

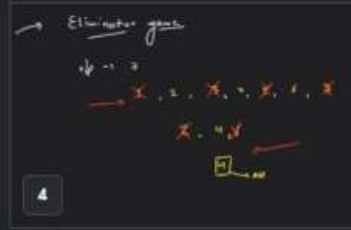
1

Solving Medium Level Questions - LIVE

2



3



4

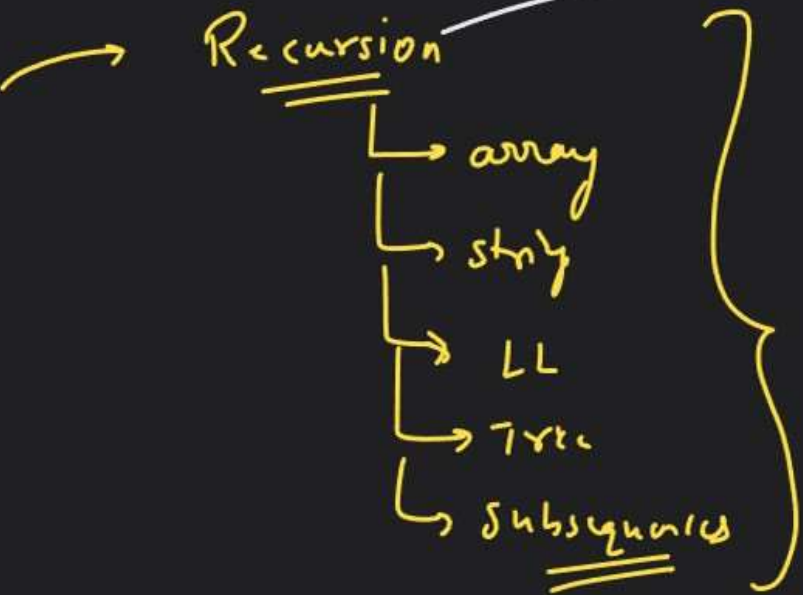


Annotations

On



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what is Recursion

Stack → Rec cell

Recursion tree

Dry Run



→ Elimination game

$n/p \rightarrow 7$

→ ~~1~~, 2, ~~3~~, 4, ~~5~~, 6, ~~7~~

~~2~~, 4, ~~6~~

4 → 4

← Slides

LIVE

2

Recursion
array
step
ll
node
Integer
Stack → list
Recursion tree
Dry run

3

Elimination game
→ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
→ 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
→ 4, 8, 16
→ 8
→ 4
→ 2
→ 1

4

→ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
→ 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
→ 4, 8, 16
→ 8
→ 4
→ 2
→ 1

5

→ 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20
→ 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
→ 4, 8, 16
→ 8
→ 4
→ 2
→ 1

Annotations

On



Love Babbar

^

v

4 / 45

$$n = \underline{\underline{14}}$$

~~1~~, 2, ~~3~~, 4, ~~5~~, 6, ~~7~~, 8, ~~9~~, 10, ~~11~~, 12, ~~13~~, 14

~~7~~, 4, ~~6~~, 8, ~~10~~, 12, ~~14~~

~~11~~, 8, ~~12~~

2 min

8 → 24

← Slides

3

4

5

6

Annotations

On

^

v

5 / 45

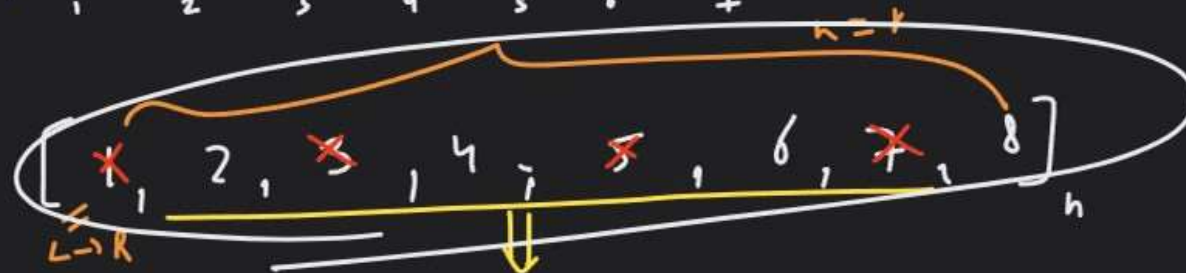


$n=8$

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

1, 2, 3, 4, 5, 6, 7, 8
0 1 2 3 4 5 6 7

$$f(n)_{L \rightarrow R} =$$



$\rightarrow [2, 4, 6, 8]$

$2 * [1, 2, 3, 4]_{R \rightarrow L}^{n/2}$

$$f(n)_{L \rightarrow R}$$

$$= 2 * [1, 2, 3, 4]_{R \rightarrow L}$$

$$= 2 * f\left(\frac{n}{2}\right)_{R \rightarrow L}$$



$$f(n) = 2 \star$$

$$f\left(\frac{n}{2}\right)$$

$$\left(\frac{n}{2}\right) \rightarrow 1$$

$$= 2 \star [1, 2, 3, \dots, \frac{n}{2}]$$

$$3 \rightarrow 1$$

$$= 2 \star \left[\frac{n}{2}, \dots, 3, 2, 1 \right]$$

$$= 2 \star [1, 2, 3, \dots, \frac{n}{2}]$$

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

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

← Slides

5

6

7

8

Annotations

On



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$$f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$$

← Slides

6 $f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$

7 $f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$

8 $f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$

9 $f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$

$f(n)_{L \rightarrow R} = 2^n \left[1 + \frac{h}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$

Annotations

On



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$$\begin{aligned}
 f(n)_{L \rightarrow R} &= [\cancel{x}, 2, \cancel{3}, 4, \cancel{x} \quad \quad \quad \cancel{x} \quad \quad \cancel{x}] \\
 f(\frac{n}{2})_{L \rightarrow R} &= [\cancel{x}, 2, \cancel{x}] \quad \quad \quad \cancel{x} \quad \quad \frac{n}{2} \\
 f(n)_{R \rightarrow L} &= [1, \cancel{2}, \cancel{3}] \quad \quad \quad \cancel{x} \quad \quad \cancel{x} \quad \quad \cancel{x}
 \end{aligned}$$

2/3

← Slides

7

$$f(n) = 2 * [1, 2, \dots, \frac{n}{2}]$$

8

$$f(n)_{L \rightarrow R} = 2 * [1, 2, \dots, \frac{n}{2}]$$

9

$$f(n) = [1, 2, 3, \dots, n]$$

10

$$f(n)_{L \rightarrow R} = [1, 2, 3, \dots, n]$$

$$f(n)_{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

$$f(n)_{R \rightarrow L} = 2 * [\frac{n}{2}, \dots, 1]$$

Annotations

On



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8

9

10

11

Annotations

On

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soln()

i/p $\rightarrow n$

$f(n)$
L \rightarrow R

$\rightarrow [1, 2, 3, \dots, n]$

$f(n)$
L \rightarrow R

$n = 8$

$[1, 2, 3, 4, 5, 6, 7, 8]$

$f(n)$
L \rightarrow R

2

$[2, 4, 6, 8]$

$f(n)$
L \rightarrow R

2

$[2]$

$[1, 2, 3, 4]$

$f(4)$

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, 4]$$

$$f \frac{(n)}{L \rightarrow R} = 2 * f \frac{(n/2)}{R \rightarrow L}$$

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

$$= 2 * [\frac{n}{2}, \dots, 3, 2, 1]$$

← Slides

9

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

10

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

11

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

12

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

$$f \frac{(n)}{L \rightarrow R} = 2 * [1, 2, 3, \dots, \frac{n}{2}]$$

Annotations

On



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$$f(n)_{L \rightarrow R} = 2 * \left[1 + \frac{n}{2} - f\left(\frac{n}{2}\right)_{L \rightarrow R} \right]$$

Cuda

```

int solu (int n)
{
    // B.C
    if (n == 1) return n;
    return 2 * [ 1 + n/2 - solu(n/2) ];
}

```

[L]

← Slides

11

$$f(n)_{L \rightarrow R} = 2 * [1 + \frac{n}{2} - f(\frac{n}{2})_{L \rightarrow R}]$$

