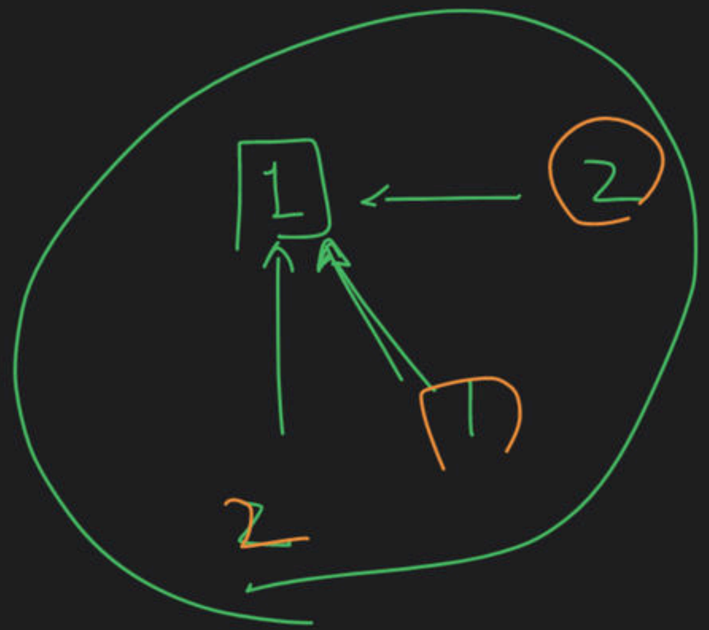
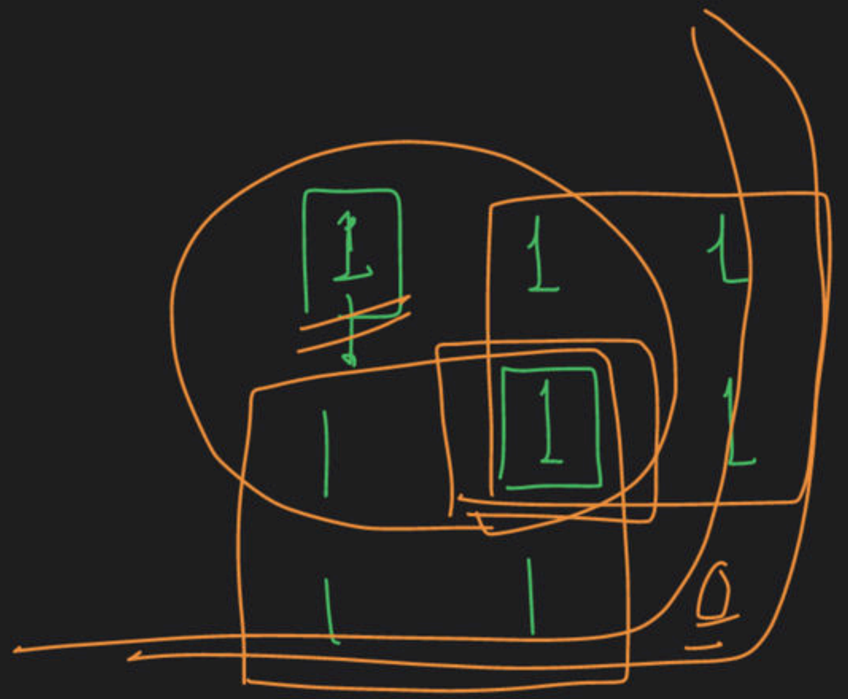
1
2
3


1
2
1
2


1
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1
1
1
1
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