

# DYNAMIC PROGRAMMING Problems

Q Interleaving Strings

first video → aabcc

second video ⇒ dbbca

final video =  
→ aadbcbca

false

Given 3 strings

True or false

Strings

aabcc

dbbca

aadbcbca

Given 3 strings

True or false

clips

merging (2) videos  
clips

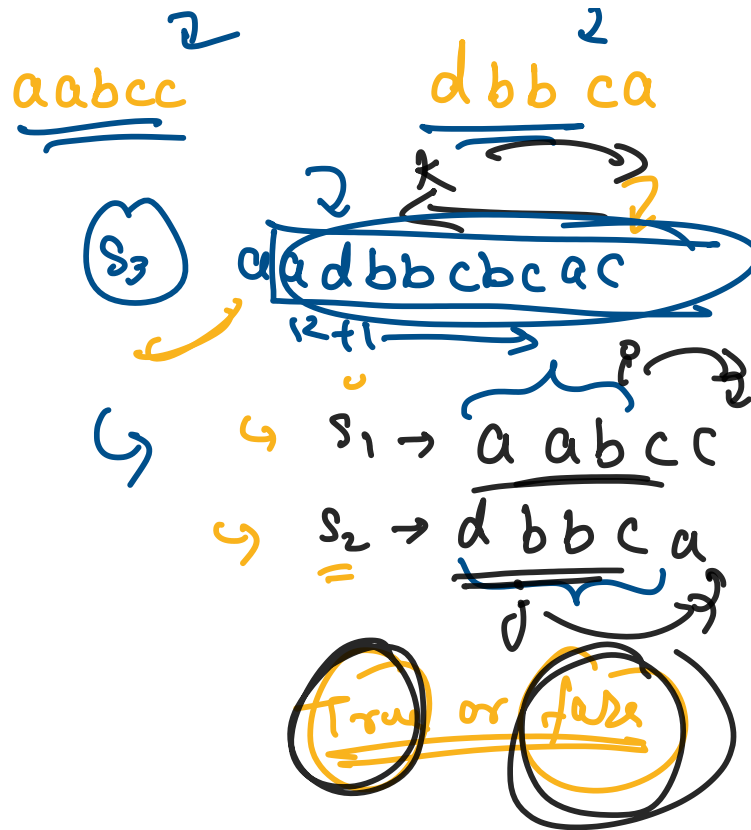
2 mins

S<sub>1</sub>  
S<sub>2</sub>  
S<sub>3</sub>

Interleaving S<sub>1</sub> & S<sub>2</sub>

[2 → videos]  
Binary Strings

Image



if ( $s_3.length == (s_1.length + s_2.length)$ )  
return false;

OR

not matching with last  
character of  $s_3$   
return false

either  $s_1$  or  $s_2$  is  
 equal to last char of  $s_3$

for any index  $k$  inside  $s_3$

$s_1 \rightarrow \textcircled{c}$   
 $s_2 \rightarrow ,$

$s_1 \rightarrow \textcircled{a} \textcircled{a} \textcircled{b} \textcircled{c}$   
 $\rightarrow \textcircled{d} \textcircled{b} \textcircled{b} \textcircled{c}$   
a a b c c  
d b b c a

U

substring of string  $s_3$  (till index  $k$ )

check if feed

should be formed by interleaving the  
substring  $s_1[0, i]$  &  $s_2[0, j]$

0,0,0

yes/no

bool interleaving ( $s_1, s_2, s_3, i, j, k$ ) {

→ if ( $s_1.size + s_2.size == s_3.size$ )