12

$$f(n)_{L \rightarrow R} = 2 * [1 + \frac{n}{2} - f(\frac{n}{2})_{L \rightarrow R}]$$

13

$$f(n)_{L \rightarrow R} = 2 * [1 + \frac{n}{2} - f(\frac{n}{2})_{L \rightarrow R}]$$

14

$$f(n)_{L \rightarrow R} = 2 * [1 + \frac{n}{2} - f(\frac{n}{2})_{L \rightarrow R}]$$

$$f(n)_{L \rightarrow R} = 2 * [1 + \frac{n}{2} - f(\frac{n}{2})_{L \rightarrow R}]$$

Annotations

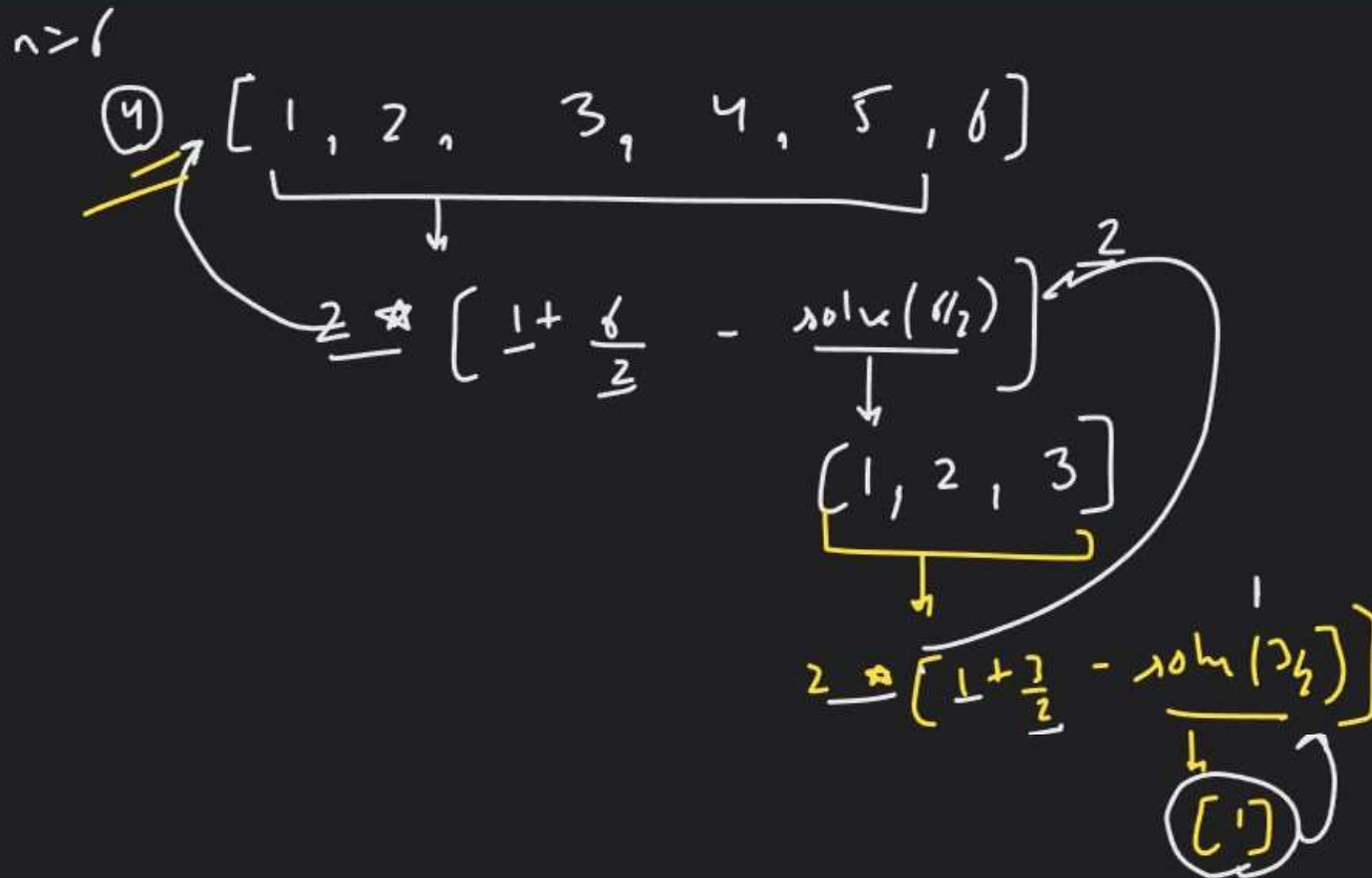
On



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12 $f(n) = 2 * \left[1 + \frac{n}{2} - \text{solve}(n_2) \right]$

13 $f(n) = 2 * \left[1 + \frac{n}{2} - \text{solve}(n_2) \right]$

14 $f(n) = 2 * \left[1 + \frac{n}{2} - \text{solve}(n_2) \right]$

15 $f(n) = 2 * \left[1 + \frac{n}{2} - \text{solve}(n_2) \right]$

$f(n) = 2 * \left[1 + \frac{n}{2} - \text{solve}(n_2) \right]$

13

$$\text{if } \left\{ \begin{array}{l} \text{if } \{ \dots \} \\ \text{if } \{ \dots \} \end{array} \right\} \text{ then } 2 * \left[1 + \frac{2}{2} - \text{solu}(\frac{2}{2}) \right]$$

14

$$\text{if } \left\{ \begin{array}{l} \text{if } \{ 1, 2, 3, 4, 5, 6 \} \\ \text{if } \{ 1, 2, 3 \} \end{array} \right\} \text{ then } 2 * \left[1 + \frac{2}{2} - \text{solu}(\frac{2}{2}) \right]$$

15

$$\text{if } \left\{ \begin{array}{l} \text{if } \{ \dots \} \\ \text{if } \{ \dots \} \end{array} \right\} \text{ then } 2 * \left[1 + \frac{2}{2} - \text{solu}(\frac{2}{2}) \right]$$

16

$$\text{if } \left\{ \begin{array}{l} \text{if } \{ \dots \} \\ \text{if } \{ \dots \} \end{array} \right\} \text{ then } 2 * \left[1 + \frac{2}{2} - \text{solu}(\frac{2}{2}) \right]$$

Predict the Winner

$$\text{if } \left\{ \begin{array}{l} \text{if } \{ \dots \} \\ \text{if } \{ \dots \} \end{array} \right\} \text{ then } 2 * \left[1 + \frac{2}{2} - \text{solu}(\frac{2}{2}) \right]$$

Annotations

On

$$\text{solu}(7) = [\cancel{1}, \cancel{2}, \cancel{3}, 4, \cancel{5}, \cancel{6}, \cancel{7}]$$

