L59
Continuing Recursion: Backtracking

Join Discord - https://bit.ly/ly-discord

RECAP

A couple of recursion &
backtracking classes, will begin
with DP after that.

[1, 2] → {1} {1, 2}, {2}, {}

[5] → {5} {}

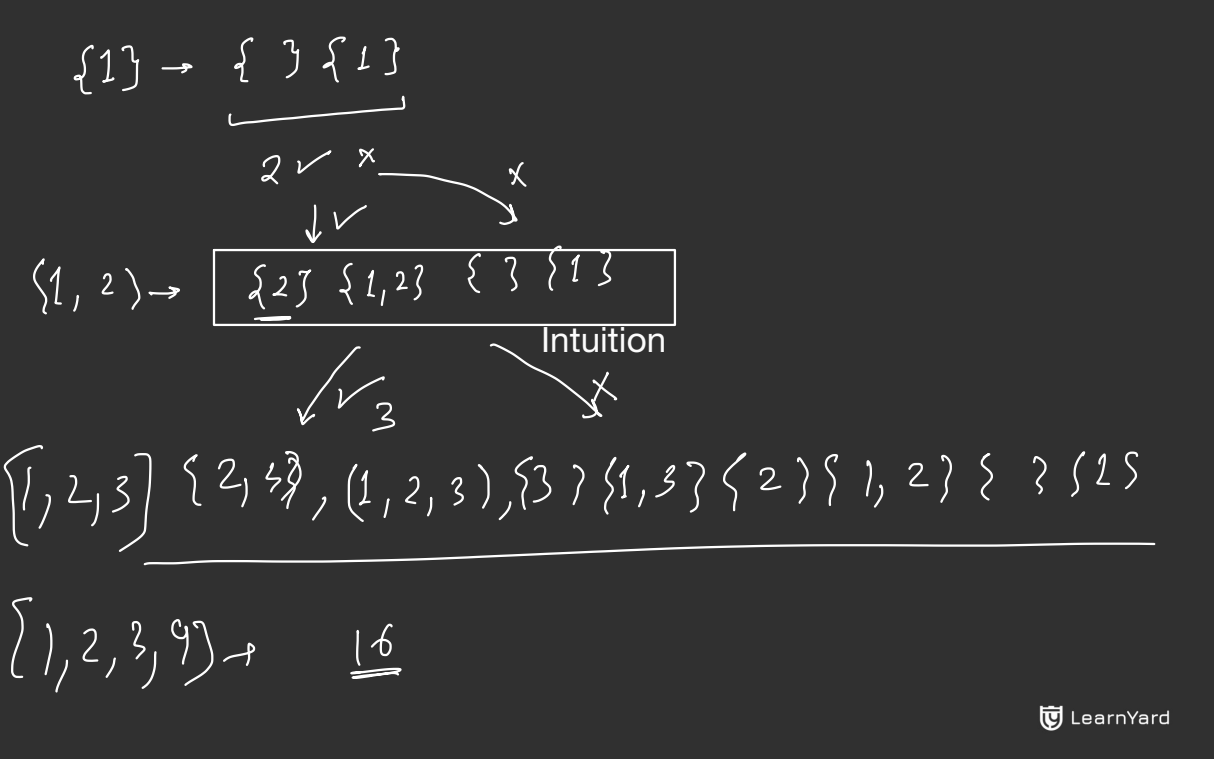
{1, 2, 3} → {1}, {2}, {3}, {1, 2}, {1, 3}, {2, 3}, {1, 2, 3}, {}