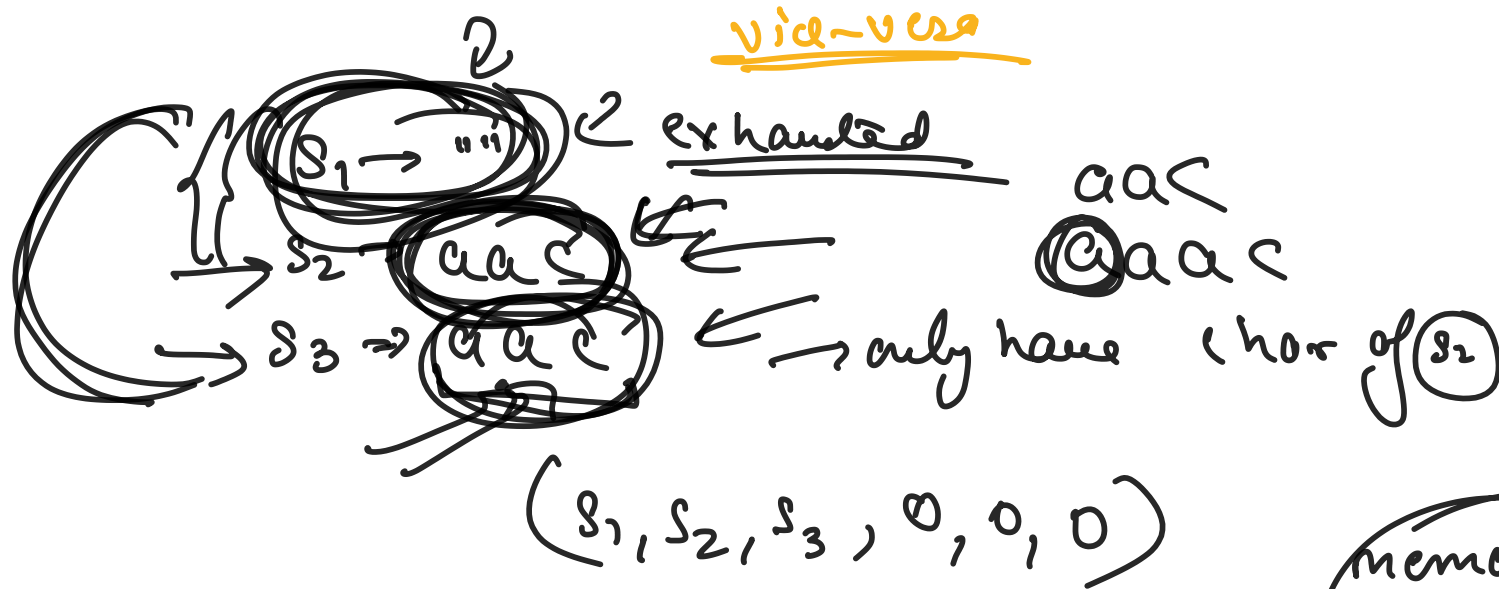
→ ret false;

→ if ( $(s_1[i] == s_3[k] \& \& \text{interleave}(s_1, s_2, s_3, i+1, j, k+1))$   
OR  $s_2[j] == s_3[k] \& \& \text{interleave}(s_1, s_2, s_3, i, j+1, k+1)$ )

return true;

else  
ret false

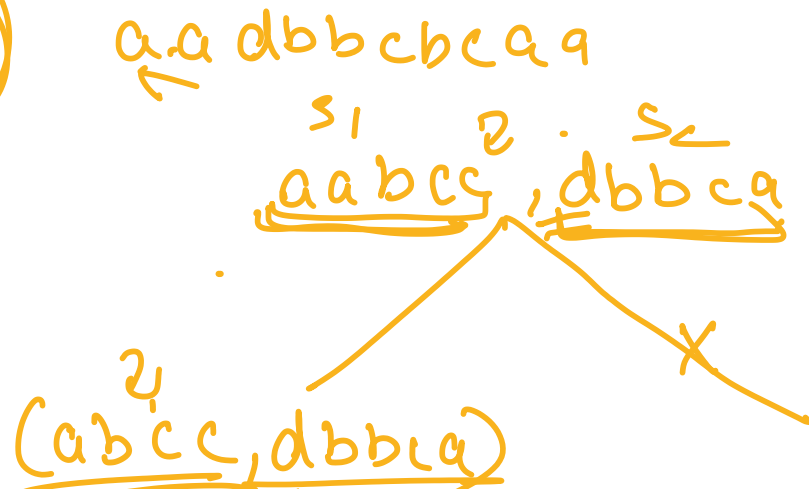
$\uparrow$  exhausted  $(s_1)$   
 if (  $i == s_1.size()$  )  
 return  $s_2.substr(j) == s_3.substr(k)$