↓

$$2 * \left[1 + \frac{2}{2} - \text{solu}\left(\frac{7}{2}\right) \right]$$

↓

$$[1, 2, 3]$$

↓

$$2 * \left[1 + \frac{2}{2} - \text{solu}\left[\frac{3}{2}\right] \right]$$

↓

$$[1]$$

↓

$$4$$

$$1 + \frac{2}{2} - 1 = 1$$

$n=6$

$$f(n)_{L \rightarrow R} = [\cancel{1}, 2, \cancel{3}, 4, \cancel{5}, 6]$$

jabardast
→ elim. hmm

$L \rightarrow R$
 $R \rightarrow L$

$$f(n)_{L \rightarrow R} = [2, 4, 6]$$

$$f(n)_{L \rightarrow R} = 2 * [1, 2, 3]$$

was recursion

$$f(n)_{L \rightarrow R} = 2 * f(n/2)_{R \rightarrow L}$$

14

15

16

17

Annotations

On



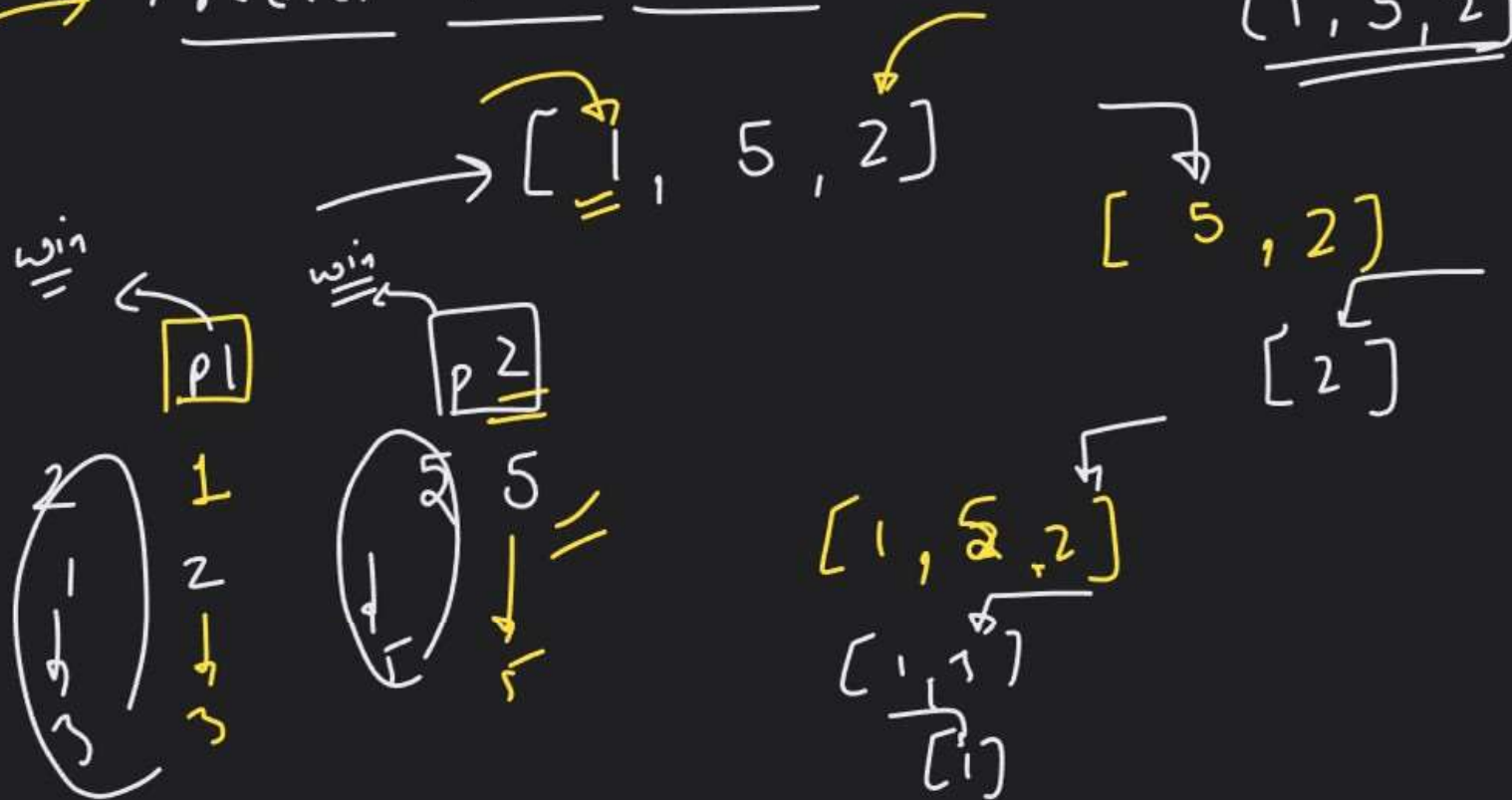
Love Babbar

^

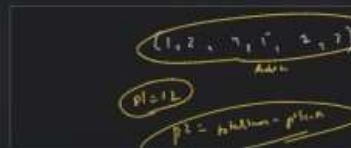
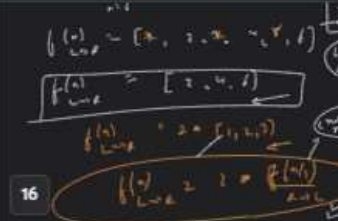
v

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Predict the Winner



← Slides



Annotations

On



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p1

p2

i) $\boxed{1}, 2, 4, 7, \boxed{5}$ $i-1$
num

$\boxed{1}$

4

i

2, 4, 7, 5, $\boxed{3}$

j

$i+1$ $j-1$ j
 $\boxed{2}$ 4, 7, 5, $\boxed{3}$

p2

$(i+2, j) -$
 $(i+1, j-1) -$

$$\text{int } \underline{op1} = \text{num}[i] + \min(\text{soln}(i+2, j), \text{soln}(i+1, j-1))$$

$$\text{int } \underline{op2} = \text{num}[j] + \min(\text{soln}(i, j-2), \text{soln}(i+1, j-1))$$

$$\text{int } \underline{pLscore} = \max(op1, op2);$$

16

17

18

19

Annotations

On

^

v

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$[1, 2, 9, 5, 7, 2]$

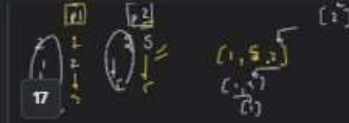
Archer 1

$$p1 = 12$$

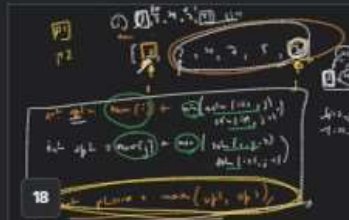
$$p2 = \text{total sum} - p1 \text{ score}$$

← Slides

17



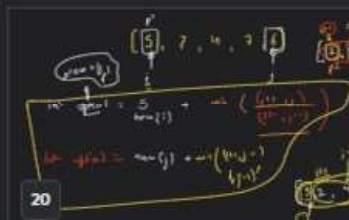
18



19



20



21



Annotations

On

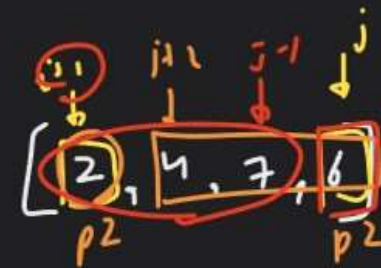
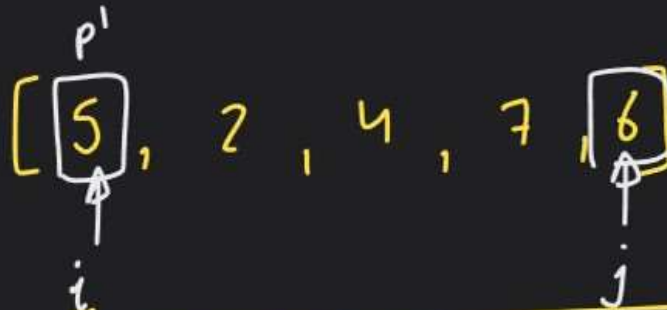


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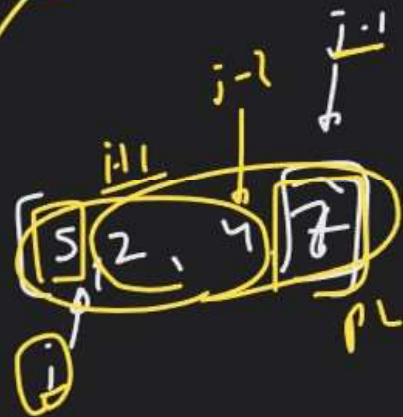
19 / 45

plow 0, 1



$$\text{in } \text{option1} = \text{num}[i] + \min \left(\frac{(i+2, j)}{(i+1, j-1)} \right)$$

$$\text{in } \text{option2} = \text{num}[j] + \min \left(\frac{(i+1, j-1)}{(i, j-2)} \right)$$



18

Handwritten notes and diagrams for slide 18, including a recursive formula and a diagram of an array.

19

Handwritten notes and diagrams for slide 19, including a diagram of an array and a formula.

20

Handwritten notes and diagrams for slide 20, including a diagram of an array and a play button icon.

21

Handwritten notes and diagrams for slide 21, including a diagram of an array and a play button icon.

Handwritten notes and diagrams for slide 22, including a diagram of an array and a play button icon.

