

(238) Product of Array Except Self.

nums  $\leftarrow$ 

0	1	2	3
1	2	3	4

leftProd  $\leftarrow$ 

1	2	6	24
---	---	---	----

rightProd  $\leftarrow$ 

24	12	6	4
----	----	---	---

Ans  $\leftarrow$   
$$\text{Ans}[i] \leftarrow \text{leftProd}[i-1] \times \text{rightProd}[i+1]$$

Edge Case:

$\text{Ans}[0] \leftarrow \text{rightProd}[1]$

$\text{Ans}[3] \leftarrow \text{leftProd}[2]$

Runtime:  $\rightarrow O(n)$

Space  $\rightarrow O(n)$  { leftProd(),  
rightProd() }

Ans()  $\rightarrow$  not considered for space.

	0	1	2	3
nums	1	2	3	4

SPACE OPTIMIZED

→ Initialize ans[] → with Prefix Product.

Ans	1	2	6	24
-----	---	---	---	----

$$\text{Product} \leftarrow 1$$

$$\text{Ans}[3] = \underbrace{\text{Ans}[2]}_{1 \times 2 \times 3 = 6} \times \text{Product} = 6 \times 1 = 6$$

$$\text{Product} \leftarrow \text{Product} * \text{nums}[3] = 1 \times 4 = 4$$

$$\text{Ans}[2] = \underbrace{\text{Ans}[1]}_{1 \times 2} \times \underbrace{\text{Product}}_4$$

$$\text{Product} \leftarrow \text{Product} \times \text{nums}[2] = 4 \times 3 = 12$$

$$\text{Ans}[1] = \underbrace{\text{Ans}[0]}_1 \times \underbrace{\text{Product}}_{4 \times 3}$$

$$\text{Product} \leftarrow 12 \times 2 = 24$$

$$\text{Ans}[0] = \text{Product}$$

Runtime: $O(n)$ Space time: $O(1)$
---------------------------------------