

## Recursion 4

Ques Find first index

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

↗ 4      0  
 ↗ 1      1  
 ↗ 10     -1

Expectation

$f_i(\text{arr}, \frac{\text{val}}{4}, 0)$

↗ 0

Faith

$f_i(\text{arr}, \frac{\text{val}}{4}, 1)$   
↗ 6

Combine

```
if (arr[idx] == val)
    return idx;
else
    return f_i(arr, val, idx + 1)
```

Ques  $l_i(\text{arr}, \text{val}, \text{arr}.l - 1)$

Last index



Start in reverse

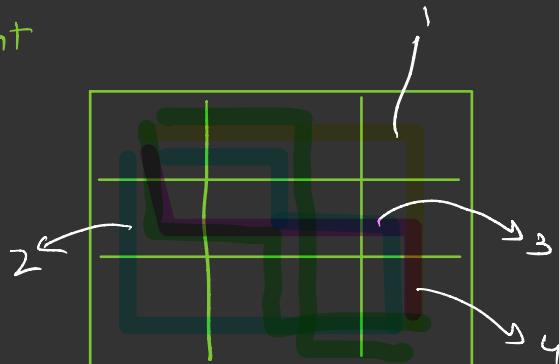
Ques. Maze Path

Count

V (D)

H (R)

top left  $(0,0)$   
to  
bottom right



RRDD

DDR

RDRD

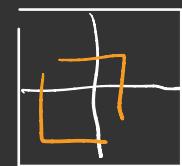
D RRD

RDDR

DRDR



$\Rightarrow 6$



$\Rightarrow \textcircled{2}$

2 Directions  $\Rightarrow$  Right + Down

1	2	3	1
6	3		1
4	5	6	1
3	2		1
7	8	9	
1	1	1	1

Count Many Path ( int arr[ ][ ], int sr, int c )

Expectation

Count Many path (arr, 0, 0)

$\Rightarrow 6$

Faith

Count MP (arr, 0, 1)

$\Downarrow$

Count MP (arr, 1, 0)

$\Downarrow$

Combine

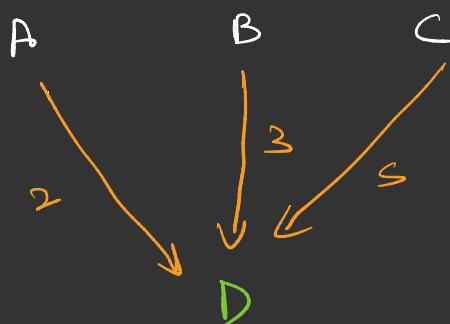
int aR = Count MP (arr, 0, 1)  
int aD = Count MP (arr, 1, 0)  
return aR + aD;

MP (arr, sr, c+1)  
MP (arr, sr+1, c)