Annotations

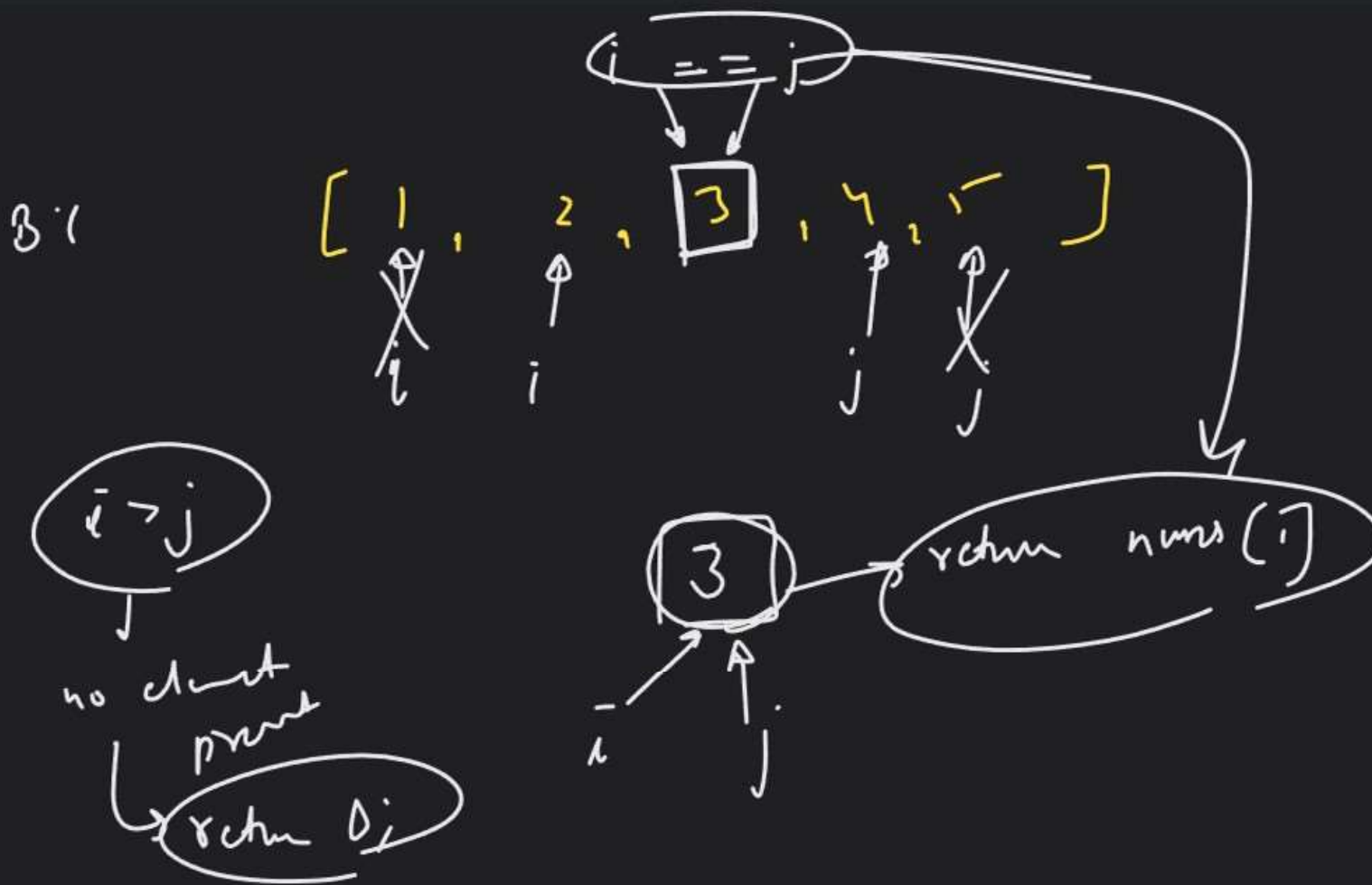
On



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← Slides

19

20

21

22

Annotations

On

21 / 45

B.C

no element present →

if ($i > j$)
return 0;

single element present =

if ($i == j$)
return num[i];
p

← Slides



Annotations On

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arr \rightarrow [5, 3, 7, 10]

← Slides



22

Handwritten text: no closed point \rightarrow if $(i > j)$ return 0
single closed point \rightarrow if $(i = j)$ return 0

arr \rightarrow [5, 3, 7, 10]



23



Handwritten text: [1, 1, 1, 1]
[1]

Annotations

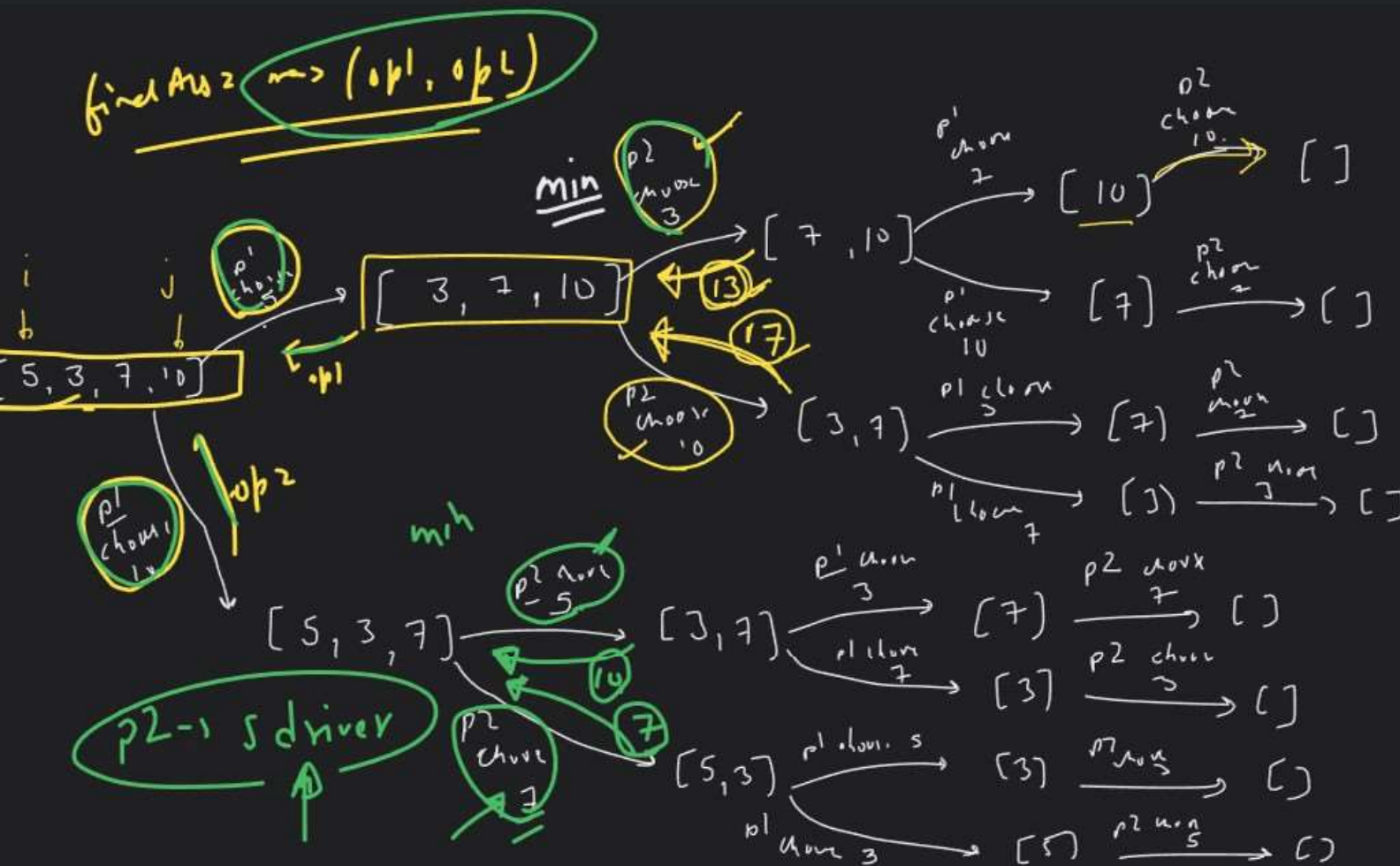
On



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22

ans $\rightarrow [5, 3, 7, 10]$

23



24



25

Annotations

On

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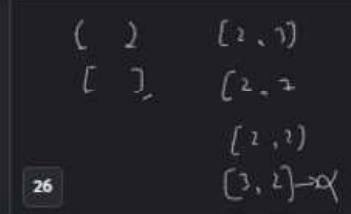
23



24



25



26



Annotations

On



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Handwritten notes on a dark background:

- Top left: i
- Top middle: $[\quad]$ with indices i and j and a double-headed arrow between them.
- Top right: $[\quad]$ with j and i inside, circled.
- Middle left: $\frac{(x \quad y)}{x < y}$
- Middle middle: $[\quad]$ with $i = j$ below it.
- Middle right: $i > j$
- Bottom right: A circle containing the text "Invalid keys" with an arrow pointing down to "no" and a checkmark.

