

TC = $O(n)$

SC = $O(1)$

for (i = 1 to n-1):
array(i) =

array(i) +
array(i-1);

1D Array

Prefix sum

↓

new
array

	0	1	2	3	4
Prefix Sum	2	4 6	6 12	8 20	10 30

	0	1	2	3	4
Prefix sum	2	6	12	20	30

for (i = 1 to n-1):

Prefix = array(i) + prefix sum(i-1);
sum(i)

Time complexity
 $O(n)$

Space complexity = $O(n)$

Optimized
approach

2D Array

	0	1	2	3
0	1	1	1	1
1	1	1	1	1
2	1	1	1	1
3	1	1	1	1

$m=4, n=4$
Sum = 4

$\sigma_1 = 2$
 $c_1 = 2$
 $\sigma_2 = 3$
 $c_2 = 3$

$O(m \times n)$

Repeated region

column-wise Prefix sum

Row-wise Prefix Sum

	0	1	2	3
0	1	2	3	4
1	1	2	3	4
2	1	2	3	4
3	1	2	3	4

	0	1	2	3
0	1	2	3	4
1	1	2	3	4
2	1	2	3	4
3	1	2	3	4

sum = 4

final

2D

Array
Matrix

$$\begin{array}{l}
 \frac{2\sigma\sigma(\sigma_1-1)(c_1-1)}{16 - 8 - 8 + 4} \\
 \quad \quad \quad \uparrow \\
 \quad \quad \quad = 4 \\
 \hline
 \end{array}
 \left\{
 \begin{array}{l}
 \sigma_1 = 0 \\
 c_1 = 0 \\
 \\
 \sigma_1 = 0 \\
 c_1 = 0 \\
 \\
 \sigma_1 = 0 \\
 c_1 = 0
 \end{array}
 \right.
 \begin{array}{l}
 \frac{x_2 = 3}{c_2 = 3} \\
 \\
 \sigma_2 = 1 \\
 c_2 = 3 \\
 \\
 x_2 = 3 \\
 c_2 = 1
 \end{array}
 \left|
 \begin{array}{l}
 \text{total} \\
 \text{Sum} = 16 \\
 \hline
 2\sigma\sigma(\sigma_2)(c_2) \\
 \hline
 \text{up} = 8 \\
 2\sigma\sigma(\sigma_1-1)(c_2) \\
 \hline
 \text{left} = 8 \\
 2\sigma\sigma(\sigma_2)(c_1-1)
 \end{array}
 \right.$$

Note:

$$\sigma_1, \sigma_2, c_1, c_2$$

variables are original
one entered by the
user