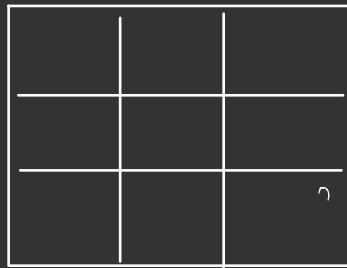
S - D

$\Rightarrow 2 + 3 + 5$

$\Rightarrow 10$



# Ques Print Many Paths



R R DD

R DRD

R DDR

D RRD

D RDR

D DRR

- ① Pass psf in parameter

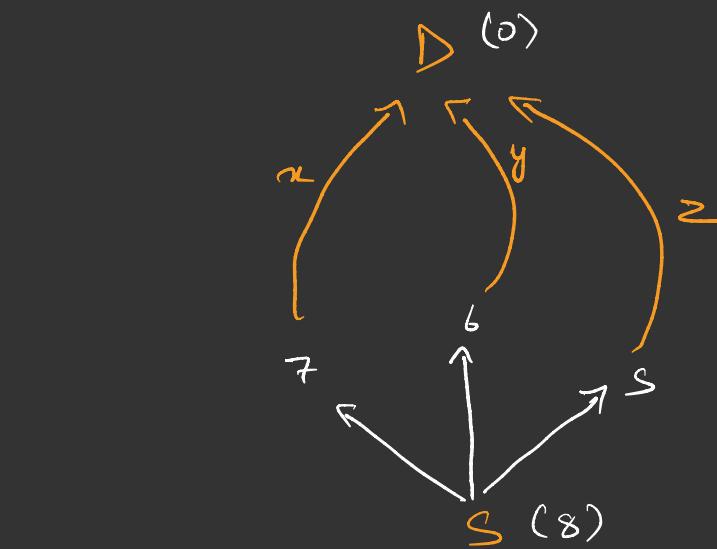
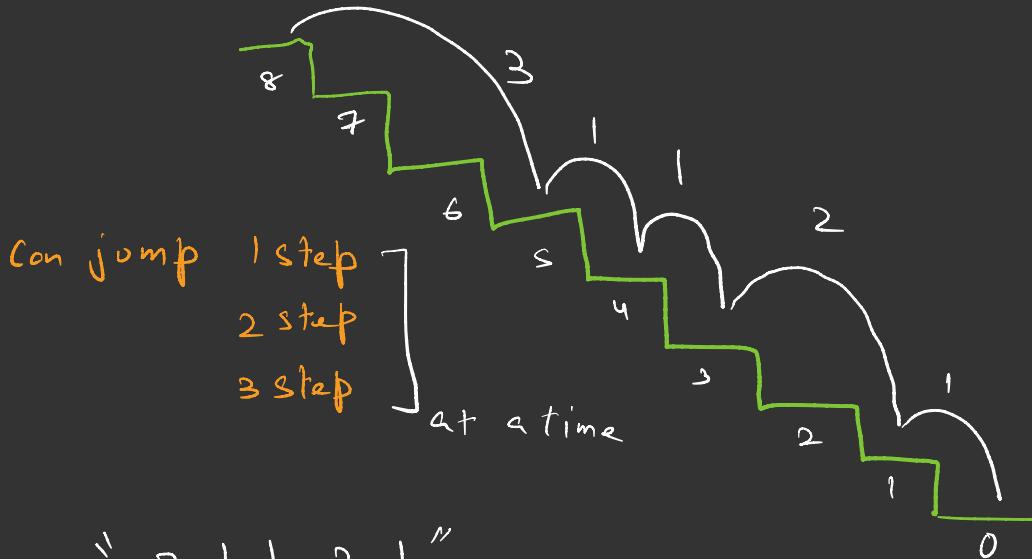
P R C

P	R	C
RRDD	2	2
RRD	1	2
"RR"	0	2
"R"	0	1
**	0	0

pMP (mazg, psf + 'R', r, c+)

pMP (mazg, psf + 'D', r+1, c)

# Ques Stair Paths



total ways  
from source  
to Destination

$$x + y + z$$

Expectation

Faith

no  $8 \rightarrow 0$

7  $\rightarrow 0$

6  $\rightarrow 0$

5  $\rightarrow 0$

Count StairPaths(int n) {

CSP

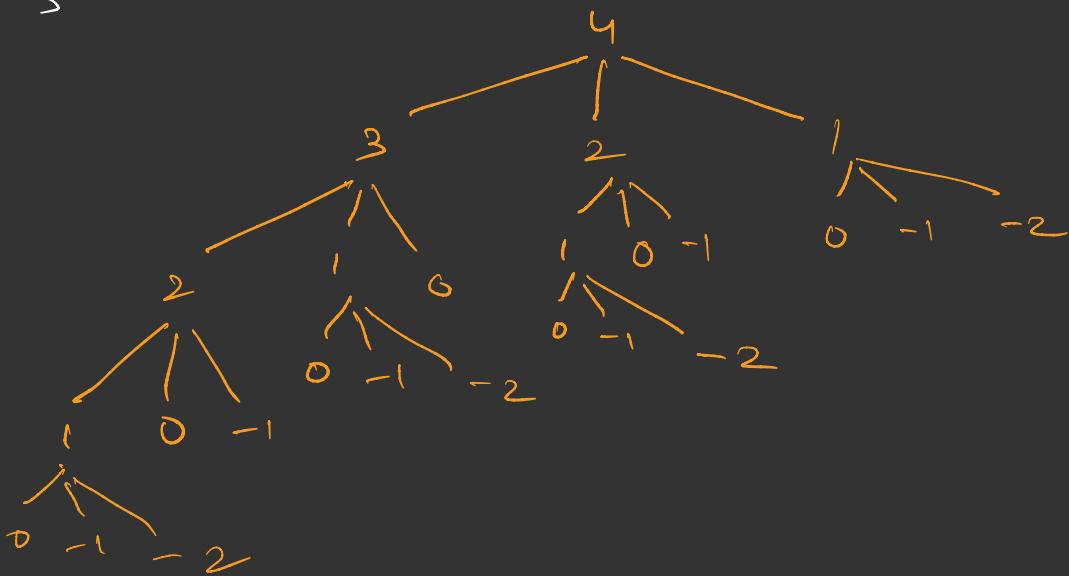
x = CSP(n - 1);

y = CSP(n - 2);