$[2, 3]$
$$[2, 7]$$
$$[2, 2]$$
$$[3, 2] \rightarrow \alpha$$
[illegible]

$\frac{(x+1)}{x < 0}$

26

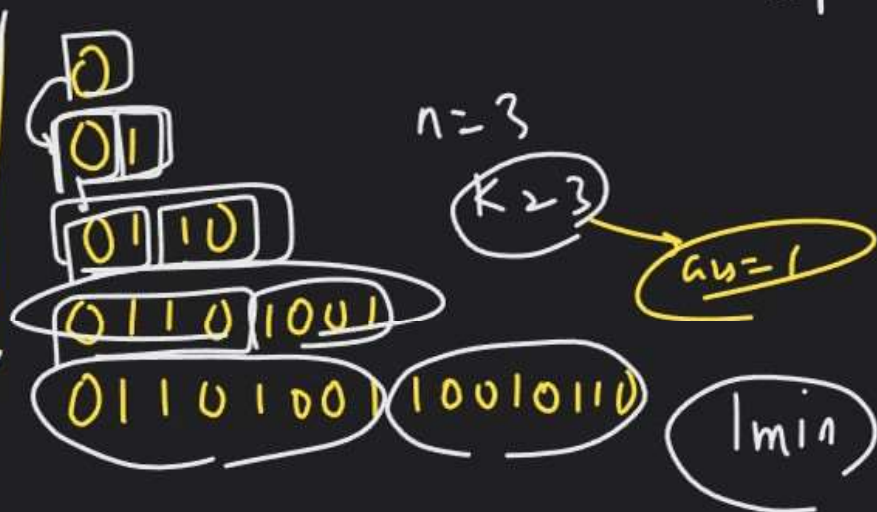
[illegible]

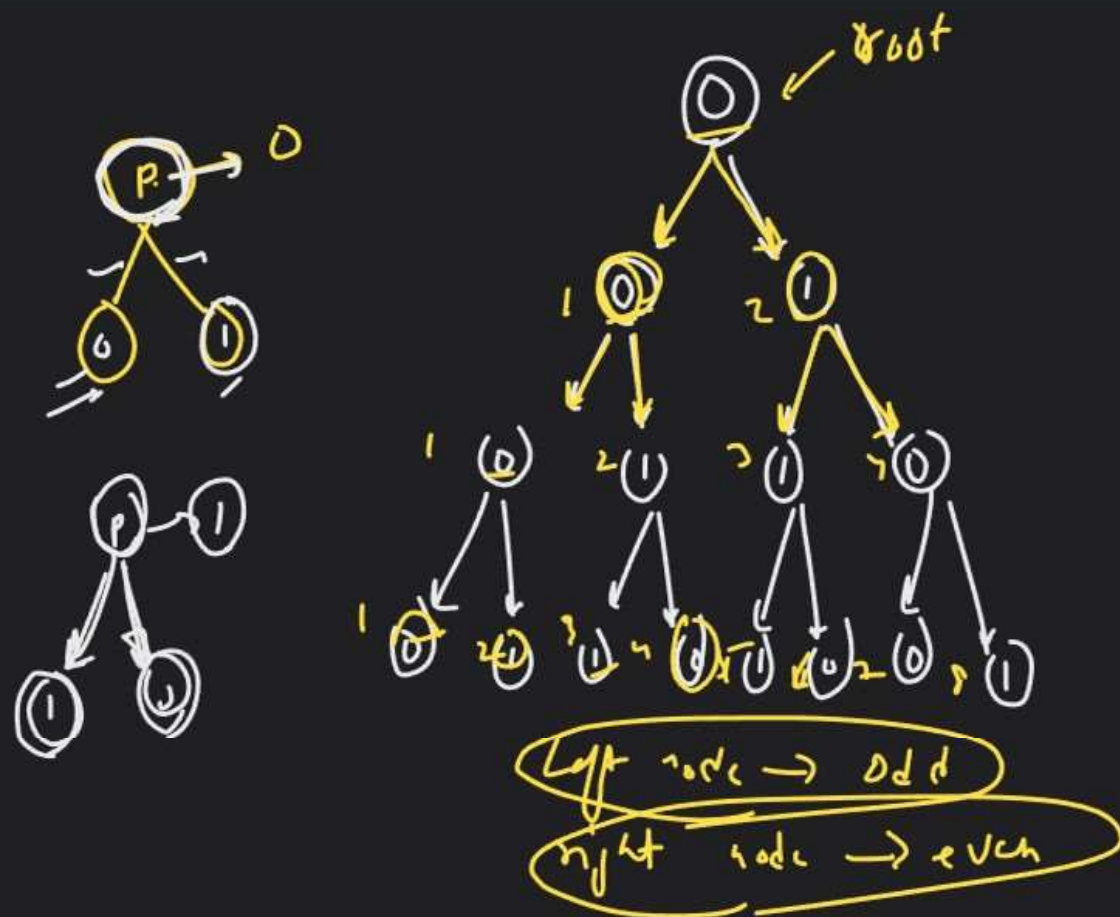
On

Observation

$$i/p \rightarrow \frac{n^3}{\text{row}}, \quad \begin{matrix} K \\ \downarrow \\ \text{digit} \end{matrix}$$

I 1^{st} row \rightarrow 0
II 11^{th} \rightarrow 01
III \rightarrow 0111
IV \rightarrow 01101001
V \rightarrow 011010011001





~~$n/1/k$~~ k^{th} symbol

2 factors

↳ parent of K

↳ $K \rightarrow \text{win/odd}$

26

$[2, 2]$
 $[3, 2] \rightarrow \infty$

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k^{th} symbol in grammar

$1/p \rightarrow a^k + K$

$1/p \rightarrow a^k + K$

$1/p \rightarrow a^k + K$

$1/p \rightarrow a^k + K$

28

Handwritten diagram showing a binary tree structure with nodes 0 and 1, and a play button icon.

29

$k = 2$

$k = 2$

$k = 2$

$k = 2$

Annotations

On

Handwritten text: if $(k \text{ prime} = 0 \ \& \ K \text{ is even})$ then $a = 1/k$; if $(k \text{ prime} = 0 \ \& \ K \text{ is odd})$ then $a = 1/k$.