memoize

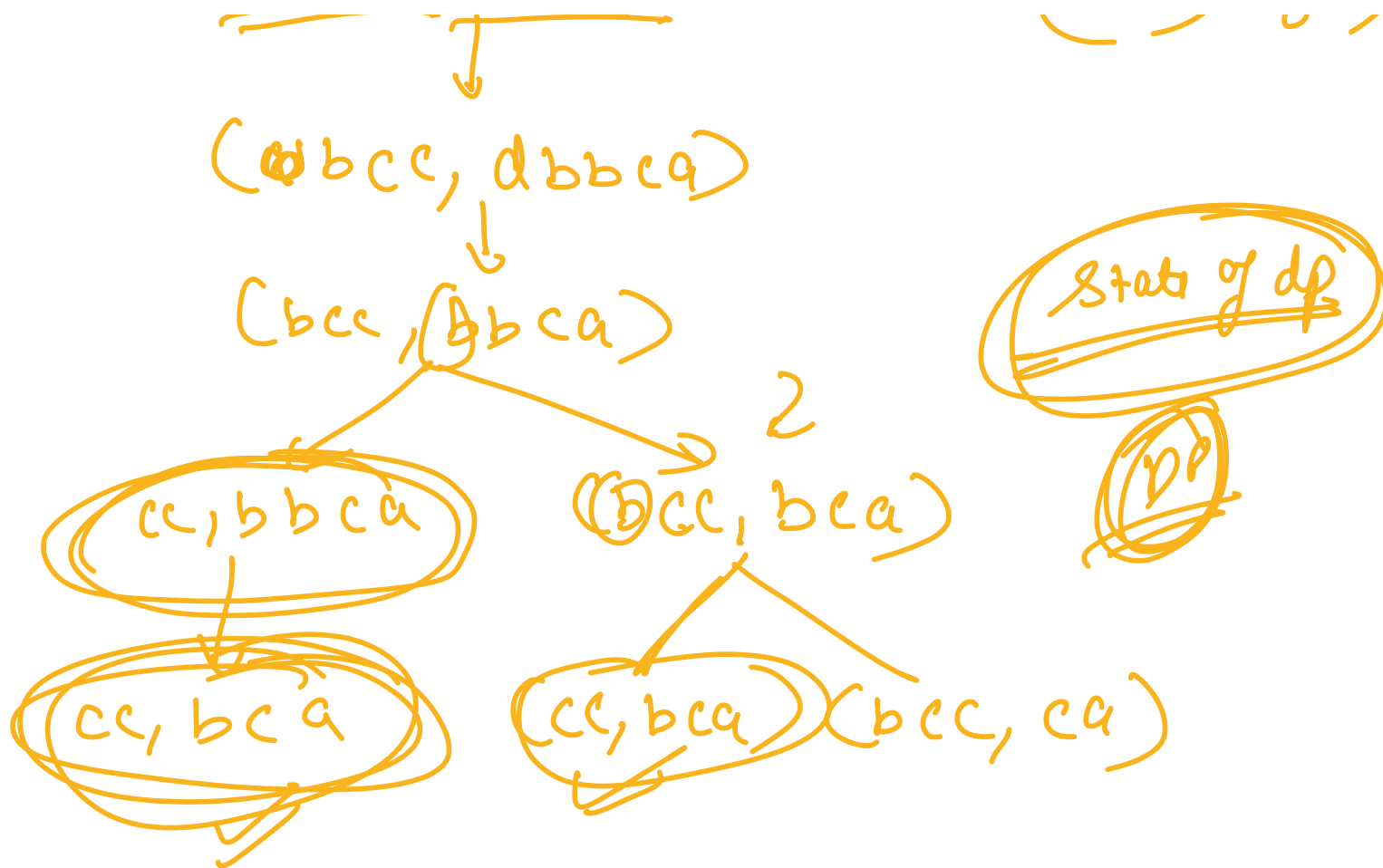
$s_3 \rightarrow i+j$

$i-1$     $j-1$   
 $i+j-1$



$i+j-1$

$(i-1) (j-1)$



~~$i, d, k$~~

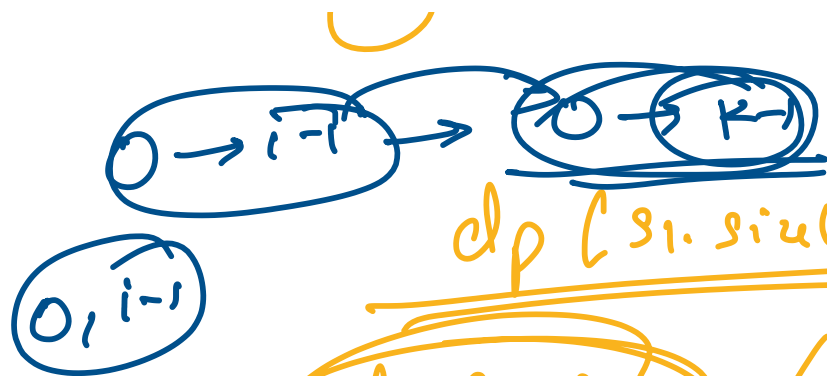
for any Subproblem  $\rightarrow$  the parameters that defines it, contributes to

State of dp

$(3d)?$

~~dp~~

...



$dp[s_1.size()][s_2.size()]$

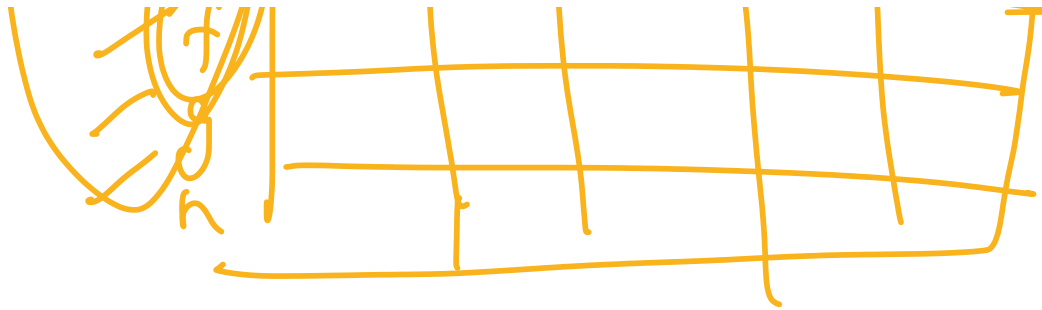
True now

$$dp[i][j] = \left( \frac{s_1[i] == s_3[k]}{i+1, j, k+1} \right) \&\& \text{interlea}(s, s_2, s_3) \quad \text{OR}$$

Bool

$$dp[i][j] = \left[ \begin{array}{l} \left( dp[i-1][j] \right) \&\& (s_1[i-1] == s_3[i+j-1]) \\ \text{OR} \\ dp[i][j-1] \&\& s_2[j-1] == s_3[i+j-1] \end{array} \right]$$





Q Netflix ? Prime <sup>2</sup>

Episode 3

episode 2

recap

How?

episode 2

Skip recap

Skip intro

ds algo

episode 3

Time



7/12

~~...~~

instance

LCS

PRECAP

abcabc

Subsequence  $= 2$   
and  
it's present twice  
in my story

Longest Repeated Subsequence

abcdabc

abbb

Yes



(a) b b b  
 a b b

s<sub>1</sub>  
 s<sub>2</sub>

index should be  
 diff for same char

subseq  $\geq 2$

repeated

LCS

LCS

LCS (a b b b, a b b b)

LCS

$s_1(i) == s_2(j) \& \& (i+1 == j+1)$  → Y/N

$\begin{matrix} \uparrow & \uparrow \\ a & b & b & b \\ a & b & b & b \\ & j & j \end{matrix}$

$s_1(i) == s_2(j) \& \& i! = j$   
 $1 + (i+1, j+1)$

recursive

$\begin{matrix} (b, b) \\ (b, b) \end{matrix}$

2cs       $i! = j$

ch. 11 / dp feed

→ Captain

A	B	C	D	E	F
1	10	✓	-	-	-
0					

3      3  
 6 pilots  
 Captain      (ant)



$x$  is an act of  $y$   
 $\underline{\text{age}(x) < \text{age}(y)}$   
 $\underline{\text{index}(x) < \text{index}(y)}$