1. The subset problem

~~[5]~~ →

[1, 2, 3, 4, 5] → 2^5 2^n

LearnYard



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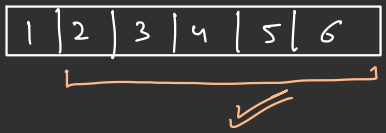
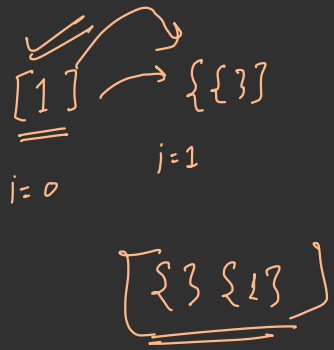
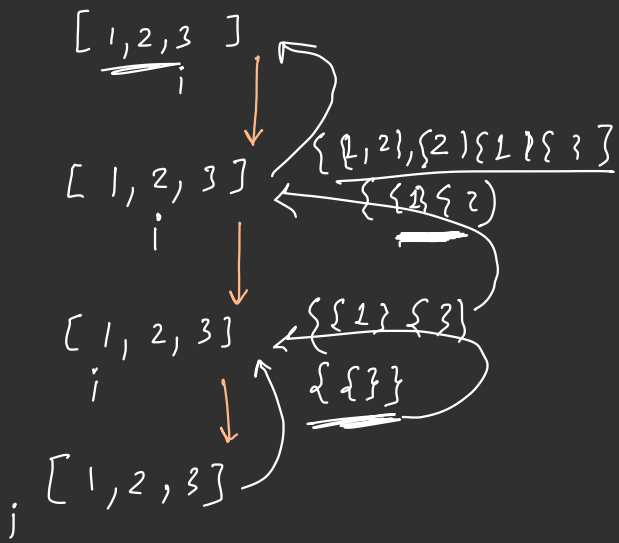




Solution 1

LearnYard



LearnYard

Let’s
implement

[1 2 3]