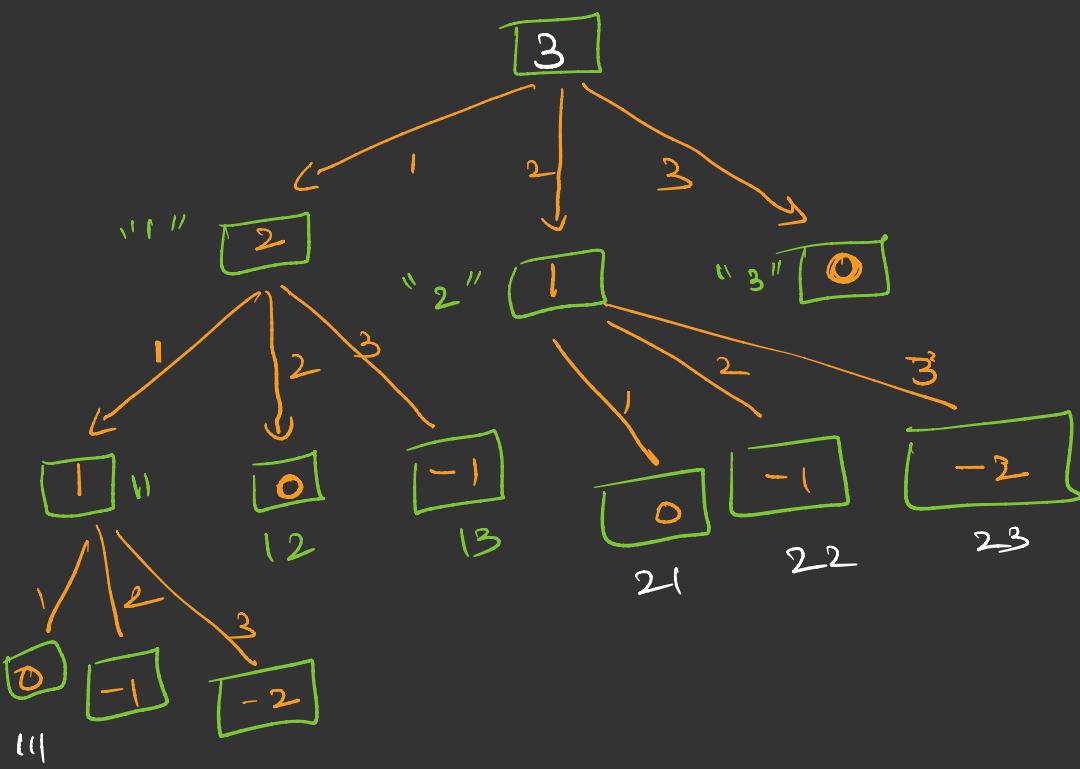
z = CSP(n - 3);

return x + y + z;

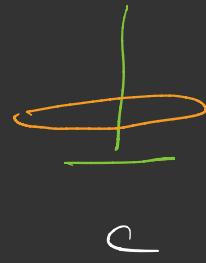
}



Ques Paint all the stair paths



Ques Tower of Hanoi  
Paint the path to move n disks  
from S to D



$\text{toh}(\text{int } n, \text{char } S, \text{char } D, \text{char } H)$

Expectation

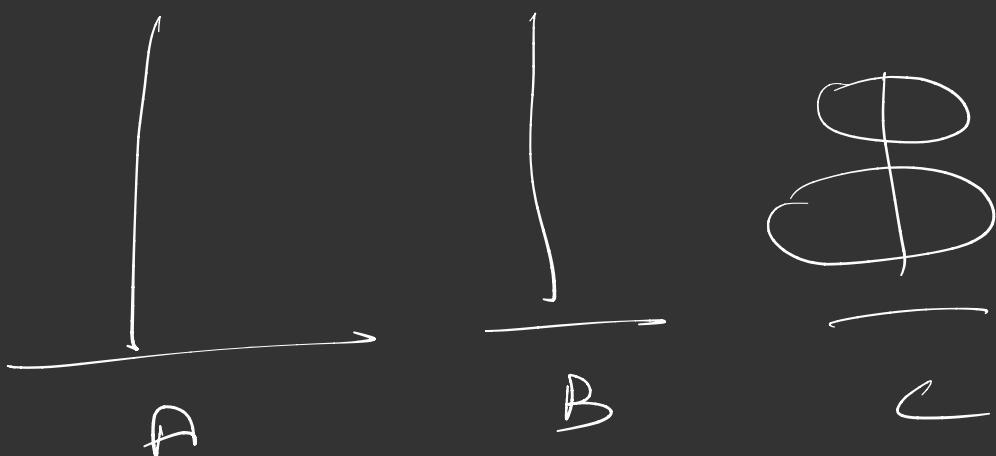
$n \Rightarrow S \rightarrow \text{toh } D, \text{ using } H$

'if ( $n == 0$ ) return;

$\text{toh}(n-1, S, H, D)$

Sysd ("nth disk is moved from S to D")

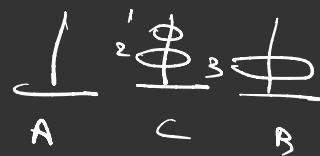
$\text{toh}(n-1, H, D, S)$



move 1 from A to B

move 2 from A to C

move 1 from B to C



S      D      H  
 1      2      3

$\text{tah}(n-1, S, H, D)$

Step 3: nth disk is moved from S to D

$\text{tah}(n-1, H, D, S)$

Console

disk	S	D
1	A	B
2	A	C
1	B	C
3	A	B