if ($K_{\text{parent}} = 0$ & K is even)
ans is 1

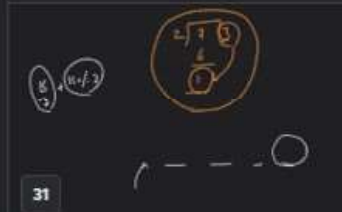
if ($K_{\text{parent}} = 0$ & K is odd)
ans is 0

if ($K_{\text{parent}} = 1$ & K is even)
ans is 0

if ($K_{\text{parent}} = 1$ & K is odd)
ans is 1



← Slides



Annotations

On

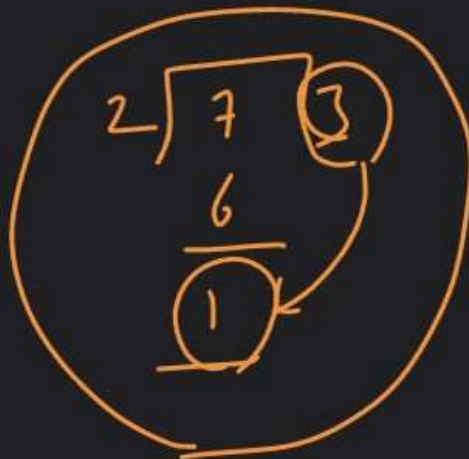


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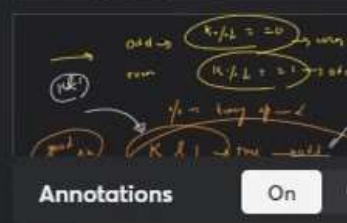
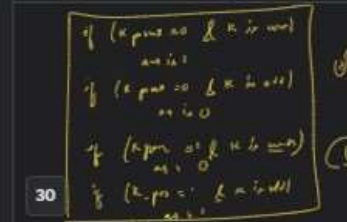


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$$\left(\frac{K}{2}\right) + \left(K \cdot \frac{1}{2}\right)$$



← Slides



Annotations

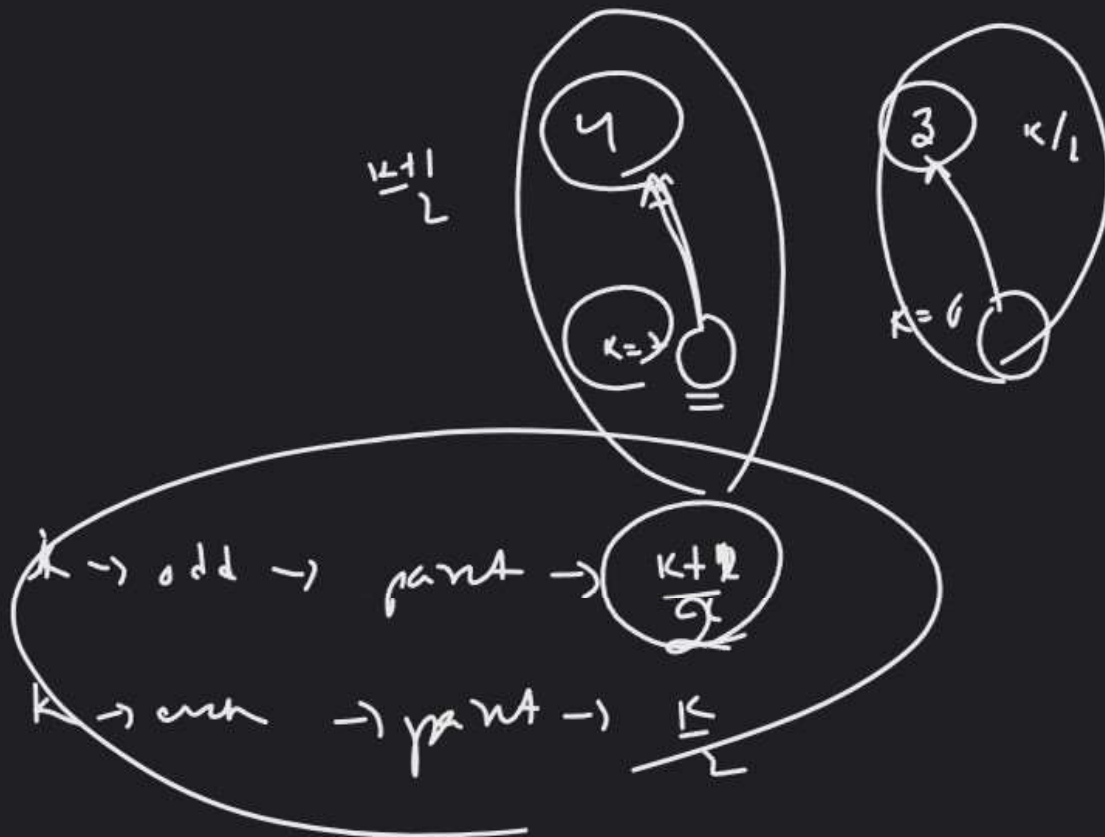
On



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← Slides

30

Handwritten notes on a slide, including mathematical expressions and a small diagram.

31

Handwritten notes on a slide, including a diagram with a circle and arrows.

32

Handwritten notes on a slide, including a diagram with a circle and arrows.

33

Handwritten notes on a slide, including a diagram with a circle and arrows.

Handwritten notes on a slide, including a diagram with a circle and arrows.