8

$2 \times 2 \times 2$

2^3

1 Y N

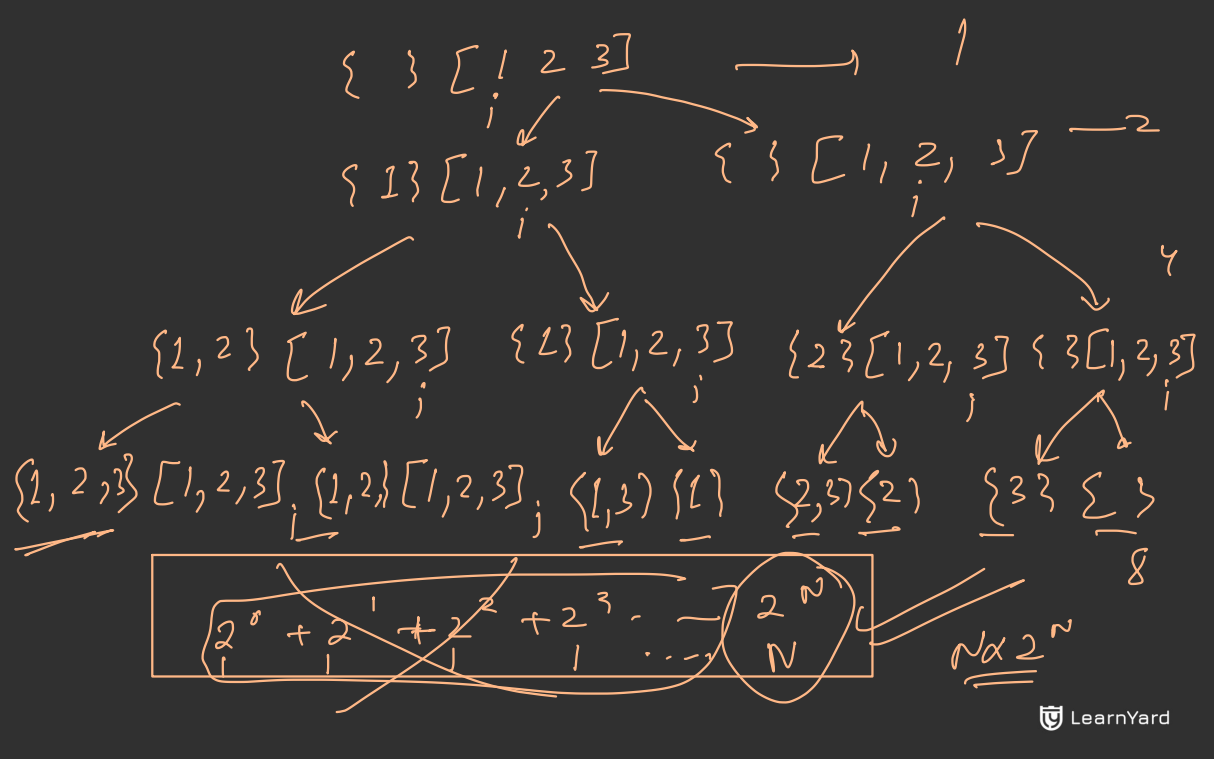
{1} { }

Solution 2

1	2	3	
Y	Y	Y	→ 1,2,3
Y	Y	N	→ 1 2
Y	N	Y	→ 1 3
Y	N	N	→ 1
N	Y	Y	→ 2 3
N	Y	N	→ 2
N	N	Y	→ 3
N	N	N	→ { }

1	2	
Y	Y	→ {1 2}
Y	N	→ {1}
N	Y	→ {2}
N	N	→ { }

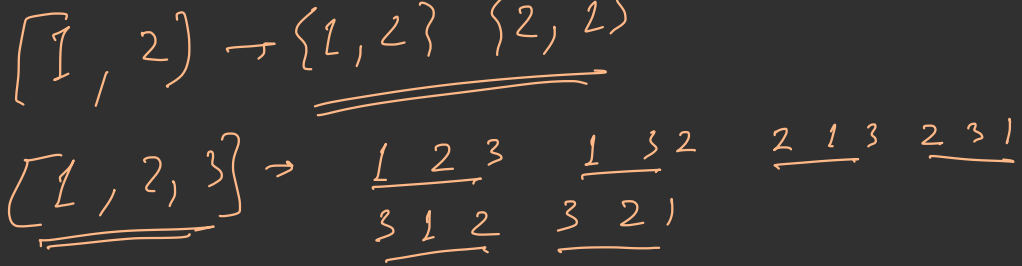
LearnYard


{ } [1 2 3]
1
{ 1 } [1, 2, 3]
{ } [1, 2, 3]
2
{ 1, 2 } [1, 2, 3]
{ 1 } [1, 2, 3]
{ 2 } [1, 2, 3]
{ } [1, 2, 3]
4
{ 1, 2, 3 } [1, 2, 3]
{ 1, 2 } [1, 2, 3]
{ 1, 3 } { 1 }
{ 2, 3 } { 2 }
{ 3 } { }
8
2^0 + 2^1 + 2^2 + 2^3 . . . 2^N
N
N x 2^N

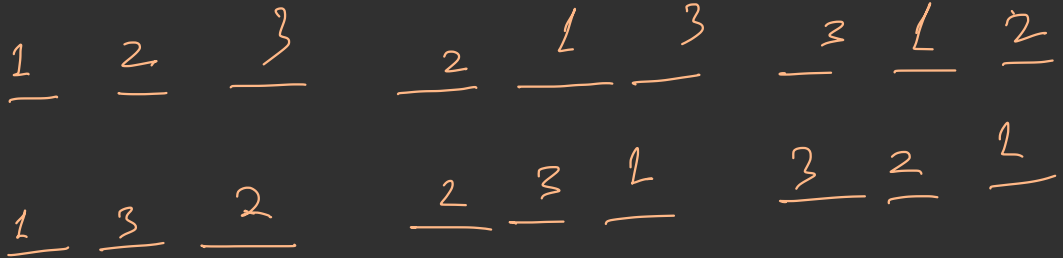
LearnYard

Let’s
implement

Time & Space?