Cap  
act

	index →	Pilot
A	6	8
S	2	1
B		6

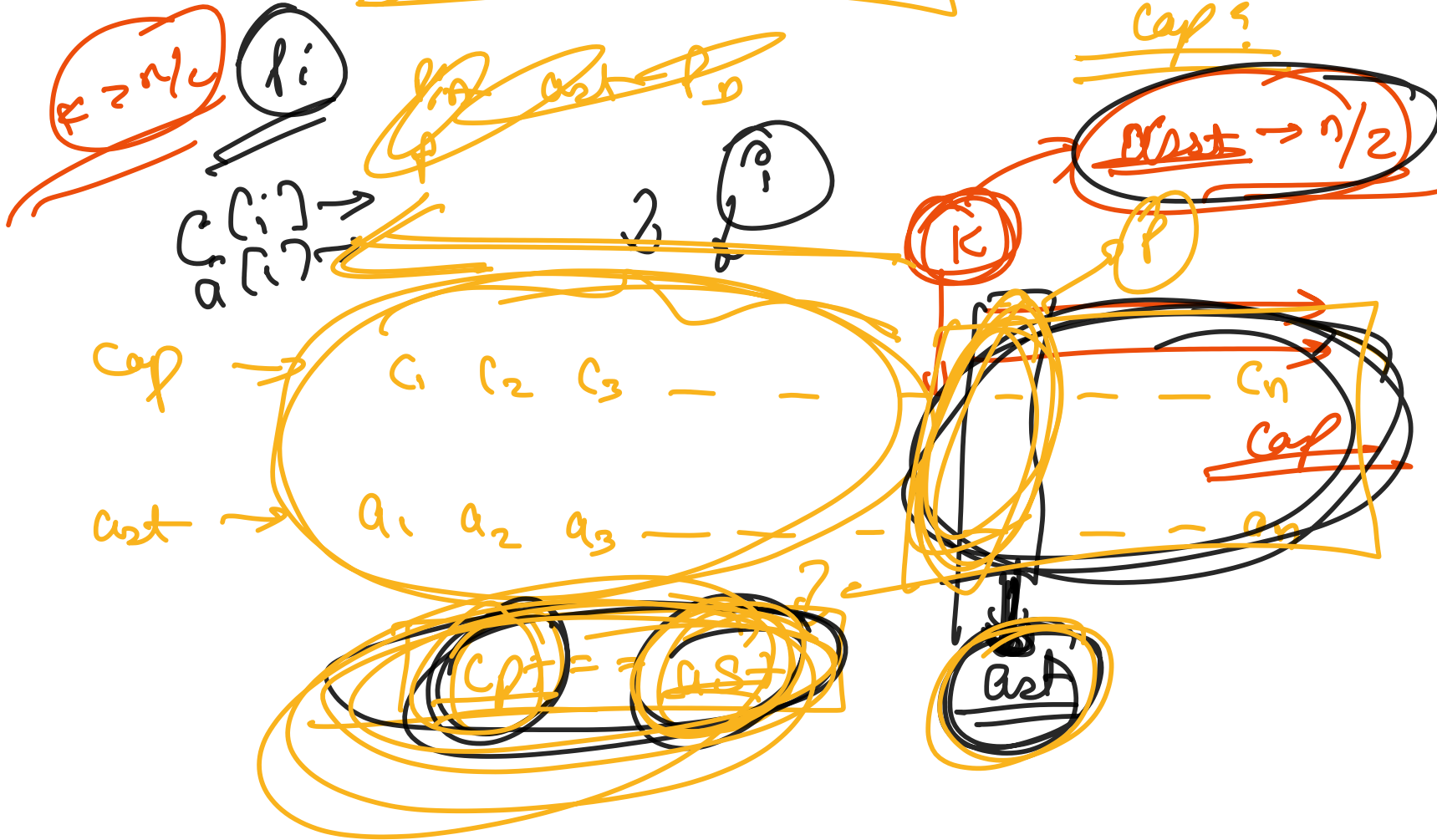
Cap act

Pilot A

$i < j$

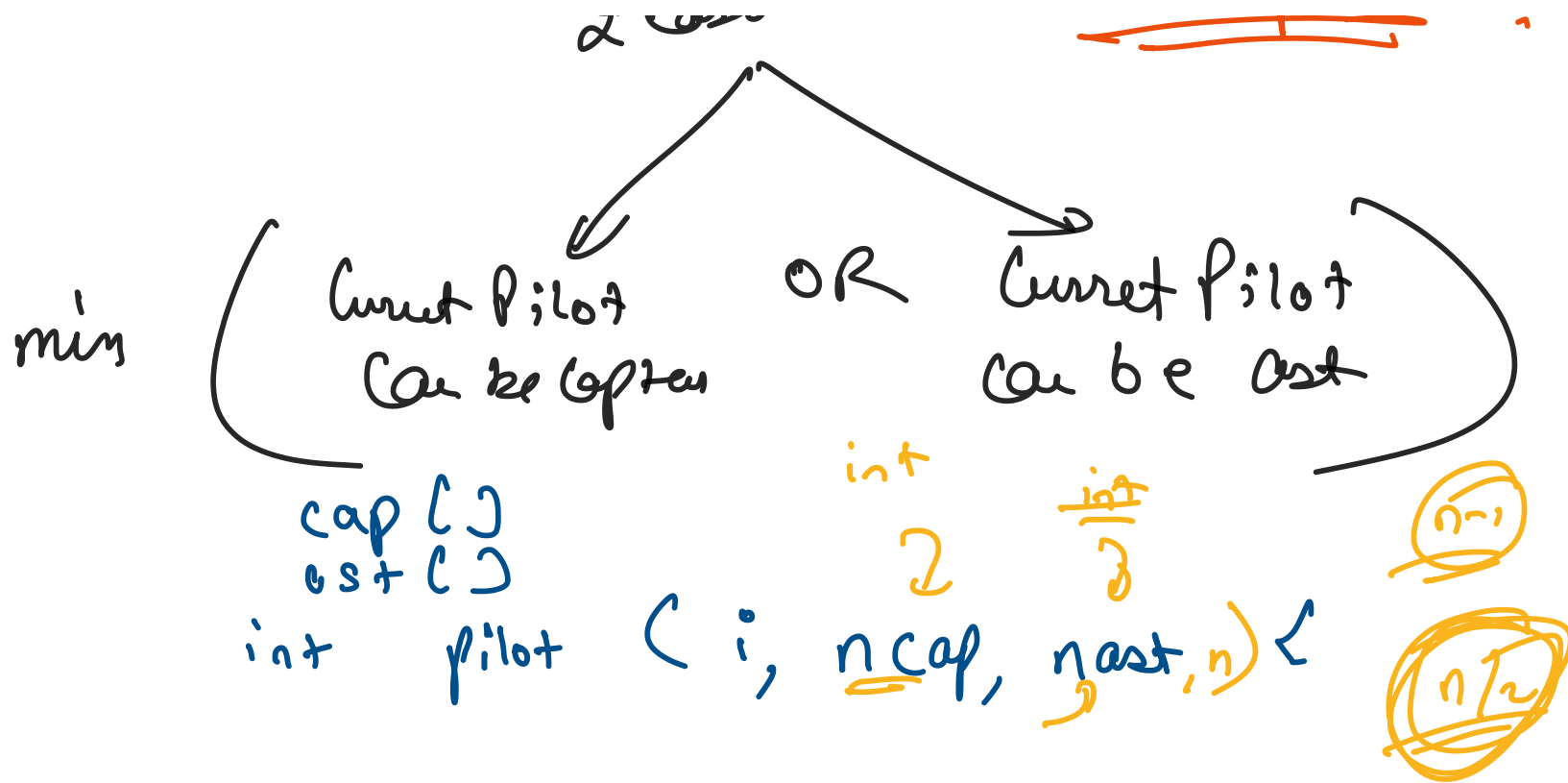
$p_a$	ast	$p_b$
$p_c$	ast	$p_o$

I will be the  
youngest any ad



a. ast

be copy day ?



```

if ( i == n ) set 0;
if ( nast == n/2 ) {
    → return cap(i) + pilot(i+1, ncap+1, ast, n)
}
else if ( nast == ncap ) {
    return ast(i) + pilot(i+1, ncap, ast+1, n)
}

```

} else {  
 return min ( 2 are  
     →  $[cap(i) + pilot(i+1, n, cap+1, ast, n)]$   
     →  $[ast(i) + pilot(i+1, n, cap, ast+1, n)]$   
 }

~~dp 3~~ →

MPILOT  
 ↓  
 SPOJ

sanket.singh @ codeblocks.com  
 →