Annotations

On

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Love Babbar



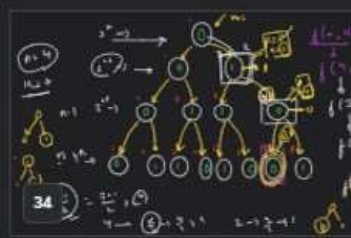
31



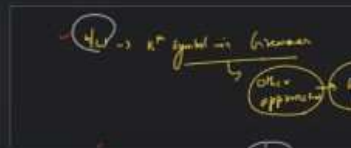
32



33



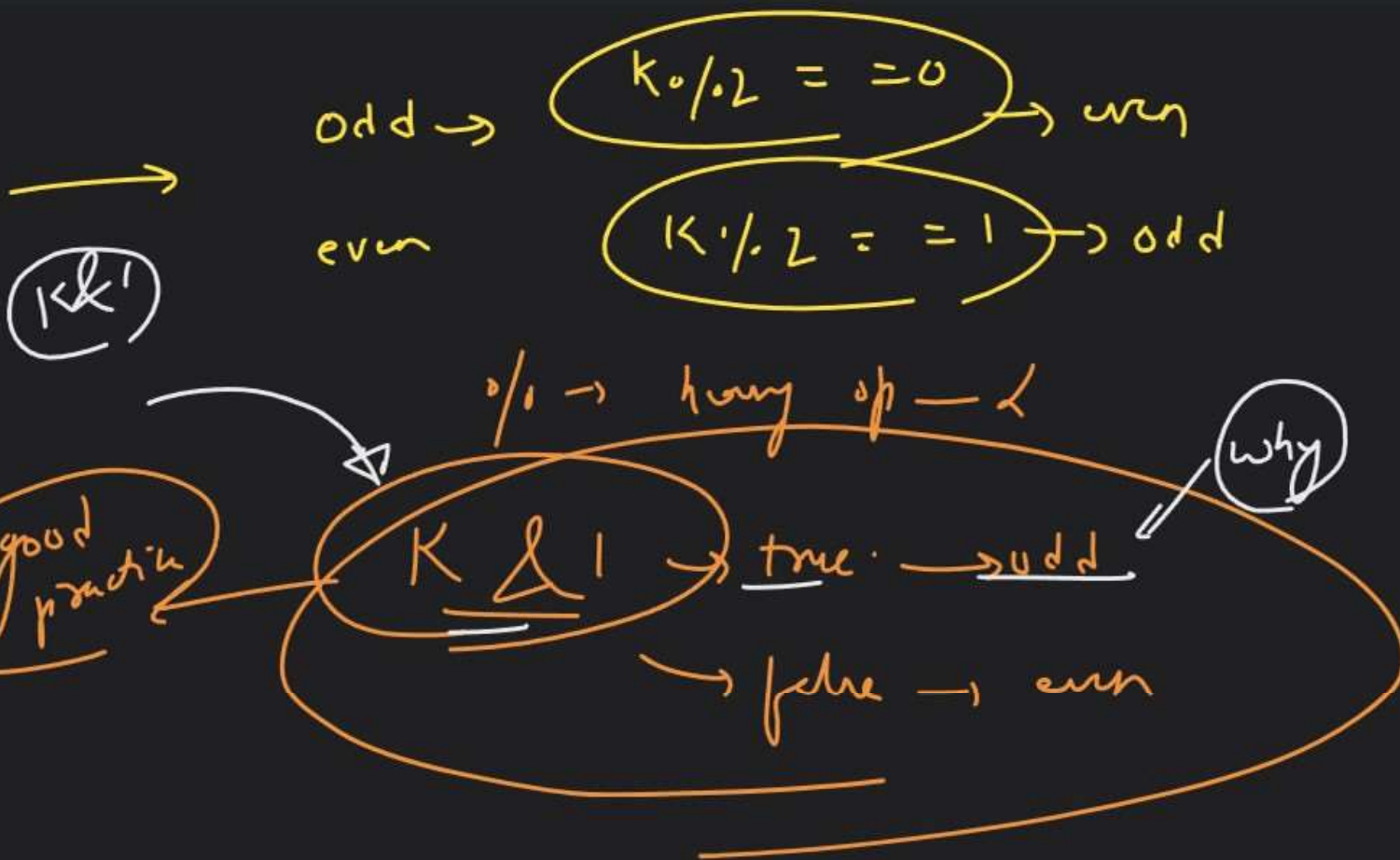
34

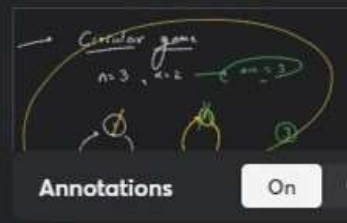
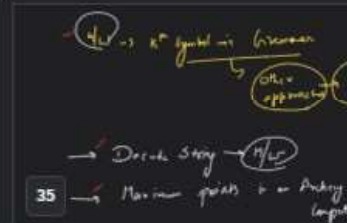
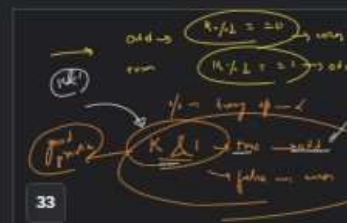
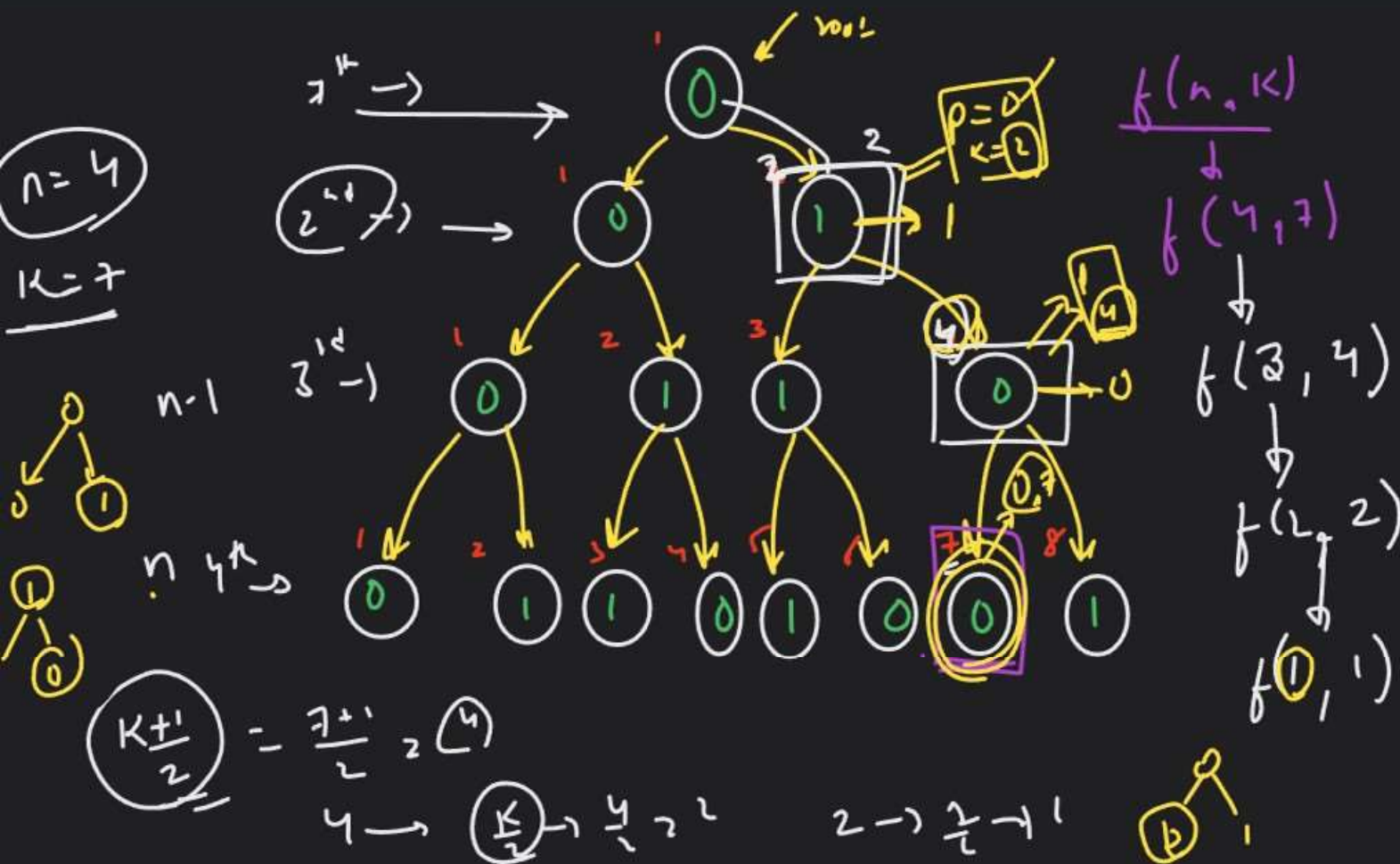


Annotations

On

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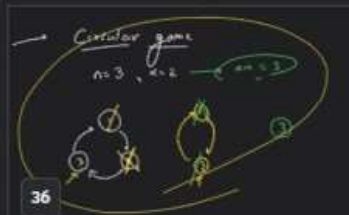
✓ H/W \rightarrow K^{th} symbol in Grammar

other approach \rightarrow H/W

\rightarrow Decode String \rightarrow H/W

\rightarrow Maximum points in an Archery Competition \rightarrow H/W

← Slides



Annotations

On

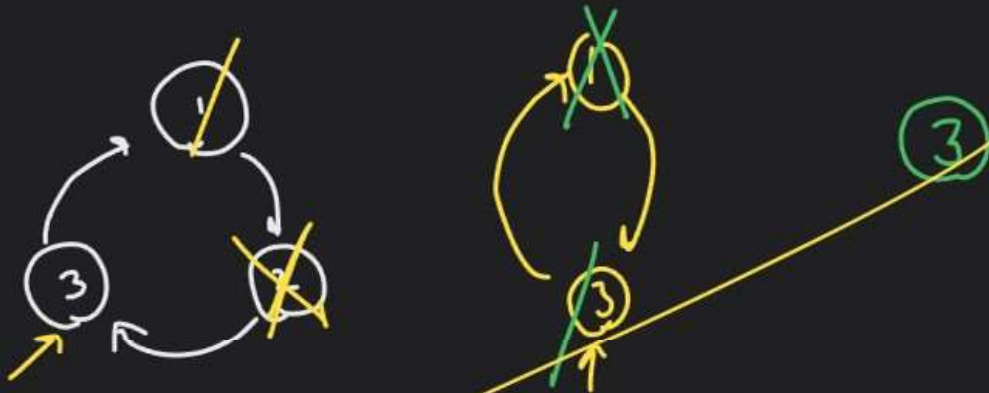


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Circular game

$$n=3, k=2$$
$$a_4 = 3$$


← Slides



4. - 2. Symbol ist Gravim

→ Date & String → $\frac{17}{15}$

35 \rightarrow Maximum points is a strictly longest



37

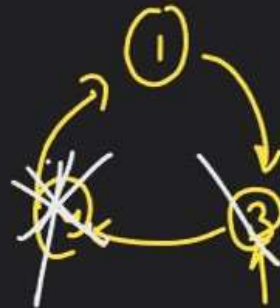


Annotations

On

$n=4, k=2$

$ans = 1$



1

← Slides

→ Delete String → $M \rightarrow$
35 → Maximum points to be picked (longest)

→ Corridor game
 $n=3, k=2 \rightarrow ans=3$
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$n=2, k=2 \rightarrow ans=2$
38