2. Generate Permutations



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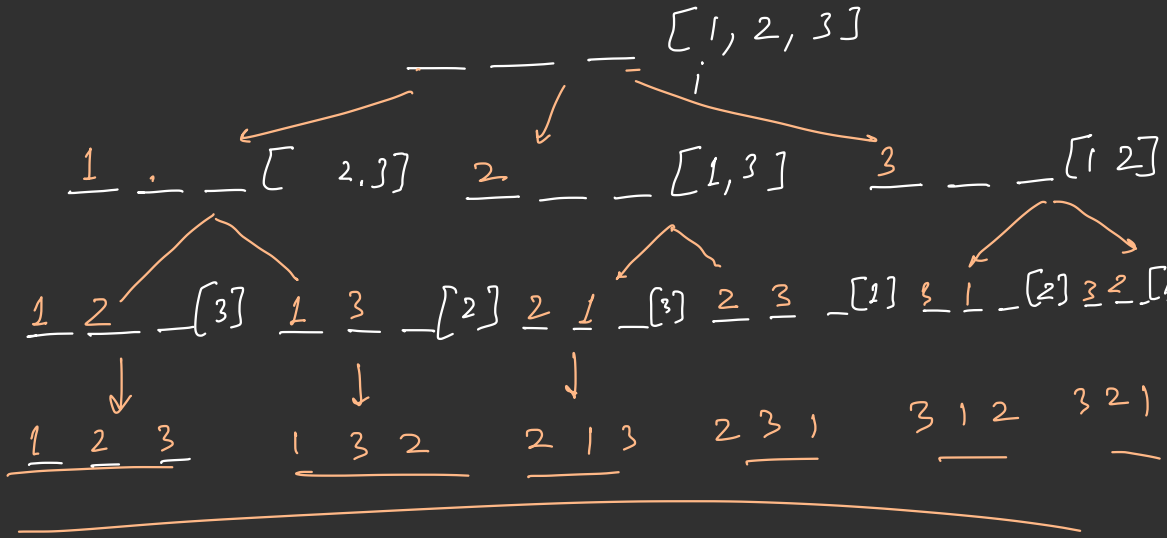
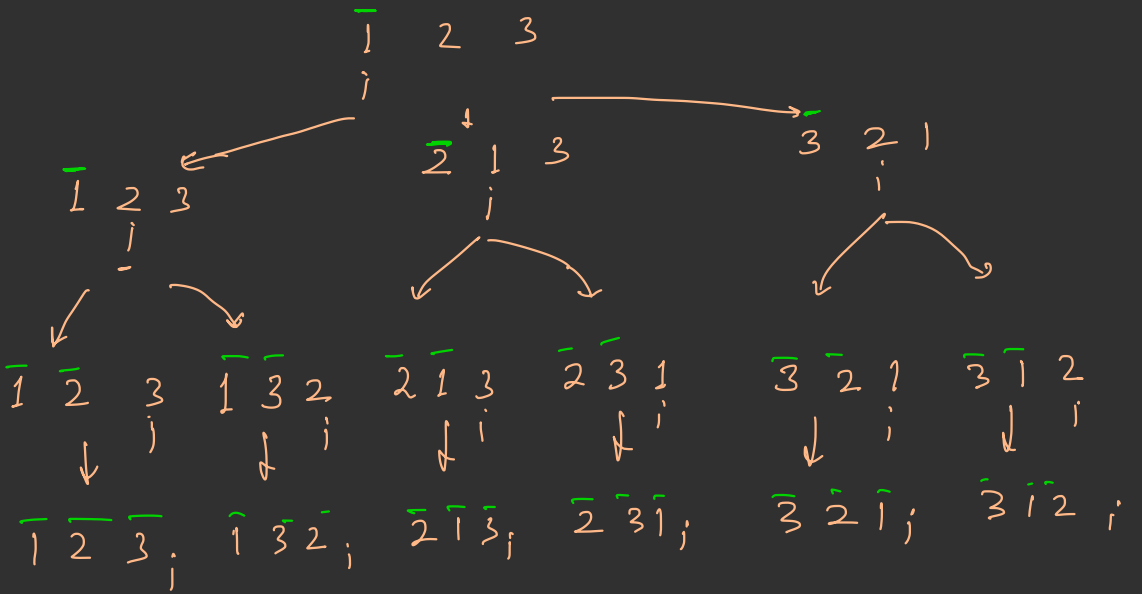


LearnYard

Intuition


1 2 3
i
1 2 3
i
2 1 3
i
3 2 1
i
1 2 3
i
1 3 2
i
2 1 3
i
2 3 1
i
3 2 1
i
3 1 2
i
1 2 3 ;
1 3 2 ;
2 1 3 ;
2 3 1 ;
3 2 1 ;
3 1 2 ;

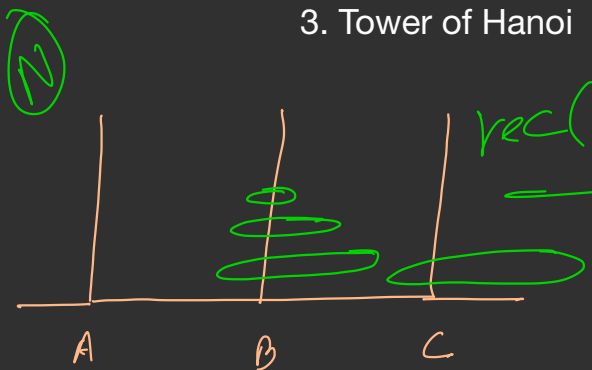
LearnYard

Solution

Let’s
implement

Time & Space?

3. Tower of Hanoi



LearnYard

Intuition

Solution

Let’s
implement

Time & Space?

Thank You!

Reminder: Going to the gym & observing the trainer work out can help you know the right technique, but you'll muscle up only if you lift some weights yourself.

So, PRACTICE, PRACTICE, PRACTICE!