$n=6, k=2 \rightarrow ans=3$

Annotations

On

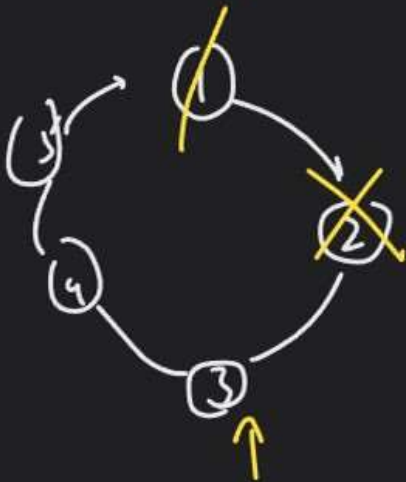


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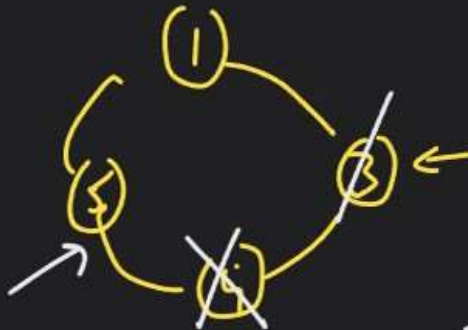


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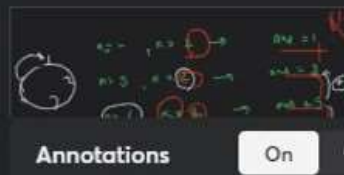
$n = 5, k = 2 \rightarrow a_4 = 3$



3



← Slides



Annotations

On

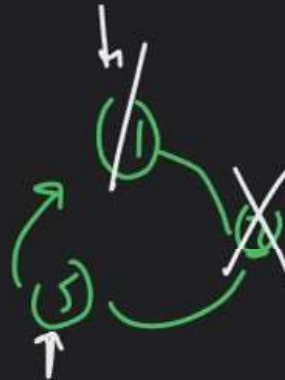
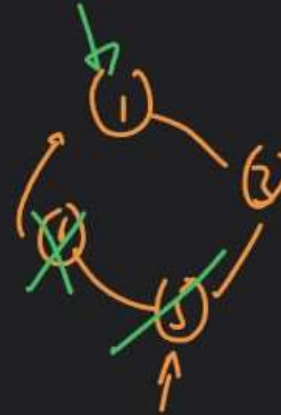
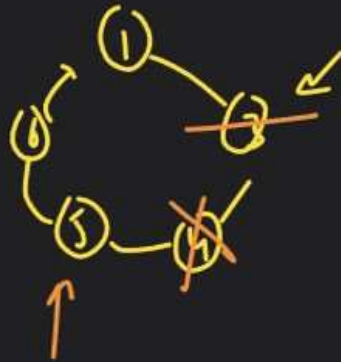


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$n = 6, K = 2 \rightarrow \text{ans} = 5$



← Slides



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38



39



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Annotations On



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$n=4, k=2 \rightarrow$

$n=5, k=2 \rightarrow$

$n=6, k=2 \rightarrow$

$n=7, k=2$
 $n=1, k=1$
 $f(n, k)$

$ans = 1$
 $if (n == 1) \text{ return } 0;$

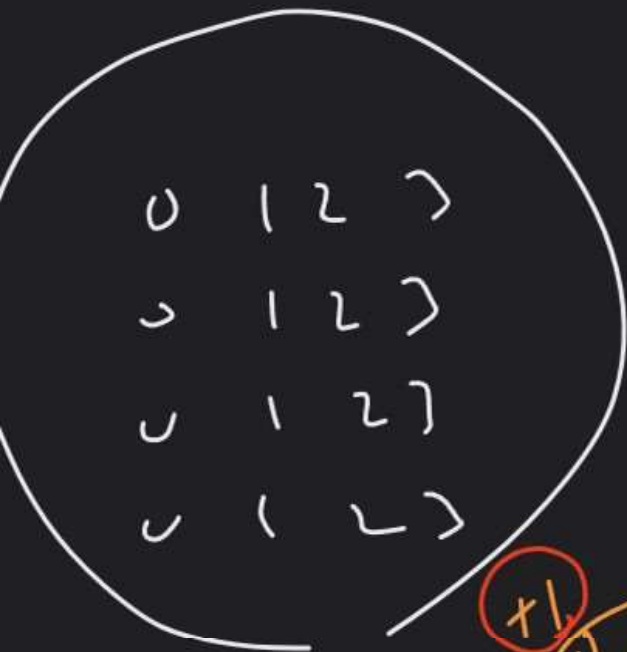
$ans = 3$
 $+2 + k$

$ans = 5$

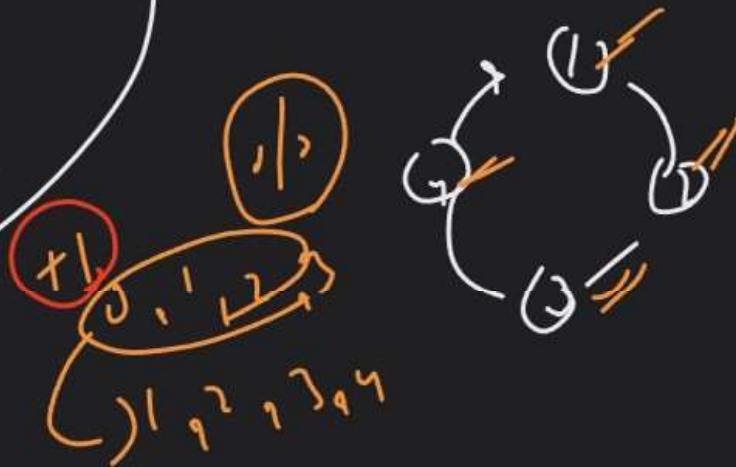
$f(n-1, k) + 1$

← Slides

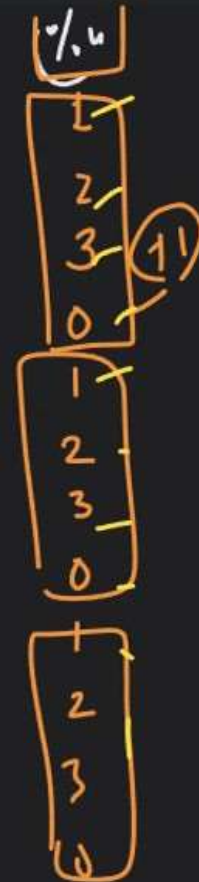




1 2 3 4
12 37
12 37



n: 1
2
3
4
5
6
7
8
9
10
11
12



← Slides

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39

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41

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Annotations

On

^

v

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← Slides

$n=4, K=2 \rightarrow$
 $n=5, K=2 \rightarrow$
 $n=6, K=2 \rightarrow$
 $n=7, K=2 \rightarrow$
 $n=8, K=2 \rightarrow$

Diagrams illustrating the construction of a circular linked list for $n=8$ and $K=2$. The nodes are numbered 1 through 8. The list is constructed by linking nodes in a circular fashion, with the head node being 1. The diagram shows the nodes arranged in a circle, with arrows indicating the next node in the sequence. The final state shows all 8 nodes linked in a circular fashion, with node 1 as the head.

$$\underline{f(n, k)}$$

$$\underline{f(n-1, k) + k}$$

$$f(4, 2) \rightarrow$$

$$f(3, 2) + k$$

← Slides

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Annotations

On



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```

int solve ( int n, int k)
{
    if (n == -1) return 0;
    return (solve(n-1, k) + k) * n;
}

```

```

int main ()
{
    return solve(n, k) + 1;
}

```

Diagram showing the return value of `solve(n, k)` is boxed and labeled with a '2', and the final result is labeled with a '3'.

Handwritten diagram showing the function call `f(4, 2)` and a return value of `ans`.

← Slides

Slide 41: Handwritten notes showing a sequence of numbers and a diagram of a tree structure.

Slide 42: Handwritten notes showing a sequence of numbers and a diagram of a tree structure.

Slide 43: Handwritten notes showing a sequence of numbers and a diagram of a tree structure.

Slide 44: Handwritten notes showing a sequence of numbers and a diagram of a tree structure.

Annotations

On



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